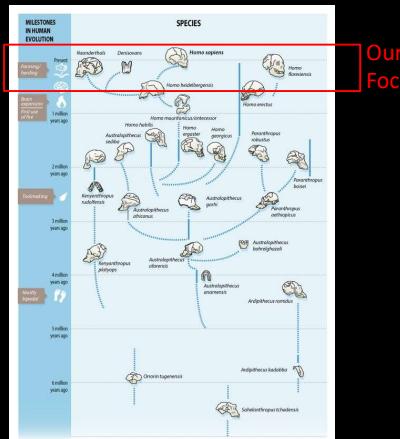


The origins of modern humans

1



2

Site locations of premodern humans

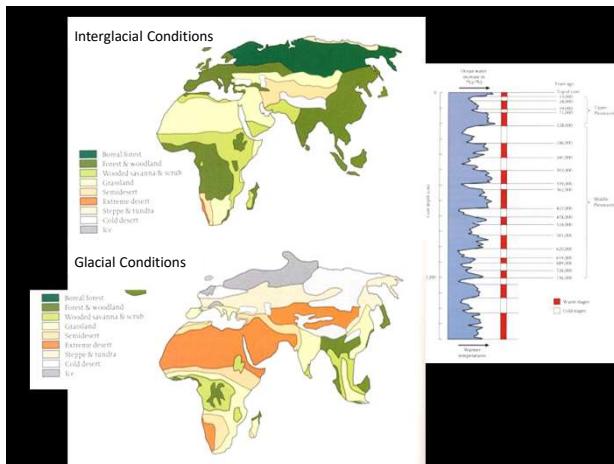


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Pre-modern and Transitional *Homo sapiens*



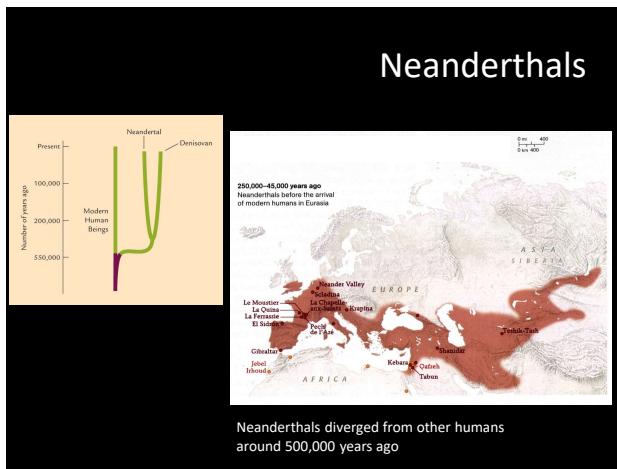
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6



7



8

Who were the Neanderthals?

- Once thought to be a direct ancestor to modern humans
 - Now recognized to be a distant cousin in the evolutionary tree
 - Genetic evidence suggests that Neanderthals diverged from the line leading to modern humans around 600,000 years ago

9

Neanderthals

- One groups of Archaic Homo sapiens are the Neanderthals
- Made famous by the 1856 discovery in the Neander Valley and the poor reconstruction of the La Chapelle-aux-Saints specimen by Marcellin Boule in the early 20th century



The arthritic, misinterpreted Neanderthal of La Chapelle-aux-Saints

10

The first Neanderthal fossil was found in 1856 and predates Charles Darwin's *Origin of Species*.

Popular images of Neanderthal present the false impression that they were 'ape-like' cave dwellers.

This error is based upon the misinterpretation of the elderly, arthritic individual who was the first fossil recovery.



- 1** Early artist's impression of Neanderthal dating to 1909 presents a very 'bestial' image.
2 This early 20th Century interpretation is more human-like, but still emphasizes 'primitive' characteristics.
3 Modern interpretation that suggests Neanderthal within variation range of modern humans of European descent.

11



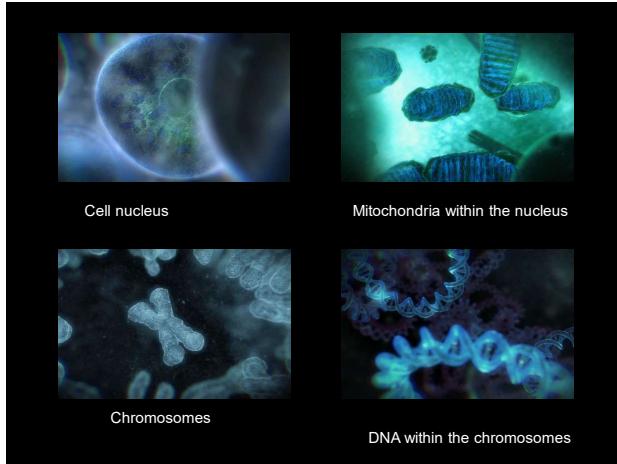
The site of Vindija, in Croatia, yielded the bones of many Neanderthals.



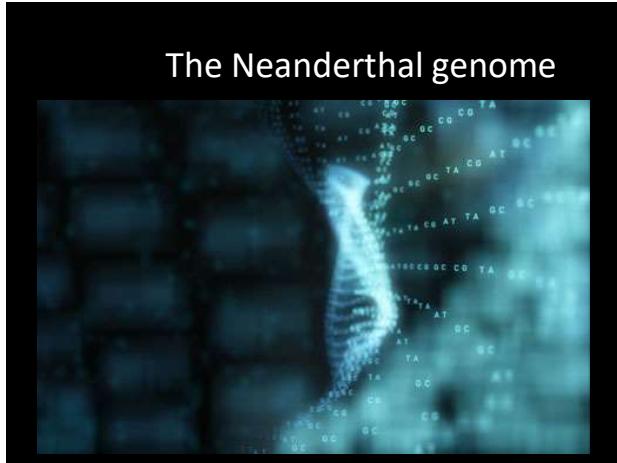
One of these bones lay in a drawer, neglected, for thirty years.

Samples of DNA have been extracted from the bone.

12



13



14

Neanderthal Genetics

Sequences of Neanderthal DNA that have been recovered are significantly different from the DNA sequence of living humans

- Indicates that the Neanderthal and human lineages diverged somewhere between 740,000 and 320,000 years ago
- Genetic evidence suggests that Neanderthals evolved separately from modern humans for a considerable period of time

Sample of Neanderthal bone for DNA testing.

