

Pre History Evolution of Stone Tool

Human evolution is the evolutionary process that led to the emergence of anatomically modern humans, beginning with the evolutionary history of primates – in particular genus Homo – and leading to the emergence of Homo sapiens as a distinct species of the hominid family, the great apes. This process involved the gradual development of traits such as human bipedalism and language.

The making of stone tools is a characteristic that archaeologists use to define what is human. The tools that survive down to today were made of stone.

The oldest stone tools that we have evidence for are from the earliest sites dated to the Lower Paleolithic--when stone tools were first made". Those tools are believed to have been made by Homo habilis, in Africa, about 2.6 million years ago, and are typically called Oldowan Tradition.

The next major leap forward originated in Africa about 1.4 million years ago, with the Acheulean tradition of biface reduction and the famous Acheulean handaxe spread out into the world with the movement of H. erectus.

The next broad leap forward recognized in stone tool technology was the **Levallois technique**.

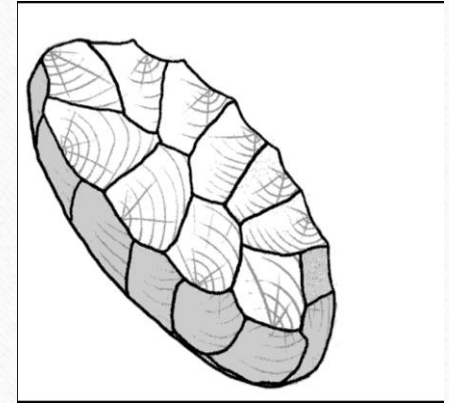
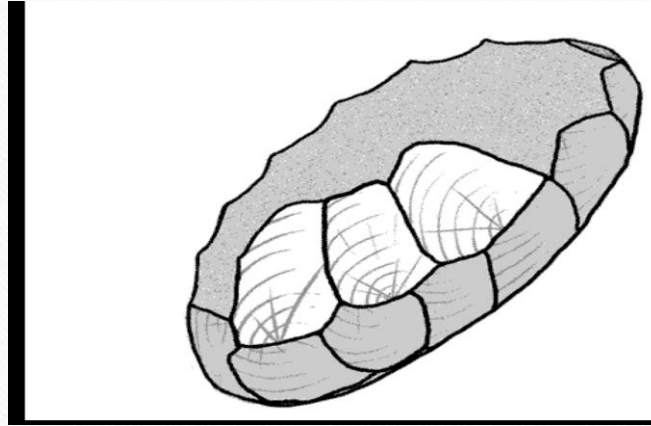
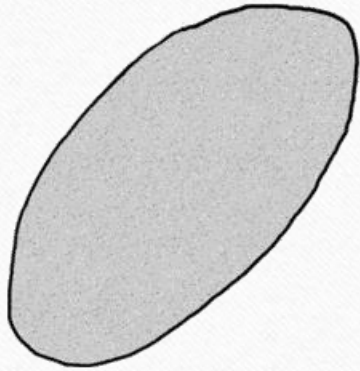
Levallois and Stone Making

A stone tool making process that involved a planned and sequenced pattern of removing stone flakes from a prepared core (called bifacial reduction sequence).

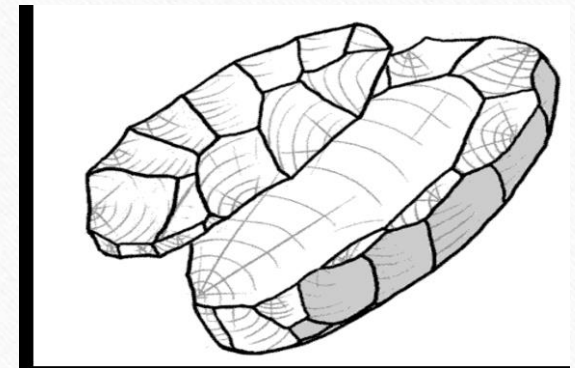
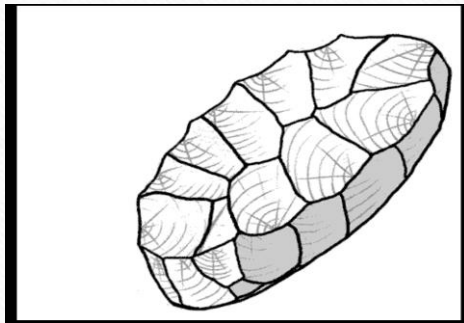
Traditionally, Levallois was considered an invention of archaic modern humans about 300,000 years ago, thought to be spread outside of Africa with the spread of humans.



Levallois point – Beuzeville



The Levallois technique of flint-knapping



Archaeologists classify stone tools into industries that share distinctive technological or morphological characteristics.

In 1969 Grahame Clark proposed an evolutionary progression of flint-knapping. He assigned a fixed sequence from Mode 1 through Mode 5 through which the dominant lithic technologies transformed.

