HOMO SAPIENS (Cromagnon, Chancelede, Grimaldi)

Approaches to understand origin of Modern Humans

In attempting to organize and explain modern human origins, paleoanthropologists have proposed a few major theories that can be summarized into two contrasting views: the regional continuity model and various versions of replacement models. These two views are quite distinct, and in some ways they're completely opposed to each other.

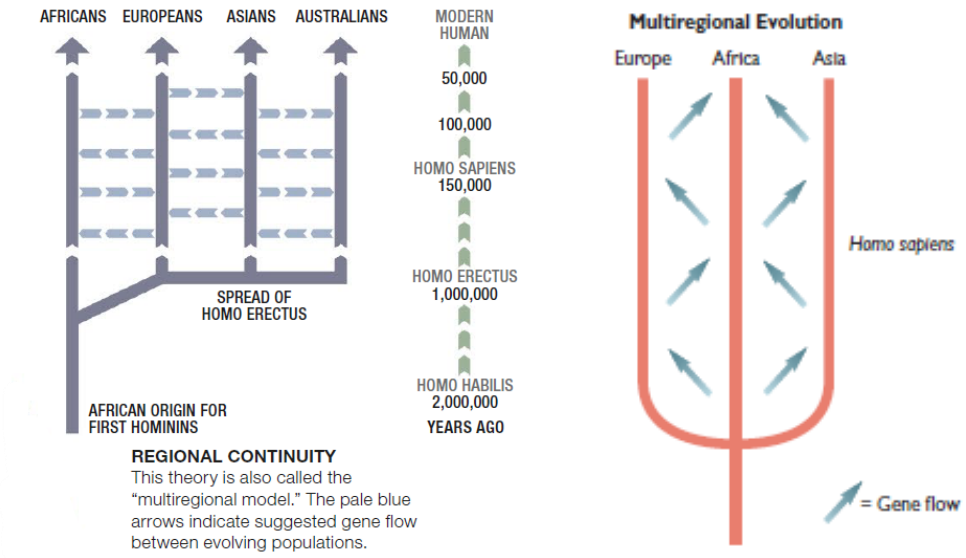
The Regional Continuity Model: Multiregional Evolution

The regional continuity model is most closely associated with paleoanthropologist **Milford Wolpoff**, of the University of Michigan, and his associates (Wolpoff et al., 1994, 2001). **They suggest that local populations—not all, of course—in Europe, Asia, and Africa continued their indigenous evolutionary development from premodern Middle Pleistocene forms to anatomically modern humans**. But if that's true, then we have to ask how so many different local populations around the globe happened to evolve with such similar morphology. In other words**, how could anatomically modern humans arise separately in different continents and end up so much alike**, both physically and genetically? The multiregional model answers this question by (1**) denying that the earliest modern H. sapiens populations originated exclusively in Africa** and (2) **asserting that significant levels of gene flow (migration) between various geographically dispersed premodern populations were extremely likely throughout the Pleistocene.**

Through gene flow and natural selection, according to the multiregional hypothesis, local populations would not have evolved totally independently from one another, and such mixing would have "prevented speciation between the regional lineages and thus maintained **human beings as a single, although obviously polytypic, species throughout the Pleistocene"** (Smith et al., 1989). Thus, under a multiregional model, **there are no taxonomic distinctions between modern and premodern hominins. That is, all hominins following H. erectus are classified as a single species: H. sapiens.**

Using Fossil Records Dr. Wolpoff and his colleagues argue that, abundant evidence from central Europe, establishes that **early modern humans still displayed many traits that are clearly Neanderthal in character,** and therefore evolved from them. Many early modern skulls, for example, display **a tell-tale bone near the place where the mandibular nerve enters the jaw**. The bone is a well-established characteristic of Neanderthal skulls. Another marker seen in both is the **space between the third molar and the jaw.**

In light of emerging evidence over the last few years, advocates of the multiregional model generally aren't dogmatic about the degree of regional continuity. They recognize that a strong influence of modern humans evolving first in Africa has left an imprint on populations throughout the world that is still detectable today. Nevertheless, the most recent data suggest that multiregional models no longer tell us much useful data about the origins of modern humans; nor do they seem to provide much information regarding the dispersal of modern H. sapiens.



Replacement Models/Out of Africa

Replacement models all emphasize that modern **humans first evolved in Africa** and only later **dispersed** to other parts of the world, **where they replaced those hominins** already living in these other regions. In recent years**, two versions of such replacement models** have been proposed, the **first** emphasizing **complete replacement**. The complete replacement model proposes that anatomically modern populations arose in Africa within the last 200,000 years and then migrated from Africa, completely replacing populations in Europe and Asia (Stringer and Andrews, 1988).

In Dr. Christopher B. Stringer's view, anatomically modern humans evolved from an archaic form of Homo sapiens in Africa and then, about 100,000 years ago, swept out of Africa to colonize Europe, Asia and eventually the rest of the world. There was little or no interbreeding between the moderns and archaic forms of Homo sapiens like the Neanderthals, in his view.

But the takeover by the modern humans was probably not a conquest or genocide. "There was no holocaust," said Dr. Stringer. "It would have been an **economic competition" for food and other resources, "one in which the Neanderthals gradually lost out."** The replacement took thousands of years, he says, because the Neanderthals and moderns were so closely matched intellectually and culturally; otherwise, it would have happened much more rapidly.