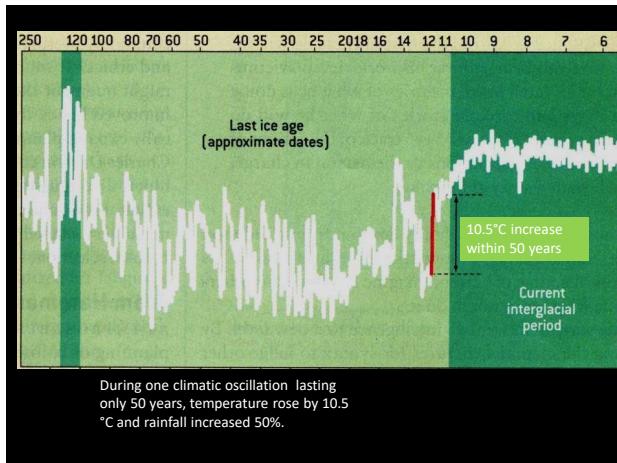
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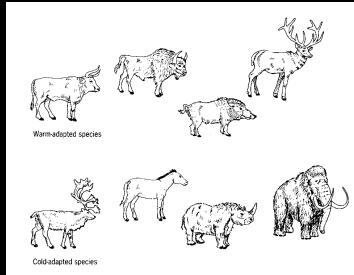
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18

Neanderthal survival strategies

- Under the prevailing climate conditions, available food resources were mostly animals; few plant foods were at hand.
 - Neanderthals therefore hunted big- and medium-sized mammals (e.g., horses, deer, bison, wild cattle).
 - But they could only ever deploy small hunting parties.
 - Women and children likely joined in the hunt.



19

Neanderthal energy requirements led to hunting as a preferred strategy

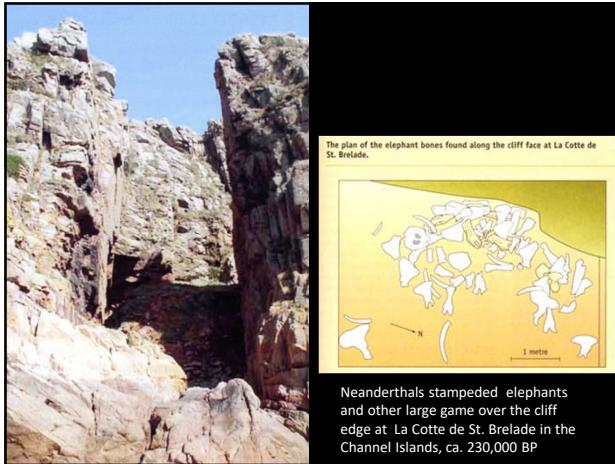


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Did Neanderthal women hunt? The computer model of a Neanderthal woman (above), based on the latest genetic research, shows her brandishing the thrusting spear of the Middle Palaeolithic.

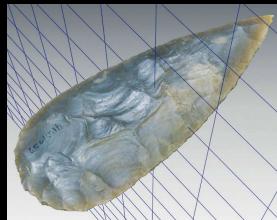
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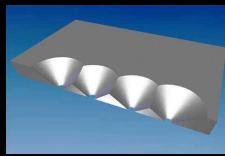
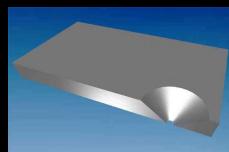
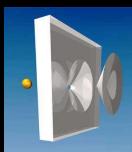
Sidebar: How to flake stone

- Palaeolithic humans made great use of flakes of stone.
 - How was this done?
 - Conchoidal fracture.



23

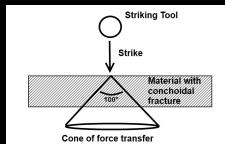
How to make a stone tool: properties of micro-crystalline rock



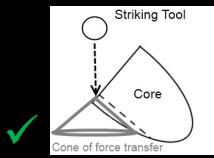
Conchoidal fracture

- Brittle rocks, "cryptocrystalline" rocks, fracture in a predictable, uniform manner. They break at an angle 100° from the point of impact.
 - Change the angle of the percussive blow and the shape of the chipped flake will also change.

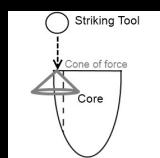
Put differently....



Conchoidal fracture means that the instant the blow strikes the surface its force is transmitted into a cone radiating at about 100 degrees. This cone (also called a Hertzian Cone) determines at what angle you must strike a blow to remove a particular chunk of stone.



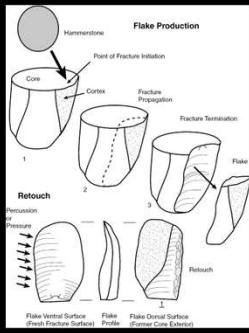
Striking the blow correctly aligns the edge of the cone with the flake you want to remove.



Striking the blow at the wrong angle causes the cone to penetrate too deeply into the core. The chances you will get the desired flake are very poor.

25

Flint knapping basics



- Delivery of force by
 - Direct Percussion
 - Hard hammer
 - Soft hammer
 - Indirect Percussion
 - Pressure Flaking

26

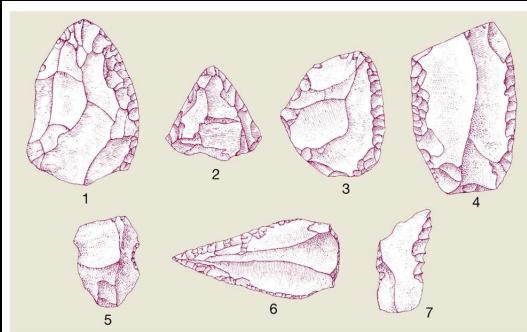
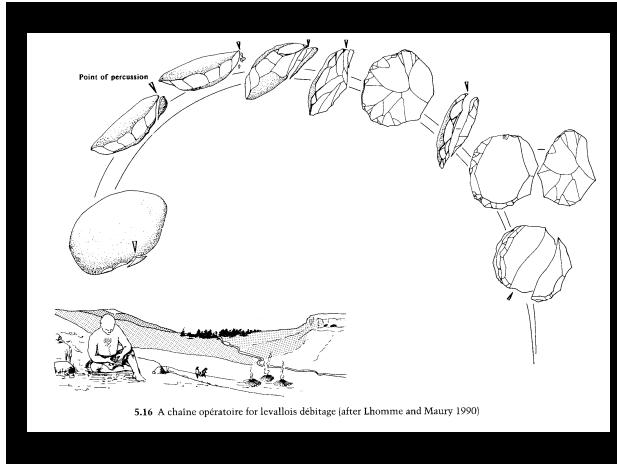


Figure 9–8 A Typical Mousterian Tool Kit

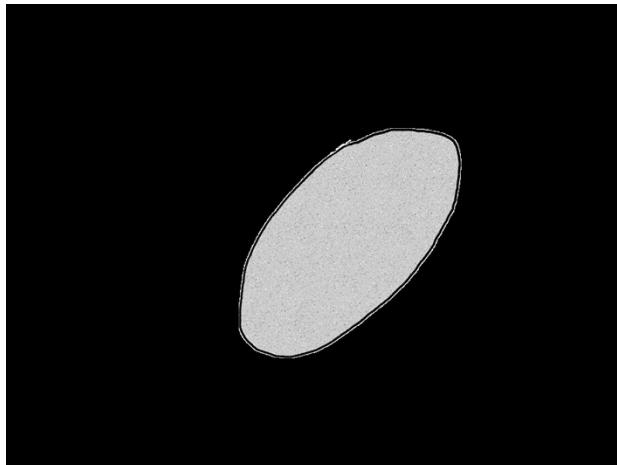
A Mousterian tool kit emphasized sidescrapers (1–4), notches (5), points (6), and sawtoothed denticulates (7). How these stone artifacts were actually used is not known, but the points may have been joined to wood shafts, and denticulates could have been used to work wood. The tools illustrated here are from Mousterian sites in Western Europe.