- Modes 1 - Early Lower Palaeolithic, Pebble cores and flake tools, Chellean, Tayacian, Clactonian, Oldowan
 - Mode 2 - Later Lower Paleolithic, large bifacial cutting tools made from flakes and cores such as Acheulean handaxes, cleavers, and picks, Abbevillian, Acheulean. Developed in Africa, ~1.75 million years ago and spread into Eurasia with *H. erectus* about 900,000 years ago.
 - Mode 3 - the Middle Palaeolithic, Flake tools struck from prepared cores, with an overlapping sequence of flake removal system - including the Levallois technology,, Mousterian, arose during the Late Acheulean at the onset of the Middle Stone Age/Middle Paleolithic, about 300,000 years ago.
 - Mode 4 - the Advanced, Punch-struck prismatic blades retouched into various specialized forms such as endscrapers, burins, backed blades and points, Upper Paleolithic, Aurignacian, Gravettian, Solutrean
 - Mode 5 - the Mesolithic. Retouched microliths and other retouched components of composite tools, Later Upper Paleolithic and Mesolithic, Magdalenian, Azilian, Maglemosian, Sauveterrian, Tardenoisian
- They were not to be conceived, however, as either universal or as synchronous. Mode 1, for example, was in use in Europe long after it had been replaced by Mode 2 in Africa.

Mode I:
The Oldowan Industry

The Oldowan Industry, named after the type of site (many sites, actually) found in Olduvai Gorge, Tanzania, where they were discovered in large quantities.

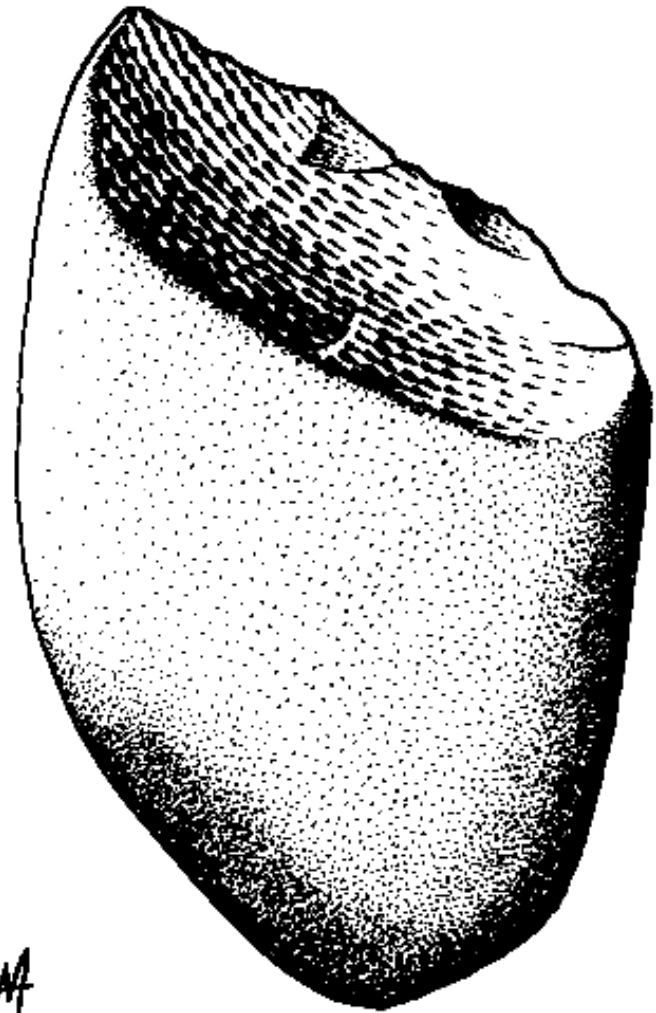
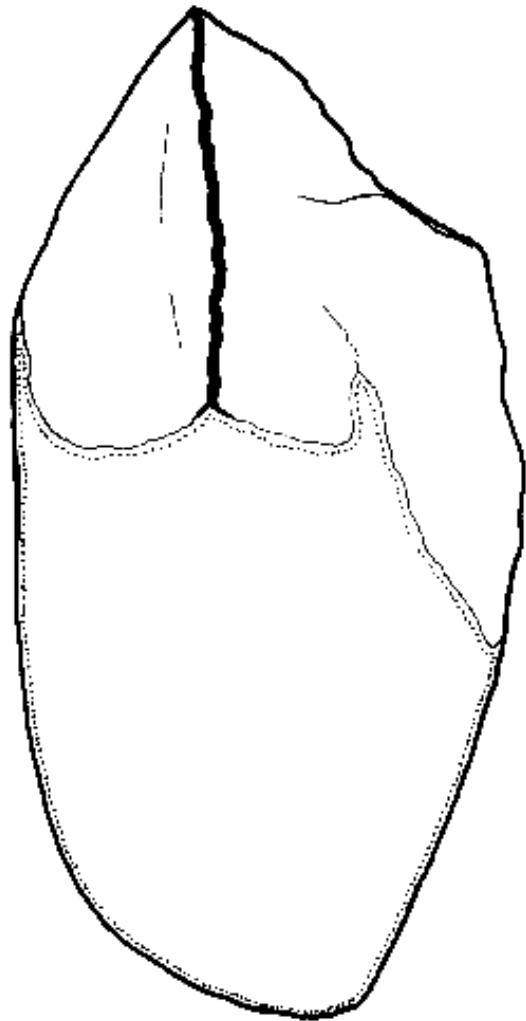
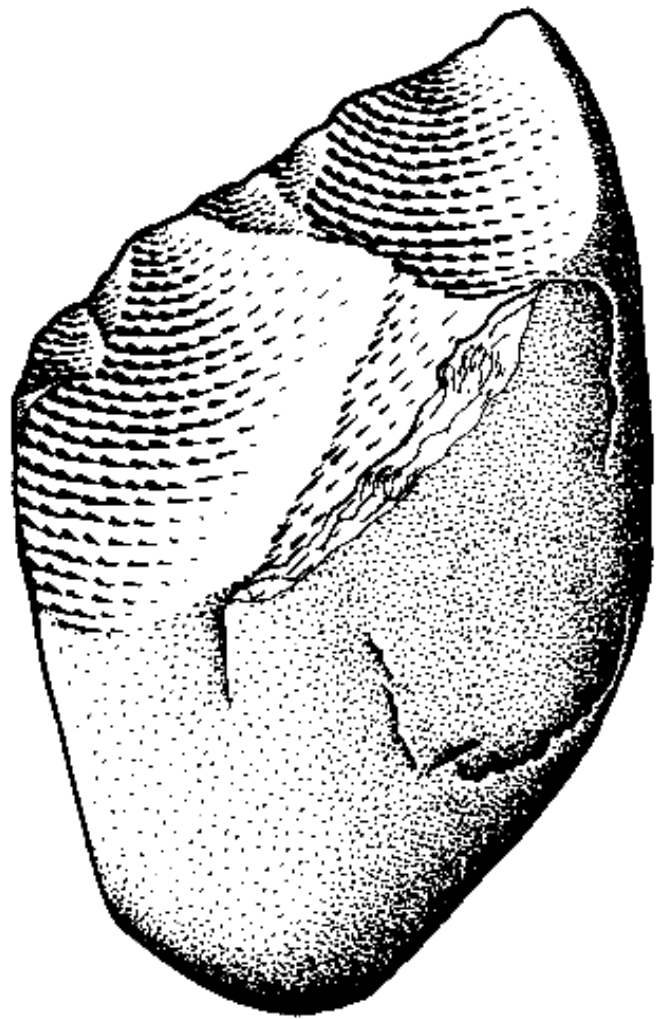
Oldowan tools were characterised by their simple construction, predominantly using core forms. These cores were river pebbles, or rocks similar to them.