It's important to note that this model doesn't account for a transition from premodern forms to modern H. sapiens anywhere in the world except Africa. **A critical deduction of the original Stringer and Andrews theory argued that anatomically modern humans appeared as the result of a biological speciation event. So in this view, migrating African modern H. sapiens could not have interbred with local non-African populations, because the African modern humans were a biologically different species.** Taxonomically, all of the premodern populations outside Africa would, in this view, be classified as belonging to different species of Homo. For example, the Neanderthals would be classified as H. neanderthalensis. This speciation explanation fits nicely with, and in fact helps explain, complete replacement; **but Stringer has more recently stated that he isn't insistent on this issue. He does suggest that even though there may have been potential for interbreeding, apparently very little actually took place.**

Interpretations of the latter phases of human evolution have recently been greatly extended by newly available genetic techniques, and they've recently been applied to the question of modern human origins. Using numerous contemporary human populations as a data source, geneticists have precisely

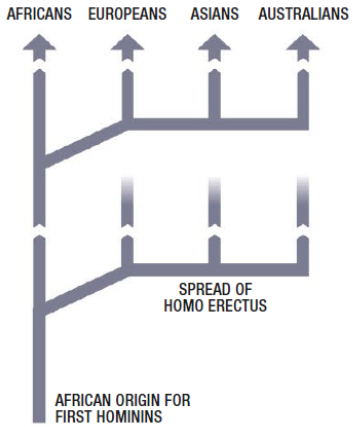
determined and compared a wide variety of DNA sequences. The theoretical basis of this approach assumes that at least some of the genetic patterning seen today can act as a kind of window into the past. In particular, the genetic patterns observed today between geographically widely dispersed humans are thought to partly reflect migrations occurring in the Late Pleistocene. This hypothesis can be further tested as contemporary population genetic patterning is better documented.

As these new data have accumulated, consistent relationships are emerging, especially in showing that indigenous **African populations have far greater diversity than do populations** from elsewhere in the world. **The consistency of the results is highly significant, because it strongly supports an African origin for modern humans and some mode of replacement elsewhere in the world.**

The main evidence of single origin theory comes from the **mtDNA of people living in USA, New Guinea, Africa and East Asia studied by Rebecca Cann.** They **showed difference suggesting that their common ancestor lived only 200,000 years ago.** Cann also claimed that, **since the amount of variation among individuals was greatest in African populations, the common ancestor of all lived in Africa**. Thus was born what media called Mitochondrial Eve and Eve hypothesis for origin of modern humans.

Comparisons of mtDNA from more than a dozen Neandertal skeletons— from Engis and Scladina in Belgium, Rochers de Villeneuve and La Chapelle-aux- Saints in France, Monte Lessini in Italy, El Sidrón in Spain, Feldhofer Cave in Germany, Mezmaiskaya in Russia, Teshik Tash in Uzbekistan, and Vindija Cave in Croatia—with that of early modern humans and living humans shows similarity among Neandertals and dissimilarity between Neandertals and modern humans. The German molecular geneticist Matthias Krings and his associates found, for example, **that 27 mtDNA base pairs of a sequence of 378 base pairs from the Feldhofer Cave Neandertal differ completely from living Europeans'.** In contrast, living human populations have an average of just eight differences among them. These genetic differences seem to support the hypothesis that no gene flow occurred between Neandertals and modern humans during the later Pleistocene and, importantly, that Neandertals contributed none of their genetic material to the modern human gene pool. Neandertals underwent extinction, pure and simple.

MtDNA data, however, are somewhat limited because mtDNA is a fairly small segment of DNA, and it is transmitted between generations as a single unit; genetically it acts like a single gene. Indeed, in just the last few years, comparisons of Neanderthal and early modern mtDNA led to some significant misinterpretations. Clearly, data from the vastly larger nuclear genome are far more informative.



RECENT AFRICAN ORIGIN
Also known as "Out of Africa II" or "African Eve," this model sees a later expansion of *Homo sapiens* replacing earlier archaic populations in Europe, Asia, and Australia.

Evidence for an East African origin of premodern humans also comes from research on variation Y chromosome. Y chromosome like mtDNA doesnot undergoes recombination. Hence most of variation in Y chromosome is caused by random mutations. Variation in Y chromosome can be thus analysed as variation in mtDNA. Analysis of Y chromosome provides evidence of African origin and then exodus. However unlike mtDNA the Y chromosome suggests that the common ancestor lived around 100.000 years ago.

However, a giant leap forward occurred in 2010 when sequencing of the entire Neanderthal nuclear genome was completed. Researchers immediately compared the Neanderthal genome with that of people living today and discovered that some populations still retain some Neanderthal genes (Green et al., 2010). Without doubt, we can now conclude that some interbreeding took place

between Neanderthals and modern humans, arguing against complete replacement and supporting some form of partial replacement or assimilation.

Partial Replacement Models/ Assimilation

The new findings from DNA analysis confirm that the degree of interbreeding was modest, ranging from 1 to 4 percent in modern populations outside Africa, while also revealing that contemporary Africans have no trace of Neanderthal genes, suggesting the interbreeding occurred after modern humans migrated out of Africa. This would seem obvious when you consider that (as far as we know) Neanderthals never lived anywhere in Africa. For our African ancestors to even have the opportunity to mate with a Neanderthal, they would first have to leave their African homeland.