Source: Klein RG. June 1974. Ice-Age Hunters of the Ukraine. *Scientific American* 96-105. Reprinted with permission of Nelson H. Prentiss.

27



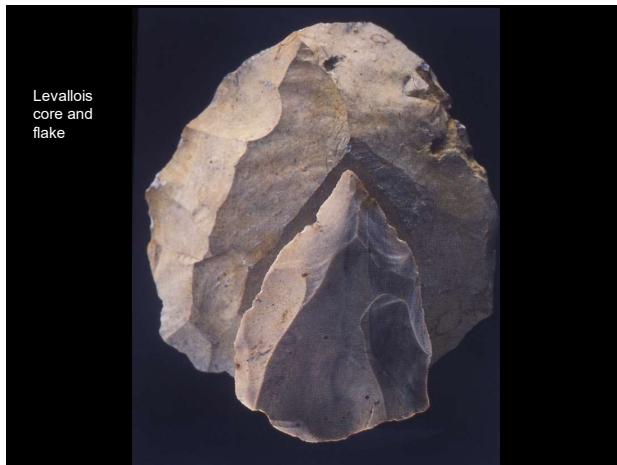
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31



32

The Moustierian Tool tradition (166,000 to 40,000 bp)

Campbell & Loy 2002:289

- Found throughout Europe, SW Asia, and N Africa. Most commonly associated with Neanderthals in Europe.
- Derived from the older Acheulian Tradition, and represents further refinement of trends of Levalloisian Tradition (more flakes per core, that are also smaller and finer).
- Tool kit contains greater variety of specialized forms (hand axes, flakes, scrapers, borers, gravers, notched flakes, projectile points). Some tools with bone or wood handles.
- Deliberate selection of stone with superior flaking traits, and transport of good lithics from specific quarries.

33

- Middle Palaeolithic habitation sites are found in open-air and cave locations. Sites are larger, with denser artifact yields, than Lower Palaeolithic sites.
 - Assemblages yield diverse tools and waste products indicating sustained or repeated occupation. This suggests either less mobility, or hunting animals that migrated through a predictable range. Thus, people were able to regularly return to favoured encampment areas.
 - Efforts were made to improve accommodations. At least one cave site suggests that shelters were built within it. This might be because of repeated use, or to address the harsher climate.



34

The developing social behaviour can be viewed as a 'social safety net' (altruism) that served to protect and care for disabled or otherwise vulnerable members of the group. This is seen in recovery of human remains of elderly, arthritic, infirm and toothless individuals, healed fractures, and medical amputations. (Ex.: Shanidar)



Skeletal remains with healed injuries, suggesting demanding and dangerous activities (hunt), with some circumstantial evidence of possible interpersonal violence.

35

- The depth of this social life is noted in appearance of deliberate graves that demonstrate burial ritual, burial offerings, and even inclusion of flowers in the grave.
 - Cut marks and missing heads have been interpreted as evidence of violence or cannibalism. However, it is more likely that this reflects some part of a burial ritual (ritual defleshing, skulls being collected and reburied elsewhere...)



At the site of Kebara (65,000 BCE) in Israel, the remains of a Neanderthal indicate purposeful burial. Note the position of the body and the removal of the skull.

36

Shanidar Cave, Iraq



37

Neanderthal art??



38

La Pasiega



The ladder-shaped painting on the left in the La Pasiega cave in Spain is older than 64,000 BP, and so must have been made by Neanderthals.

39



- As water seeps into caves, it may deposit milky crusts of minerals on the walls known as flowstones. Flowstones contain tiny amounts of uranium, which slowly breaks down into thorium. The older a flowstone gets, the more thorium builds up inside it.
- Archaeologists are seen sampling calcite crust that formed over a red ladder-like painting in the La Pasiega cave in Spain.
- The crust is dated to ca. 64,000 BP; the painting must be older.

40

Cueva de los Aviones



Cueva de los Aviones is another Spanish cave that has yielded Neanderthal remains and traces of their ability to express themselves symbolically – through “art”, in this case, jewelry.

41



- Perforated shells found in sediments at Cueva de los Aviones are between 115,000 and 120,000 years old.

42

Another transitional Homo sapiens?



43



Excavations at Jebel Irhoud in Morocco yielded several human skulls, clearly Homo sapiens but with dental features that appear primitive; these are not features shared by Neanderthals, however.

44



The Jebel Irhoud site in Morocco. Credit Shannon McPherron/Max Planck Institute for Evolutionary Anthropology

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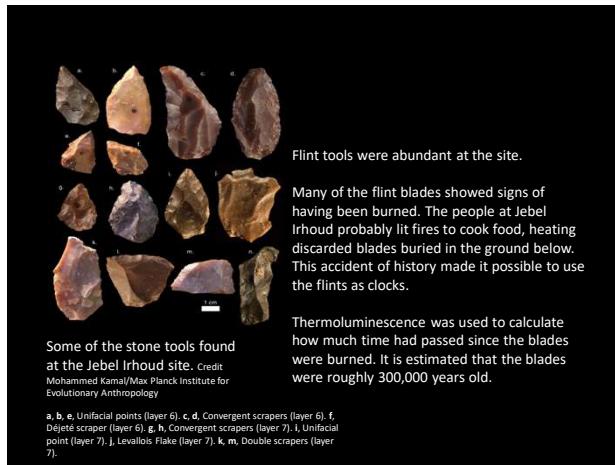


Since 2004, archaeologists have been working through layers of rocks on a desert hillside at Jebel Irhoud. They've found a wealth of fossils, including skull bones from five individuals who all died around the same time.

