1 The human family tree

2 Modern humans differ from premodern humans in their skulls and faces
   • Modern human skulls are relatively high (measured from the ear aperture to the top of the braincase) and short (measured from a point roughly between the eyes to the far rear).
   • In modern humans, the face tends to be short and flat, and it is tucked in under the forepart of the braincase rather than mounted in front of it.

3 Fossils and genes indicate that anatomically modern humans originated in Africa more than 50 ky (50,000 years) ago. At this time, only the Neanderthals and other non–modern humans occupied Eurasia
   • Early modern human fossils include a robust skull from Herto, Ethiopia dated to about 160 ky ago.

4 Between 50 and 40 ky ago, anatomically modern Africans developed new behaviors and they rapidly dispersed to Eurasia
   • Until 50 ky ago, people everywhere were behaviorally primitive:
     • They manufactured relatively informal stone artifacts.
     • They made few if any artifacts in bone, ivory, shell, etc.
     • They rarely, if ever produced art.
     • Their sites contain no obvious ruins or evidence for spatial organization.
     • They buried their dead without indications of ritual or ceremony.
     • They didn’t fish and they hunted relatively ineffectively.

5 Art that dates before 50 ky ago is rare and equivocal
   • The oldest widely cited example is a small volcanic pebble from the Berekhat Ram handaxe site (Syrian/Israeli border) on which deliberately incised lines set off a possible head and arms. The pebble is about 240 ky old.
   • To some archaeologists, the Berekhat Ram pebble anticipates human figurines that fully modern Upper Paleolithic Cro–Magnons produced in Europe beginning about 35 ky ago.

6 There are also engraved stones dated between 100 and 50 ky ago
   • The most frequently cited examples are:
     • Criss–crossing incised lines on a fragment of iron oxide (red ocher) from Blombos Cave, South Africa, dated to roughly 77 ky ago.
     • Incised concentric lines on a flint plaque from Quneitra on the Syrian/Israeli border, dated to about 100 ky.

7 Perhaps most important, there are tiny estuarine shell “beads” from Blombos Cave, dated to ca. 77 ky ago
• Their identification as beads depends primarily on a wear facet on the “lip” that is said to be “consistent with friction from rubbing against thread, clothes, or other beads.”
• Experiments show that the perforations could have been produced by a sharp bone point inserted through a slit-like aperture on the side. However, similar perforations are common on snail-like beads of all ages in South African coastal sites, and post-depositional pressure is the most likely cause.
• There is the additional problem that unless perforation by itself is the principal criterion, other sites of comparable age have provided no beads. Some of these sites are rich in ostrich eggshell, which was the most common material for bead making in Africa after 50 ky ago.
• Finally, if the Blombos objects are beads, they signal a behavior that surely enhanced survival and reproduction, given its rapid spread after 50 ky ago. Why then did it remain confined to Blombos 77 ky ago?

8 Art after 40 ky ago is abundant and unambiguous
• The earliest unequivocal examples include:
  • paintings on cave walls like those from Chauvet Cave, France, directly dated to 32 ky ago; and
  • carefully produced figurines like a lion from Vogelherd Cave, southwestern Germany, that is also 32 ky old.

9 Human ability to hunt and gather changed dramatically in Africa after 50 kya
• Middle Stone Age (MSA) and Later Stone Age (LSA) sites on South African coasts show the change most clearly.
• The MSA was broadly contemporaneous with the European Mousterian or Middle Paleolithic between about 250 and 50 kya.
• MSA and Mousterian artifacts are similar, but MSA people were anatomically near modern, while Mousterian people were Neanderthals.
• The LSA succeeded the MSA 50–40 kya. Fully modern LSA people expanding from Africa created the Upper Paleolithic in western Asia and Europe.

10 A multi-cave complex at Klasies River Mouth, South Africa, has especially informed on MSA behavior and ecology
• The Klasies River arises in mountains paralleling the Indian Ocean coast of South Africa and reaches the coast about 700 km east of Cape Town.
• The coastal region has a temperate climate, similar to that of coastal California, and the vegetation includes many evergreen shrubs.

11 The two principal Klasies River Mouth (KRM) caves are 1 and 2
• When MSA people lived at KRM, it was possible to walk directly into KRM 2. Now it must be reached by a wooden walkway from the adjacent, eroded slope.
• KRM 1 was occupied more or less continuously between about 115 kya and 60 kya. It was then abandoned and reoccupied only about 5 kya (by LSA people).
• KRM 2 was occupied between perhaps 80 and 60 kya.