In a breakthrough study led by Swedish geneticist Svante Pääbo, a new technology applied to the analysis of three female Neandertal bones from Vindija Cave at last has provided the sequence of 4 billion base pairs representing the Neandertal genome. Pääbo and his team used high-throughput DNA sequencing, a technology through which much of a genome can be sequenced from a compilation of various genome fragments recovered from fossil bones. The results are breathtaking: Eurasians and Neandertals share between 1% and 4% of their nuclear DNA, an indication of a small but significant admixture. Given that Africans share no nuclear DNA with Neandertals, the admixture occurred between early modern Europeans and Neandertals after early modern people left Africa. People living today outside of Africa have DNA that likely originated from Neandertals. In that sense, the Neandertals are still with us!

Another fascinating discovery is that among the modern people so far sampled (five individuals), the three non-Africans all have some Neanderthal DNA. The tentative conclusion from these preliminary findings suggests that the interbreeding occurred soon after modern humans emigrated out of Africa. The most likely scenario suggests that the intermixing occurred around 80,000–50,000 ya, quite possibly in the Middle East. These results are very new and are partly based on very limited samples of living people. Technological innovations in DNA sequencing are occurring at an amazing pace, making it faster and cheaper. But it is still a challenge to sequence all the 3 billion+ nucleotides each of us has in our nuclear genome.

In addition, says Dr. Fred H. Smith of Northern Illinois University, the backs of most Neanderthal skulls look "as if a little bun were stuck there." Skulls of **early modern humans found in Czechoslovakia also display this feature. But it is found in neither the Neanderthals nor the early moderns in Israel. "How did the earliest modern humans in Eastern Europe get it unless they got it from Neanderthals?"**

Dr. Smith proposes what he calls **"a possible scenario."**

Neanderthals' physical characteristics, he suggests, enabled them to adapt well to the cold of ice-age Europe. The most recent ice age lasted from about 120,000 to about 18,000 years ago, when the ice sheets began a gradual withdrawal. The Neanderthals had large babies, and size helps babies survive cold better. From an adaptation standpoint, the other physical characteristics of Neanderthals may have been secondary.

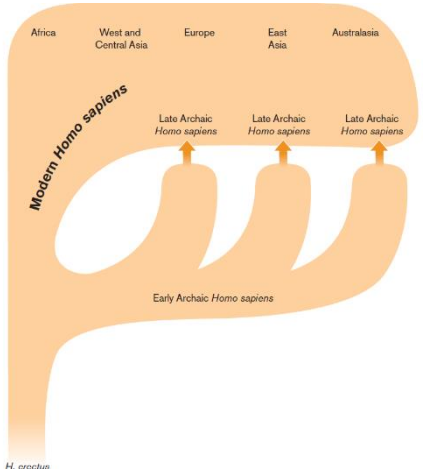
Genetic investigation

Recent advances in DNA techniques have enabled scientists to extract genetic material from fossil bones, including Neanderthals and the hominins from Sima de los Huesos (see p.153). Comparing this with modern human DNA shows that the modern human and Neanderthal lineages diverged more than 500,000 years ago, and between 1 and 4 percent of the DNA of modern Europeans and Asians comes from Neanderthals. This indicates recent interbreeding between our species, which may even represent assimilation of the Neanderthals into the modern human population in Europe and Asia. Interbreeding probably happened soon after the modern human population expanded out of Africa, around 50,000–65,000 years ago. The DNA of modern Africans contains traces of other interbreeding events, too, with as yet unknown archaic human populations.

DNA EXTRACTION
Ancient DNA—if it is present at all in a fossil bone—is highly fragmented. The genome (about 3 billion base pairs) must then be reconstructed from tiny fragments of perhaps a hundred base pairs each.

During a warm interlude in the last Ice Age, Dr. Smith's scenario continues, early modern people from elsewere, lacking the Neanderthals' physical adaptation to cold, drifted into Europe and interbred with its Neanderthal population. The Ice Age reasserted itself for a time, but by then the surviving popluation had developed better clothing, more efficient fires and better houses to withstand the cold.

A robust body adapted to cold became less important and even a liability because it required more energy. As the generations passed, the human population lost its Neanderthal features under the culling of natural selection.



But while the Neanderthal physical type disappeared, Dr. Smith says, the breed "did not go extinct in the classical sense." Rather, he said, Neanderthal genes live on today in Europeans and those who, like most Americans, trace their lineage to Europe.

When we have full genomes from more individuals living in many more geographical areas, the patterns of modern human dispersal should become clearer. Did the modern human-Neanderthal interbreeding occur primarily in one area, or did it happen in several regions? Moreover, did some modern human populations several thousand years ago interbreed with their Neanderthal cousins more than others did? Even more interesting, were there still other premodern human groups still around when modern humans emigrated from Africa—and did they interbreed, too? **From his study of fossil remains, Fred Smith, of Illinois State University, has proposed an "assimilation" model that hypothesizes that more interbreeding did take place, at least in some regions (Smith, 2002).**

To test these hypotheses and answer all the fascinating questions, we will also need more whole-genome DNA from ancient remains, particularly from early modern human skeletons. This, won't be an easy task; remember, it took four years of intensive effort to decode and reassemble the Neanderthal genome. Then, too, we need to be aware that DNA thousands of years old can be obtained from hominin remains that are found in environments that have been persistently cold (or at least cool). In tropical areas, DNA degrades rapidly; so it seems a long shot that any usable DNA can be obtained from hominins that lived in many extremely large and significant regions (for example, Africa and Southeast Asia).