46

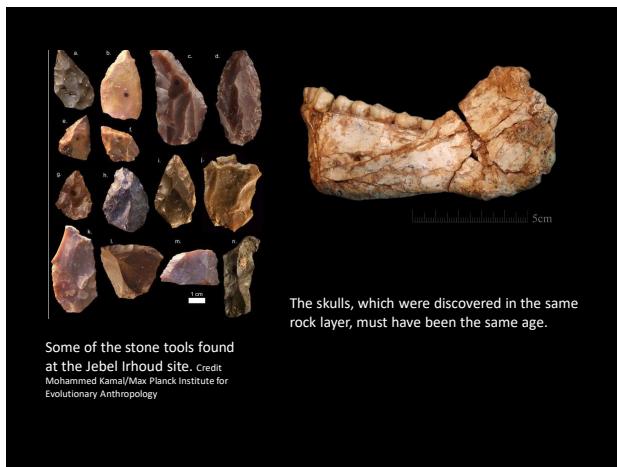


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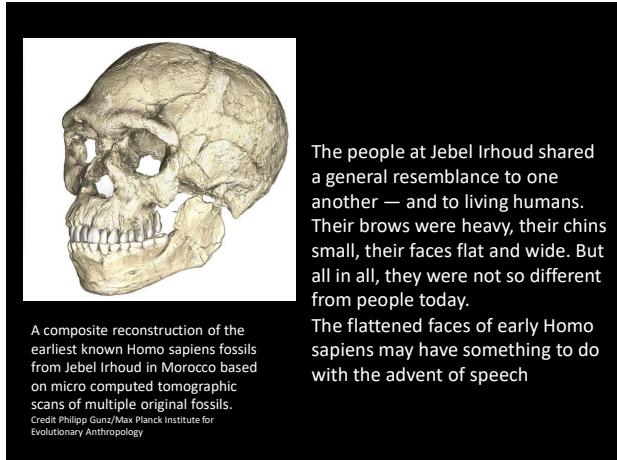


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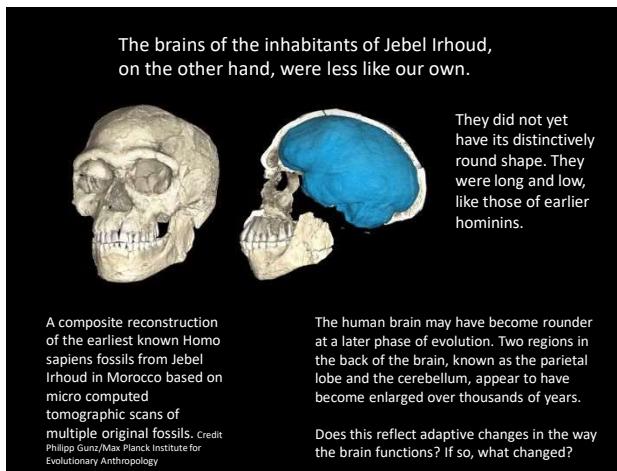
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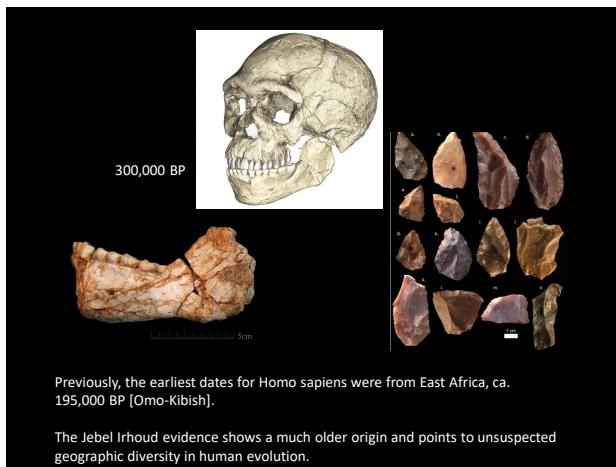
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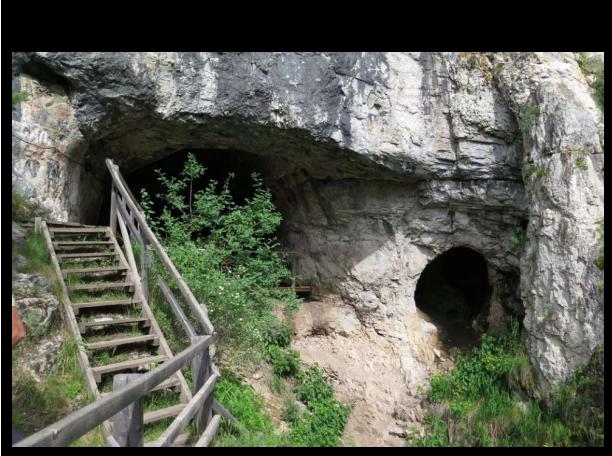
- Identifying the oldest known human remains doesn't mean they were the first—far from it.
 - Phylogenetic studies indicate that *Homo sapiens* and Neanderthals last shared a common ancestor, *Homo heidelbergensis*, about six hundred and fifty thousand years ago, so our species won't turn out to be older than that.
 - Still, “what happened in Africa between six hundred thousand and four hundred thousand years ago is basically unknown.”

53

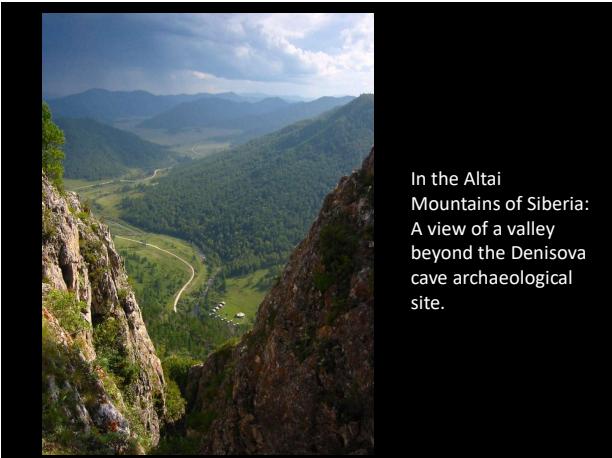
Meanwhile, in central Asia, the
“Denisovans”