12 Die Kelders Cave 1 (DK1), about 140 km SE of Cape Town also informs on MSA ecology and behavior
• MSA people occupied DK1 between perhaps 80 and 60 kya.
• The site was then abandoned until LSA people reoccupied it only about 2 kya.
• Almost all other southern African sites also show a gap between the MSA and the LSA, although usually it is shorter than at DK1.
• In part, the gap probably reflects hyperaridity between roughly 50 and 25 kya.

13 The Ysterfontein 1 MSA rockshelter complements KRM and DK1
• The Ysterfontein rockshelter is on the west (Atlantic) coast of South Africa, about 70 km NNW of Cape Town.
• Widening of the road to a nearby small boat harbor exposed the rockshelter in an adjacent cliff face.

14 The Ysterfontein deposits are yellowish sands that originated mainly from a dune that once stood in front the shelter
• MSA people introduced large numbers of intertidal shellfish.
• Radiocarbon dating on shell indicates that the deposits accumulated > 46 kya
• The deposits must be younger than 115 kya, since they would have been flushed from the shelter during a period of high sea level that ended ca 115 kya.
• The deposits are thus bracketed between 115 and 46 kya. Optically Stimulated Luminescence may provide a more precise estimate.
• The shelter contains fireplaces, which in one part of the excavation are stacked as at Klasies River Mouth.

15 Animal remains and artifacts indicate that MSA people hunted and gathered less effectively than their LSA successors
• In contrast to LSA sites:
  • MSA sites contain few fish bones.
  • MSA sites are richer in bones of African penguins and poorer in bones of cormorants and other airborne birds.
• MSA sites contain relatively few bones of the most dangerous available prey -- buffaloes and wild pigs -- and many more bones of relatively docile prey, especially eland.
• MSA sites lack artifacts like those that historic people used for fishing and fowling.
• They also lack bone or stone projectile points (for weapons that could be hurled or projected from a distance) that could have been used for fowling and that would reduce the risk of hunting dangerous prey.
• MSA coastal sites contain fur seal bones that suggest the people were less mobile and did not move inland when resources there became more abundant.
• MSA sites contain especially large tortoises and shellfish that suggest less intensive collection, probably because MSA human populations were smaller.

16 □ Fur seal ages at death can reveal the season of site occupation
• Fur seals breed exclusively on off-shore rocks.
• The vast majority of young are born within a few weeks between late November and early December.
• Adults force the young from the rocks about 9 months after birth.
• Large numbers of 9–11 month–old seals then wash up on shore exhausted or dead.
• Historic people made sure to be at the coast in the August–October interval when they could literally harvest young seals.

17 □ The distribution of fur seal ages indicates the season of bone accumulation
• Where fossil seal ages cluster tightly around 9–11 months, bones accumulated mainly in the August–October interval of 9–11 month–old seal abundance.
• Where ages spread more broadly around 9–11 months, bones accumulated both inside and outside the August–October period.
• Where ages fail to cluster near the 9–11 month average, then accumulation was probably mostly outside the August–October period.
• Age can be estimated from a bone like the humerus.
• Boxplots then show that LSA seals tend to cluster around 9–11 months of age.
• However, in the large MSA sample from KRM, the ages are much more widely distributed.
• The ages of KRM seals recall those of seals accumulated by brown hyenas who occupy the coast more or less continuously through the year.

18 □ Median tortoise size reflects the intensity of human collection
• People tend to collect the largest tortoises first, because they’re the most visible and the most meaty.
An increase in the number of collectors will thus drive average tortoise size down. Tortoise size varies within the MSA and the LSA, but MSA tortoises tend to larger on average. The implication is that MSA human populations were generally smaller.

19 **Median limpet size also reflects the intensity of human collection**

- Limpet collection requires no special technology or risk.
- As with tortoises, people will tend to collect the largest limpets first.
- As the number of human collectors increases, average limpet size declines.
- Like MSA tortoises, MSA limpets are much larger than LSA specimens, implying smaller MSA human populations.
- In average size, MSA limpets much more closely approximate limpets from undisturbed rocks today.

20 **Why did anatomically modern Africans dramatically change their behavior 50–40 ky ago?**

- Population growth may have forced people into new social relationships that stimulated technological change. However, African populations seem to have been depressed 50–40 ky ago due to widespread aridity.
- A genetic mutation may have promoted the fully modern human ability to innovate.
  - This could explain why both human fossils and genes indicate that invading Africans did not interbreed with non–modern Eurasians.
  - The best way to test this idea is to identify and date genes that underlie modern human intellectual and language abilities. FOXP2, a gene involved in language and speech, provides a starting point. A “selective sweep” fixed its modern form within the last 200 ky.