Models for Explaining Modern *Homo sapiens'* Origins

Charles Darwin first presented his theory of evolution in his book *On the Origin of Species* (1859). Based on years of personal observation and of study, this unifying biological theory drew on geology, paleontology, taxonomy and systematics, and demography.

Model	Features	Proponent
Out-of-Africa 	Modern biology, behavior, and culture originated in Africa. Modern humans spread from Africa to Europe after 50,000 yBP. Modern humans replaced all populations once arriving in Europe, with no gene flow.	Christopher Stringer
Multiregional Continuity 	Modern humans evolved from earlier archaic populations in their respective regions (Africa, Europe, Asia). Throughout evolution, there is always significant gene flow on the borders of populations. There is continuity of morphology in all regions of the globe.	Milford Wolpoff
Assimilation 	Modern humans first evolved in Africa, then spread to Europe and Asia. Once they arrived in Europe and Asia, modern humans underwent gene flow with Neandertals.	Fred Smith, Erik Trinkaus

Geographical distribution

Africa

Starting at about 200,000 years ago we begin to see fossils that look more—but not entirely—modern from sites such as Omo and Herto in Ethiopia, Ngaloba in Tanzania, and Florisbad in South Africa. Their anatomy typically is intermediate in form, and their ages often are imprecisely known. Slightly later, we find fully anatomically modern humans at sites such as Klasies River Mouth and Border Cave in South Africa and Aduma in Ethiopia.

The oldest of these remains are those from Omo and Herto in Ethiopia. The Omo I partial skeleton is approximately 195,000 years old (Pearson et al., 2008) and remains from other portions of the site date to around 105,000 years old. The remains from the Herto locality in the Middle Awash region of Ethiopia date to between 160,000 and 154,000 years ago. The Herto remains include the crania of two adults and one juvenile (White et al., 2003). Like other African specimens from this period, the Herto crania "sample a population that is on the verge of anatomical modernity but not yet fully modern" (White et al., 2003, p. 745).

A partial adult cranium from Border Cave in South Africa dates to 80,000–50,000 years ago. Fragmentary cranial and postcranial remains from Klasies River Mouth date to 120,000–90,000 years ago (Rightmire and Deacon, 1991).

Europe

Scores of Neanderthal remains have been recovered in Europe that date to 150,000–30,000 years ago. However, modern human skeletal remains do not appear in Europe until relatively late, perhaps 40,000 years ago.

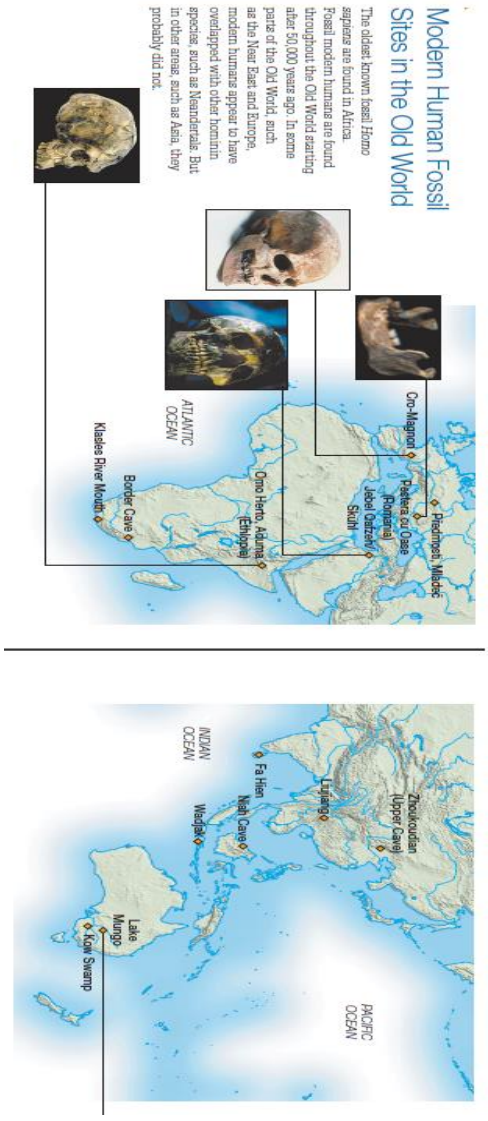
The best-known early anatomically modern humans from Europe come from the **Cro-Magnon** rock shelter located in the Dordogne region of France, which includes a number of Neanderthal sites as well. Discovered in 1868, the Cro-Magnon remains include at least four adults and an infant that date to 27,000 years ago, or well after the appearance of modern humans in Europe (Gambier, 1989). Cro-Magnon 1 or (The "Old Man" of Cro-Magnon) combines a very small face with a large and bulbous braincase, in striking anatomical contrast to Neanderthals from the same region. Because of these anatomical differences, archaeologists developed an evolutionary scenario for western Europe in which the Middle Paleolithic Neanderthals were replaced quickly by Upper Paleolithic modern humans, sometime between 40,000 and 30,000 years ago.