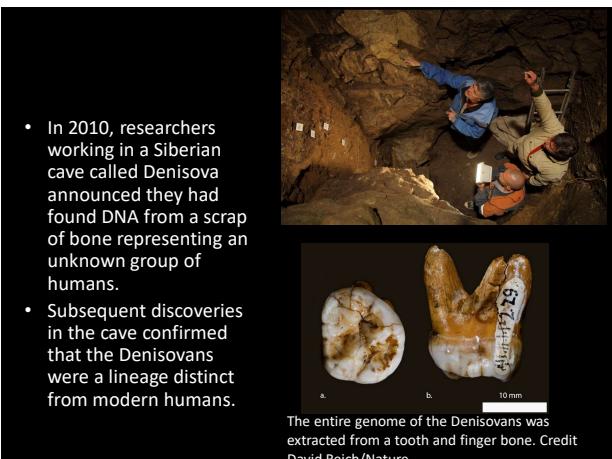
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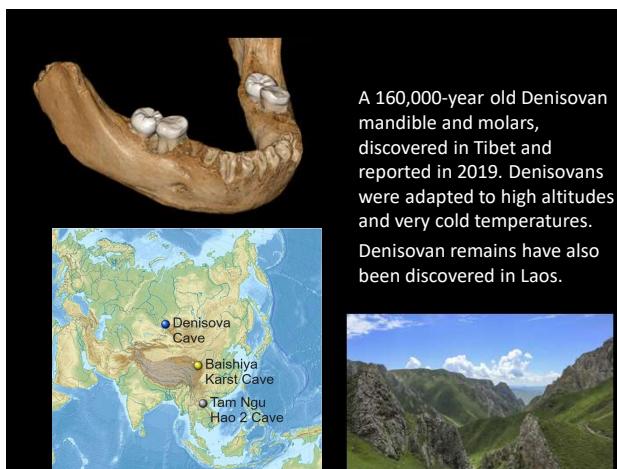
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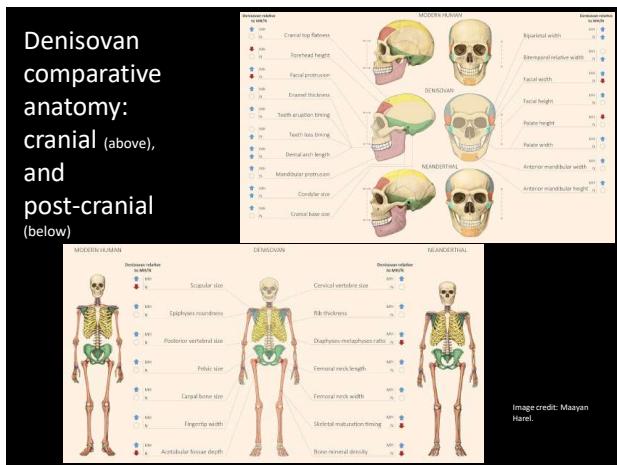


58



- Having sequenced their genome, anthropologists think that the Denisovan skull was probably wider than ours or Neanderthals. They also appeared to have no chin.

59



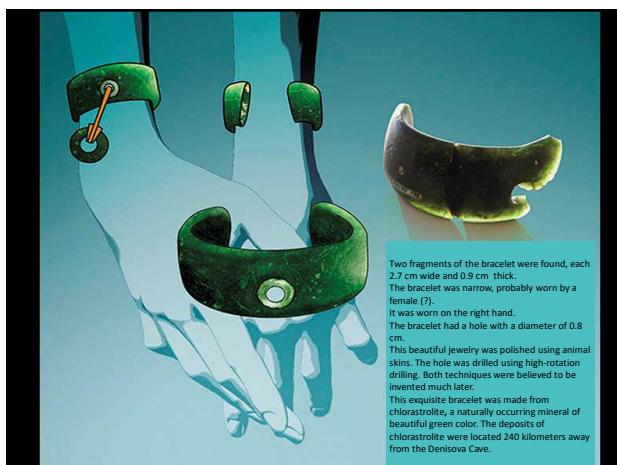
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- In 2018 the remains of another Denisovan turned up. Previously, scientists had discovered only four Denisovans; the fifth turned out to be a first-generation hybrid -- 90,000 years old.
- Hybrids may not have been all that uncommon. In 2015, researchers discovered that a modern human who lived in what is now Romania 40,000 years ago had a great-great-grandparent who was Neanderthal.

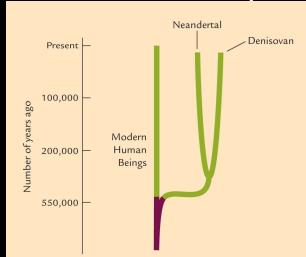
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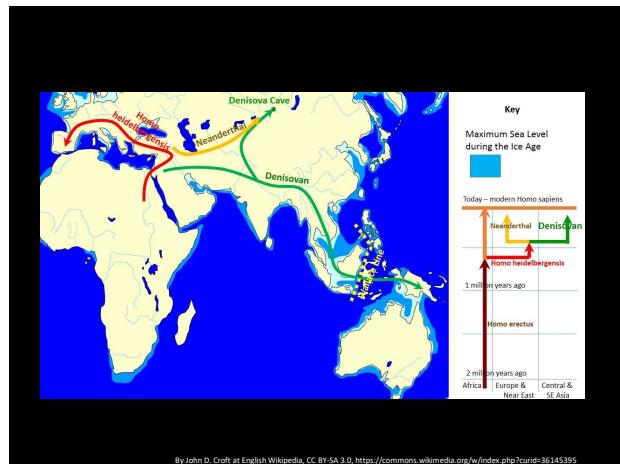


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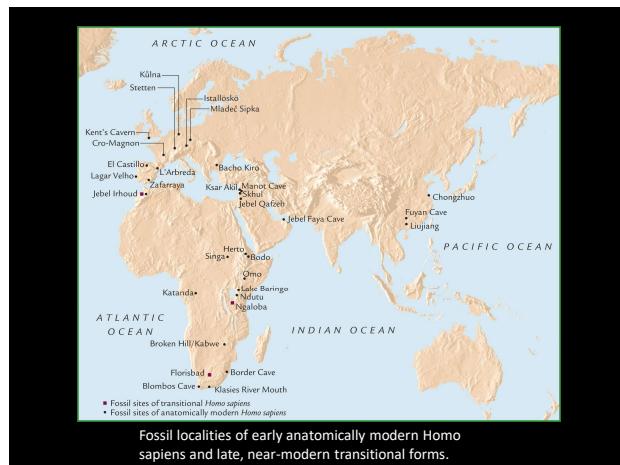


One view of the chronological and genealogical relationships among anatomically modern human beings, the Neanderthals, and the Denisovans. There is evidence of some gene flow— interbreeding— between anatomically modern humans and Neanderthals and between anatomically modern humans and Denisovans.

64



65



66

What is a Modern Human?