The remains of **Grimaldi** were discovered in the cave called the Grotte des Enfants, in the village of Grimaldi on the Mediterranean Coastal region of Italy across French border. The material found was a skeleton of woman of about 30 years of age and a boy of about 15 and the skeleton of the latter was stained with red ochre. The manner in which the skeletons were placed suggests intentional burial. In the same site the artefacts of Aurignacian type of upper paleolithic were found. The flints were worked on both the sides. Knives, scrapers, gravers etc. were the important tools.

The remains are now recognized as representing two individuals, and are dated to ca. 26,000 to 22,000 years ago. The Grimaldi skeletons were very different from the finds that had been unearthed in Europe until then. Unlike the robust Neanderthals, the Grimaldi skeletons were slender and gracile, even more so than the Cro-Magnon finds from the same cave system. The Grimaldi people were small. While an adult Cro-Magnon generally stood over 170 cm tall (large males could reach 190 cm), neither of the two skeletons stood over 160 cm. The boy was smallest at a mere 155 cm.

The faces had wide nasal openings and lacked the rectangular orbitae and broad complexion so characteristic of Cro-Magnons. These traits, combined with prognathism led the discoverers to the conclusion that the Grimaldi man had been of a **"negroid" type.**

The fossil of **Chancelade Man** was discovered in rock shelter in Dordogne region France, in 1888. A human skeleton with its arms folded on its breast region and the knees just touching the jaw was un earthed. The body was smeared with red ochre. The posture in which skeleton was laid suggests method of burial found among many ancient and modern people. The chancelade lived in Magdalenian time. They lived in late Pleistocene and mastered upper paleolithic culture. The skeleton was that of a rather short man, who stood a mere 1.55 m (5.1 ft.) tall



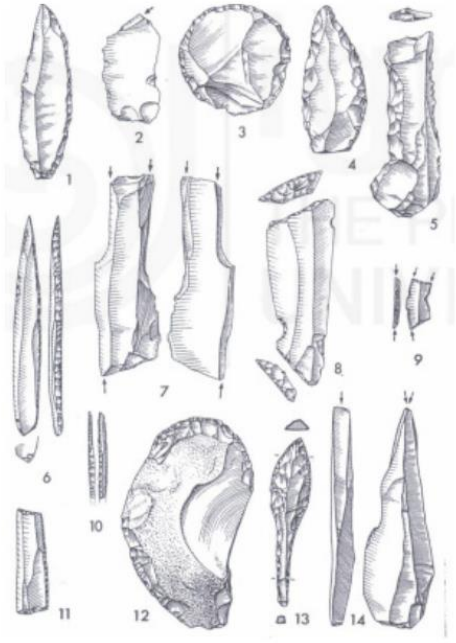
Culture

Tools

The cultural period known as the Upper Paleolithic began in western Europe approximately 40,000 ya. Upper Paleolithic cultures are usually divided into five different industries, based on stone tool technologies: **Chatelperronian, Aurignacian, Gravettian, Solutrean, and Magdalenian**.

Southwestern France is considered as the "classical region" in which all these Upper Palaeolithic developments are well preserved. The Upper Palaeolithic sequence of south-western France is used as a model for the Upper Palaeolithic cultural sequences because of the numerous well stratified sites. The stone tool industries of the Upper Palaeolithic, in this classical region, show a great deal of regional variations and sub-regional successions, which cover a time span of 40,000 – 12,000 years Before Present (BP). These industries are **Chatelperronian** (35,000 – 29,000 years ago), **Aurignacian** (34,000 – 29,000 years ago**) Gravettian** (28,000 – 22,000 years ago), **Solutrean** (21,000 – 19,000 years ago) and **Magdalenian** (18,000 – 12, 000 years ago)

Major environmental shifts were also apparent during this period. During the last glacial period, about 30,000 ya, a warming trend lasting several thousand years partially melted the glacial ice. The result was that much of Eurasia was covered by tundra and steppe, a vast area of treeless country dotted with lakes and marshes. In many areas in the north, permafrost prevented the growth of trees but permitted the growth, in the short summers, of flowering plants, mosses, and other kinds of vegetation. This vegetation served as an enormous pasture for herbivorous animals, large and small, and carnivorous animals fed off the herbivores**. It was a hunter's paradise**, with millions of animals dispersed across expanses of tundra and grassland, from Spain through Europe and into the Russian steppes.



Upper Palaeolithic Tools from Southwestern France. 1) Chatelperronian knife; 2) Burin; 3) Scraper on flake; 4) Mousterian point; 5) Denticulated and truncated blade; 6) Gravette point; 7) Multiple burin on truncation; 8) Bitruncated blade; 9) Burin on bladelet (called Noailles burin); 10) Backed bladelet; 11) Truncated bladelet with retouch; 12) Flake scraper; 13) Backed point with a shoulder (called Font-Robert point); 14) Dihedral burin (after Bordes 1968)

Chatelperronian is the earliest industry of the Upper Palaeolithic in central and south-western France. Chatelperronian appears to have been derived from the earlier Mousterian culture. The Chatelperronian culture is characterised by a stone tool called as the "backed point" or "backed knife". It is a blade having one of its edges blunted for holding or hafting recalling a modern penknife blade. It is also called Chatelperronian knife.

The Aurignacian culture is named after the type site Aurignac in southern France. In France it is stratified between the Chatelperronian and Gravettian. The Aurignacian culture is recognised by some special artifact types. These types are **"steep" and "nosed' scrapers.** Aurignacian is also recognised for its **bone and antler tools** such as awls, pierced antler bars used as smoothing tools for making arrows (arrow strengtheners), flat elongated spearheads, split-based bone points, antler and bone; and ornaments like pierced shells and teeth, carved bone pendants, bracelets, and ivory beads. Some of the earliest ivory carvings of animals and human figures begin to appear during this period. Even musical instruments made on bone such as whistles and flutes have been found at some sites.

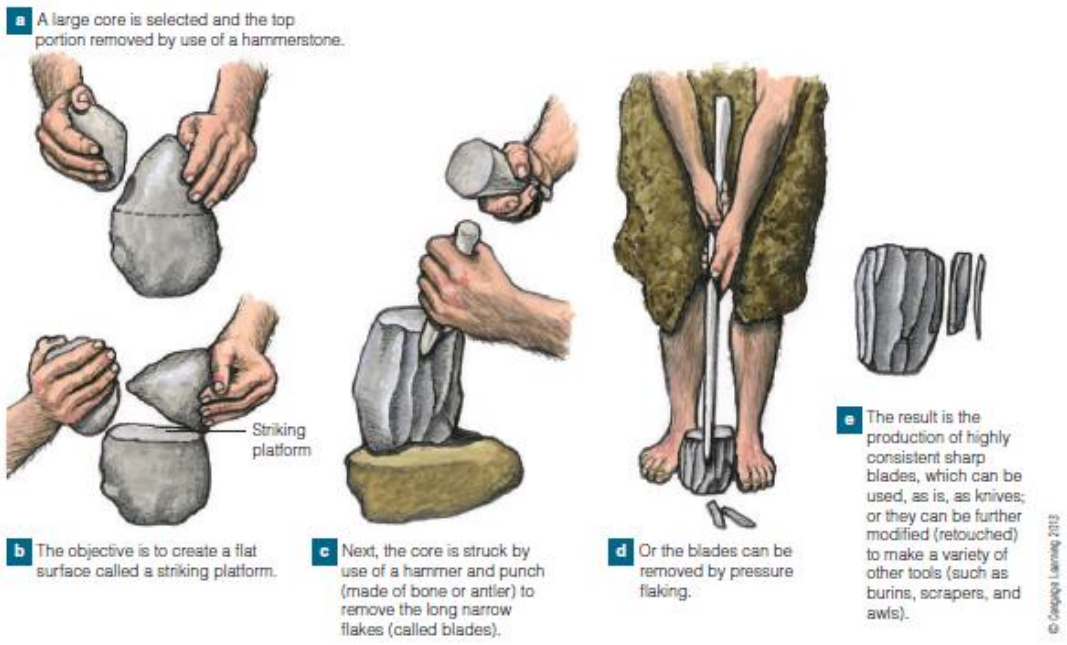
The Gravettian culture is named after the type site La Gravette in the Dordogne region of France. It succeeds the Aurignacian. The Gravettian people were big game hunters. They used spear throwers for hunting. They hunted bison, horse, reindeer and mammoth. They invented animal traps and fish traps and may also have used darts to kill birds and small mammals. They were trapping hares and foxes for their skins, which they sewed into warm clothing using ivory needles with drilled eyes. They were making nets and baskets.

Gravettian is known for **Venus figurines.** These are statuettes of women carved from stone, bone or ivory, or molded in clay and fired. Gravettian culture stretched from France to Ukraine covering Italy, Austria and Czechoslovakia

Solutrean tools are good examples of Upper Paleolithic skill and likely aesthetic appreciation as well. In this lithic (stone) tradition, skill in modifying rock (called **"knapping")** developed to the finest degree ever known. Using specialized pressure flaking techniques, the artist/technicians. made beautiful

parallel-flaked lance heads, expertly flaked on both surfaces. The lance points are so delicate that they can be considered works of art that quite possibly never served, nor were they intended to serve, a utilitarian purpose. They hunted horse, reindeer, mammoth, cave lion, rhinoceros, bear and aurochs. The Solutrean culture existed for a short period between 21,000 to 19,000 years ago and disappeared as mysteriously as it appeared

The Upper Palaeolithic is marked by technological advances in stone tool manufacture by the production of parallel sided blades which are finished into a variety of tools finished by blunting one side or backing. Blades are flakes, but very refined flat narrow ones, elongated in shape and having parallel sides. For producing blades, the cores are first trimmed all around to remove the roughness. Then, by striking along the circumference of the core, using a punch, a series of blades are removed. That means blades are produced **by indirect percussion** but not by direct percussion. After the removal of the first series of blades, a second, third and fourth series and so on are removed, until the core is exhausted. Thus, in this blade production technique, numerous blades are removed from a single core. These cores have a prismatic or fluted appearance; hence this technique is called "prismatic-core technique" or "fluted-core" technique.