Modern human refers to all members of the species *Homo sapiens* —this includes all living humans

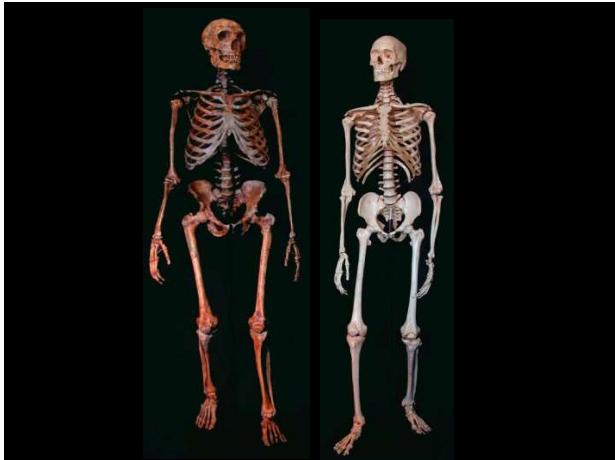


The modern human Herto fossil

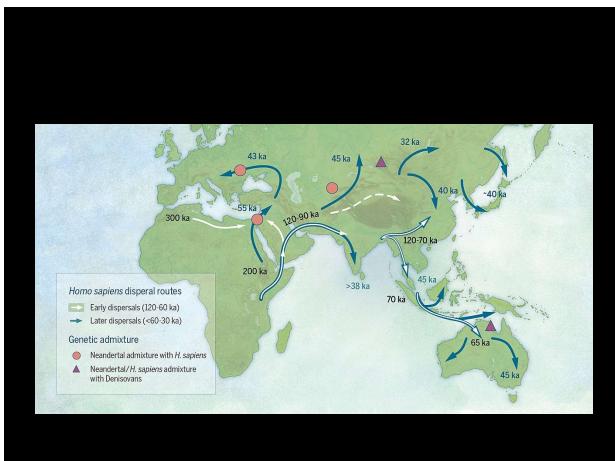
Modern human traits include

- ◆ Globular braincase
 - ◆ Reduced brow ridges
 - ◆ Reduced body mass
 - ◆ Unique pelvic shape
 - ◆ Vertical forehead
 - ◆ Pronounced chin
 - ◆ Narrow trunk
 - ◆ Reduced tooth size

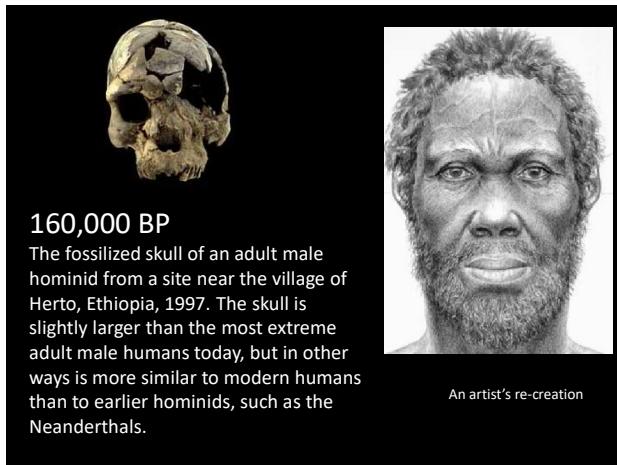
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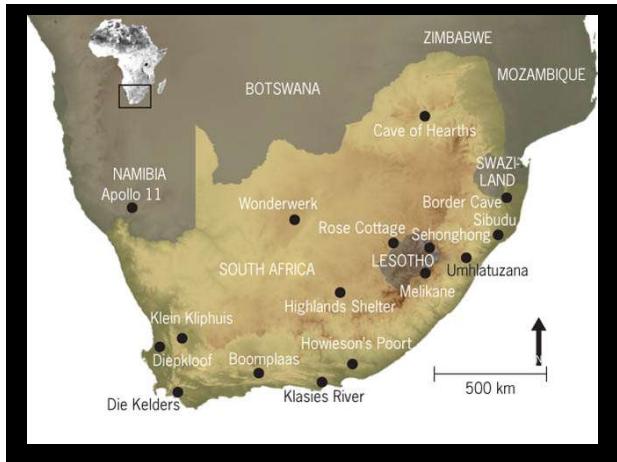
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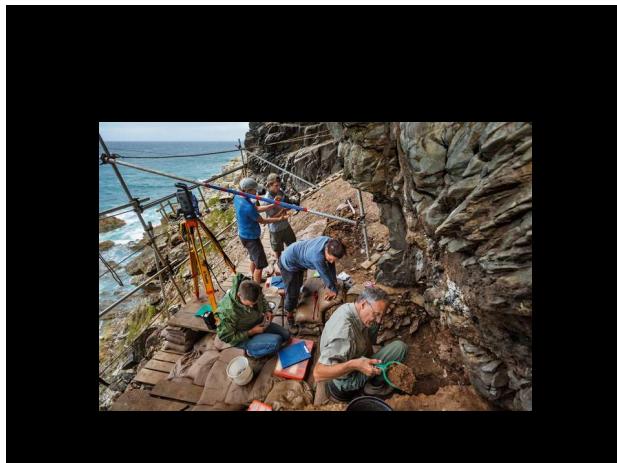
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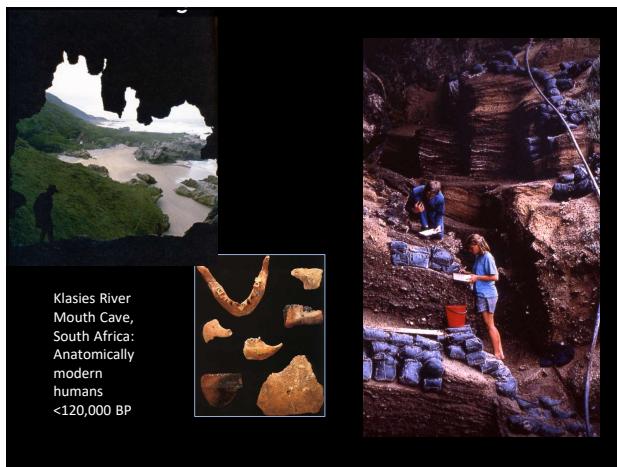
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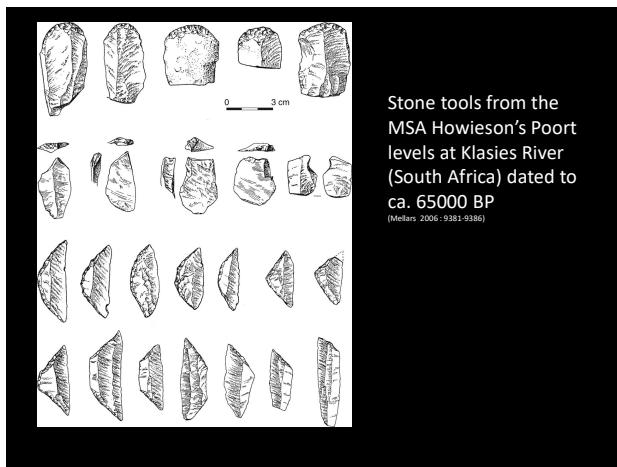


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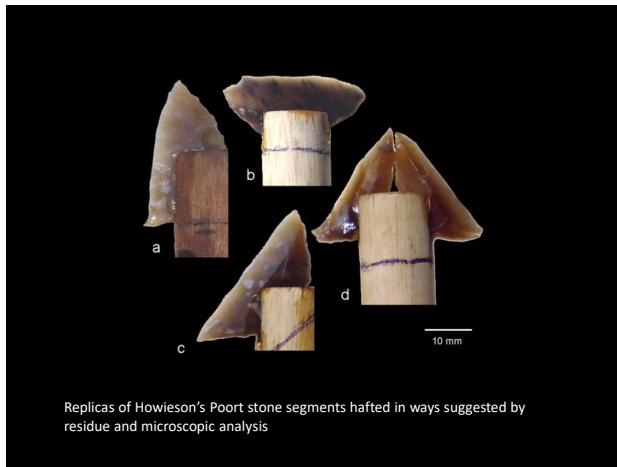
The Middle Stone Age

- Replaced the Acheulian industries in Africa 300,000-200,000 years ago
 - Includes a number of distinct industries including the Aterian, the Sangoan/Lupemban, and Howieson's Poort
 - Ended around 40,000 years ago
 - Is the archaeological context for the earliest modern humans

74



75



76

Middle Stone Age Versus Middle Paleolithic: Similarities

Similarities between the archaeological records of modern humans in Africa and Neanderthals in Europe include

1. Stone tools were made by using a prepared core technology
2. There is variability between stone tool industries
3. Evidence supports both hunting and the intensive use of fire



77

Middle Stone Age Versus Middle Paleolithic: Differences

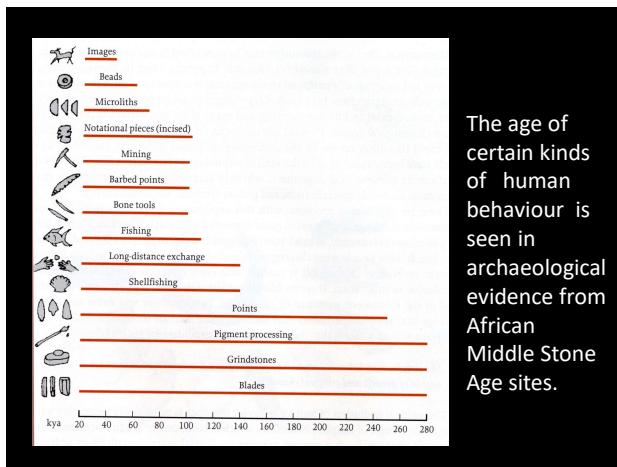
Differences between the archaeological records of modern humans in Africa and Neanderthals in Europe include

1. Greater variability is found in Middle Stone Age stone tool industries
2. In the Middle Stone Age there are elaborate bone tools, not in Middle Paleolithic
3. Clear evidence of fishing and collecting shellfish exists for the Middle Stone Age
4. Artwork is more abundant and more varied in the Middle Stone Age, than in the Middle Paleolithic

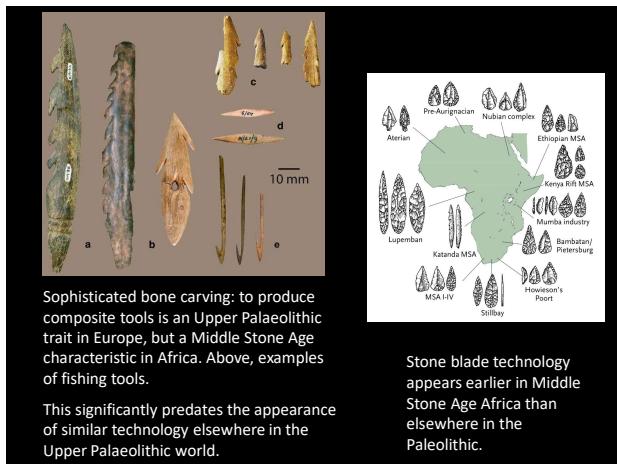


Bone tool from Middle Stone Age site of Katanda.

78



79



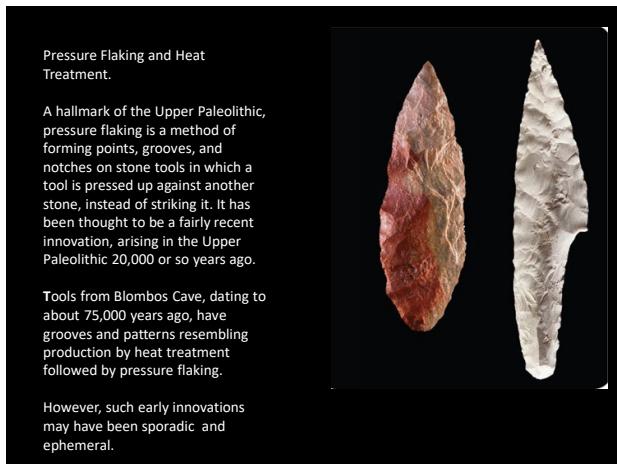
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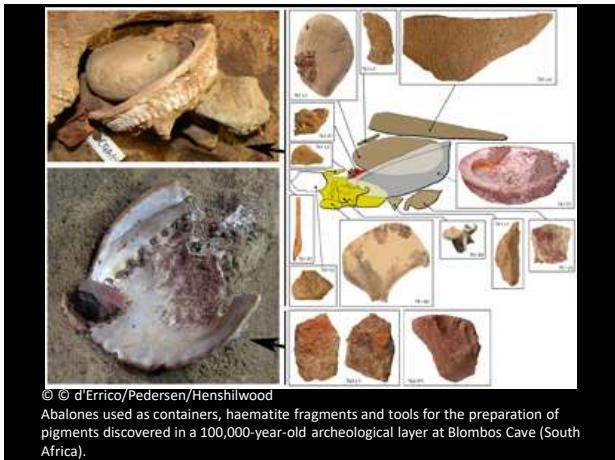
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84



85



© d'Errico/Pedersen/Henshilwood

Abalones used as containers, haematite fragments and tools for the preparation of pigments discovered in a 100,000-year-old archeological layer at Blombos Cave (South Africa).