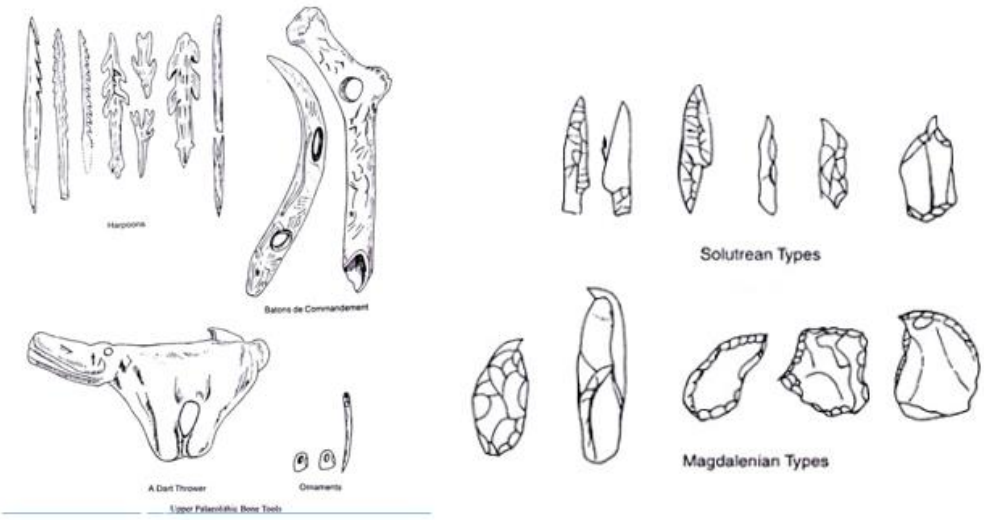
The punch blade technique.

The last stage of the Upper Paleolithic, known as the **Magdalenian,** saw even more advances in technology. It is named after the type site La Madeleine in the Dordogne region of France. Magdalenian is best known for its elaborately worked bone, antler and ivory tools and other objects which served both functional and aesthetic purposes. The motifs on these objects are square lattices, lattice of parallelograms, spirals, geometric designs, and carvings of heads of mostly horse and bison on bone handles. Items of personal adornment consist of sea shells and perforated carnivore teeth, which were possibly used as pendants for necklaces. Rock art in the form of cave paintings reached its zenith during the Magdalenian period.

The spear-thrower, or atlatl, was a wooden or bone hooked rod that extended the hunter's arm, enhancing the force and distance of a spear throw. For catching salmon and other fish, the barbed harpoon is a good example of skillful craftsmanship. There's also evidence that bows and arrows may have been used for the first time during this period. The introduction of much more efficient manufacturing methods, such as the **punch blade technique**, provided an abundance of standardized

stone blades. These could be fashioned into burins for working wood, bone, and antler; borers for drilling holes in skins, bones, and shells; and knives with serrated or notched edges for scraping wooden shafts into a variety of tools.

Spear-thrower (atlatl). Note the carving.



Subsistence

Much evidence supports the idea that modern humans exploited a wider variety of foodstuffs than those used by Neanderthals or archaic H. sapiens. Ultimately, this ability to exploit natural resources for food led to the development of agriculture, starting about 12,000 years ago, which allowed a sustained increase in population growth. However, by expanding their subsistence base in other ways, early anatomically modern humans may have established a pattern of increased population growth relative to other hominins at the very origins of our species, long before the introduction of agriculture.

One example is the use of aquatic resources, such as fish and shellfish. Although there is earlier evidence of the limited use of marine resources, including use by some Neanderthal populations, aquatic resources become a widespread and systematic part of human subsistence only in the Upper Paleolithic and Later Stone Age.

Symbolism, Burial, and Art

Burial

Perhaps the most striking difference between later modern humans and earlier hominins is the extent to which modern human archaeological assemblages incorporate clear evidence of symbolic behaviour. Whether found in caves or open air sites, Upper Paleolithic burials are composed of burial pits. More important perhaps, a number of Upper Paleolithic burials contain an elaborate array of grave goods, and multiple, carefully arranged bodies. Upper Paleolithic European burials often are covered in beads and bear other indications that the dead were buried in decorated garments

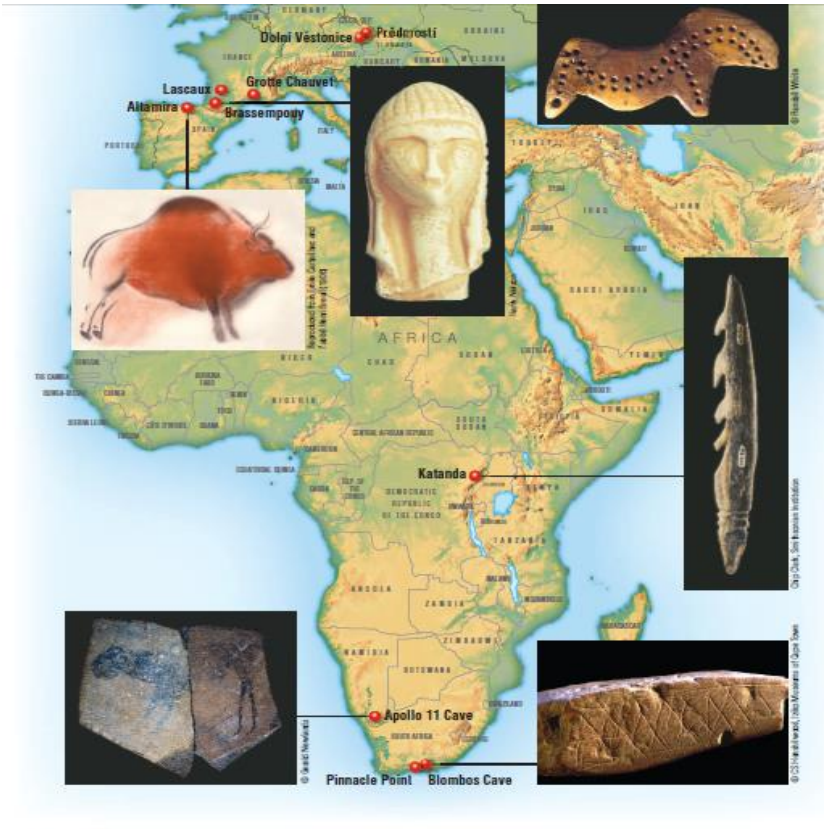
representing hundreds or thousands of hours of time in their preparation. (Stringer & Gamble, 1993). Obviously, not every Upper Paleolithic burial is an elaborate affair complete with an abundance of finely made grave goods.