86



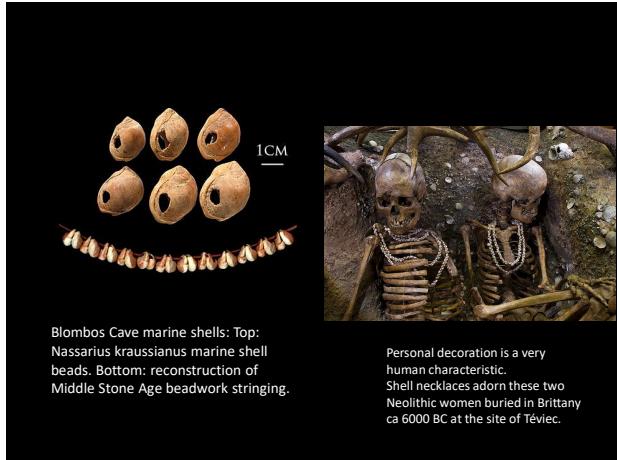
An ochre "crayon" found at Klipdrift Shelter, South Africa, 2013.

87



In northwest Namibia, a Himba woman applies powdered ochre to the hair of another.

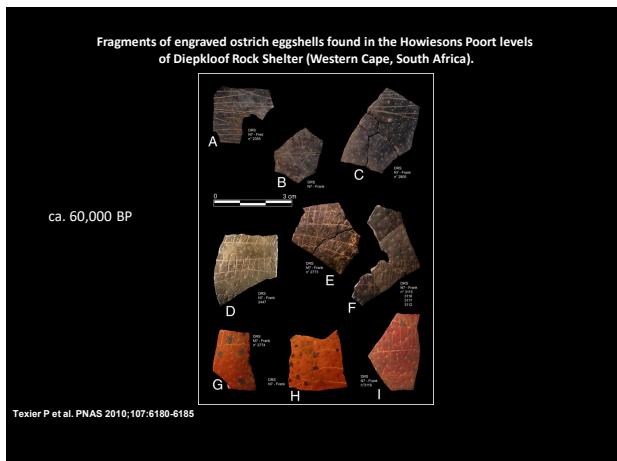
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Blombos Cave marine shells: Top: *Nassarius kraussianus* marine shell beads. Bottom: reconstruction of Middle Stone Age beadwork stringing.

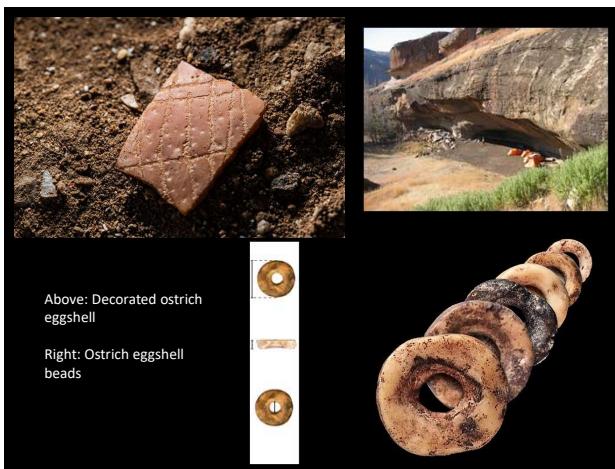
Personal decoration is a very human characteristic. Shell necklaces adorn these two Neolithic women buried in Brittany ca 6000 BC at the site of Téviec.

89



Texier P et al. PNAS 2010;107:6180-6185

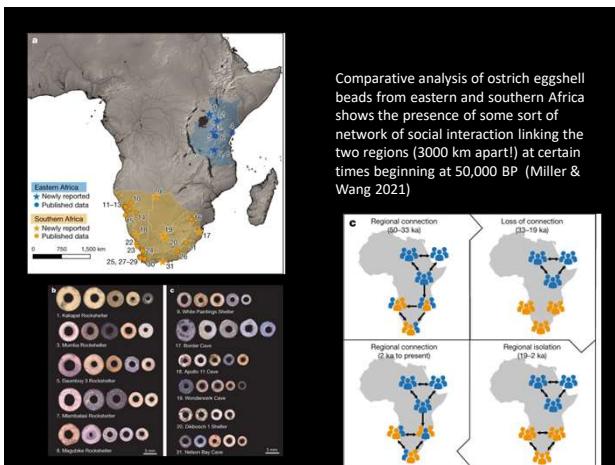
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91



92



93

Explaining sudden spikes in creativity

- Creativity flourished at certain times and in certain places. South Africa, ca. 100.000 years ago was one such place.
 - One explanation argues that it was not that a new kind of person was responsible, but rather that greater densities of people were the cause of these localized flashes.

94

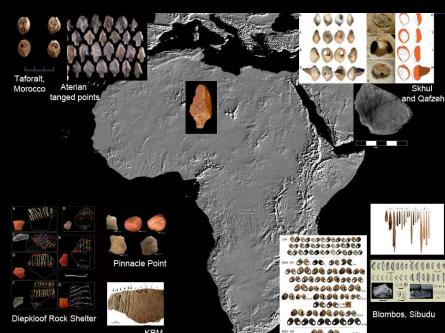
Explaining sudden spikes in creativity

- Greater population densities sometimes occurred. This made contacts *between* groups more frequent.
 - This in turn quickened the spread of good, new ideas from one human mind to another.
 - You could think of it as the emergence of a collective brain.
 - Symbolic communication helps keep this collectivity working together.



95

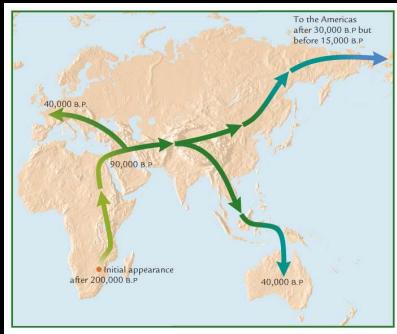
In
summary...



Composite illustration of some of the key evidence for complex behaviours in MSA Africa, including beads at Taforalt in Morocco, tanged Aterian points in northern Africa, beads and scratched ochre in Skhul and Qafzeh in Israel, and from South Africa, beads and engraved ochre at Blombos, bone tools from Sibudu, engraved ochred at Klasies, range of coloured ochre at Pinnacle Point, and decorated ostrich eggs from Diepkloof. M. Mirazon Lahr (2012) The evolution of modern human diversity in Africa. www.in-africa.org/origins-2-after-the-origin/

96

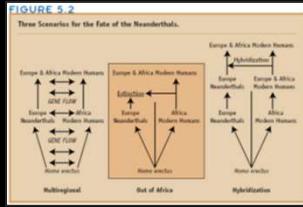
Spread of anatomically modern human beings according to the replacement model



97

The Fate of The Neanderthals:
Three Scenarios

- 1. Multiregional**
Holds that Neanderthals evolved locally into modern humans as the result of a continuous gene flow between European and African populations.
- 2. Out of Africa**
Argues that Neanderthal populations in Europe were replaced by modern humans 30,000-40,000 years ago.
- 3. Hybridization**
States that Neanderthals "disappeared" as a result of substantial interbreeding between populations.



98