Art and Ornamental Objects

Unlike the equivocal engravings of Neanderthals, the artistic expression of Upper Paleolithic humans is astounding. Cave art and petroglyphs (rock carvings) occur not only in Europe but also in Africa and Australia. Ornamental objects like statues, beads, and pendants are also prevalent in the Upper Paleolithic.

These elaborate displays of human symbolic behavior occur late in the archaeological record of modern humans, usually 40,000 years ago or later.

The earliest cave art known in Europe appeared about 32,000 years ago at Chauvet, France, and is complex in its technique and representation. Rock art appeared in Africa about 26,000 years ago at Apollo 11 cave in Namibia, and somewhat earlier than that in Australia, at places such as Carpenter's Gap The rock art of Australia, which spans thousands of years, provides a particularly rich record of human artistic expression. The animals represented on cave walls in Chauvet were once interpreted as sympathetic magic to assist in hunting success. But when compared with animal remains at archaeological sites of the same period, these images suggest that people were mostly depicting animals they did not hunt. Perhaps the animals had some other symbolic or ritual importance for them.



Symbolic artifacts from the Middle Stone Age of Africa and the Upper Paleolithic in Europe. It is notable that evidence of symbolism is found in Blombos Cave (77,000 ya) and Katanda (80,000 ya), both in Africa, about 45,000 years before any comparable evidence is known from Europe.

Red ochre (iron oxide) and the color red were of great significance to modern humans. Evidence from one of the Lake Mungo burials in Australia indicates that the body may have been covered with red

ochre. At the Qafzeh site, dating to about 92,000 years ago, seventy-one red ochre pieces, including some that were flaked or marked in some way, were associated with remains of anatomically modern humans, and several stone artifacts were stained with red ochre, although there was no evidence that the bodies themselves were covered in ochre (Hovers et al., 2003). Erella Hovers and her colleagues suggest that the form and distribution of the red ochre pieces indicate they were deliberately mined from a variety of local sources.

Portable art and ornaments are also prevalent in modern human archaeological sites. The most famous are the so-called Venus figurines that represent various female figures, often interpreted as fertility totems. However, other figurines also exist, including many zoomorphic (animal) statuettes. All are small enough to be carried around in a pocket, although we do not know if they were. Pendants made from ivory and even from animal teeth, often from animals that Upper Paleolithic people did not eat, such as fox, are also found.

There are even examples of pendants made from human molars. And thousands of beads have been found at Upper Paleolithic sites. Some beads were found isolated or in batches, and others were found laying on bodies within burials suggesting the individuals were decorated before burial. Experimental work by Randall White suggests that most beads were attached to garments and took a few hours per bead to make. Thus, the Upper Paleolithic peoples invested a huge amount of time into making these grave items and personal ornaments, indicating that they had significant symbolic meaning and probably were in some way important for survival.

CONCEPT CHECK Early Modern *Homo sapiens*

Early modern *Homo sapiens* occurred first in Africa, later in Asia and Europe. The peopling of Europe, Asia, and Africa by only modern *H. sapiens* was complete by 25,000 yBP.

Location/sites[1]	Africa (Herto, Aduma, Bouri, Omo, Klasies River Mouth, Lothagam, Wadi Kubbaniya, Wadi Halfa) Asia (Skhul 5, Tianyuandong, Minatogawa) Europe (Pestera cu Oase, Mladeč, Předmostí, Dolni Vestonice, Cro-Magnon, Grimaldi)
Chronology	160,000 yBP in Africa 90,000 yBP in western Asia 35,000 yBP in eastern Asia 32,000 yBP in Europe
Biology	Vertical forehead, high skull, rounder skull, reduced facial robusticity, smaller teeth, reduced midfacial prognathism, 1,500 cc cranial capacity Heat-adapted body morphology (small trunk, long limbs)
Culture and behavior	Upper Paleolithic Increased visible symbolic behavior (cave art) Burial of deceased with grave goods Decreased hunting, increased fishing, aquatic foods, likely more plants and reduced focus on big game animals Technology changes reflect increased focus on fishing (e.g., bone harpoons)