The cores had been struck by a spherical hammerstone to cause conchoidal fractures removing flakes from one surface, creating an edge and often a sharp tip. The blunt end is the proximal surface; the sharp, the distal.

Oldowan is a percussion technology.

Grasping the proximal surface, the hominid brought the distal surface down hard on an object he wished to detach or shatter, such as a bone or tuber.

0 5 cm



AM

The earliest known Oldowan tools yet found date from 2.6 million years ago, during the Lower Palaeolithic period, and have been uncovered at Gona in Ethiopia.

After this date, the Oldowan Industry subsequently spread throughout much of Africa.

Homo habilis was the hominin who used the tools for most of the Oldowan in Africa, but at about 1.9-1.8 million years ago Homo erectus inherited them.

The Industry flourished in southern and eastern Africa between 2.6 and 1.7 million years ago.

Spread out of Africa and into Eurasia by travelling bands of H. erectus, who took it as far east as Java by 1.8 million years ago and Northern China by 1.6 million years ago.

Mode II:
The Acheulean Industry

More complex, Mode 2 tools began to be developed through the Acheulean Industry, named after the site of Saint-Acheul in France.

The Acheulean was characterised not by the core, but by the biface, the most notable form of which was the hand axe.

The Acheulean first appears in the archaeological record as early as 1.7 million years ago in the West Turkana area of Kenya and contemporaneously in southern Africa.

The Leakeys, Louis and Mary, excavators at Olduvai, defined a "Developed Oldowan" Period in which they believed they saw evidence of an overlap in Oldowan and Acheulean.

Oldowan equated to H. Habilis and Acheulean to H. Erectus. Developed Oldowan was assigned to Habilis and Acheulean to Erectus.

African H. erectus developed Mode 2.

A wave of Mode 2 then spread across Eurasia, resulting in use of both there. H. Erectus may not have been the only hominin to leave Africa; European fossils are sometimes associated with Homo Ergaster, a contemporary of H. Erectus in Africa.

Mode 2 tools are either

- disk-shaped,
- ovoid,
- leaf-shaped and pointed,
- elongated and pointed at the distal end, with a blunt surface at the proximal end, obviously used for drilling.
- Mode 2 tools are used for butchering
- not being composite (having no haft) they are not very appropriate killing instruments. The killing must have been done some other way.
- Mode 2 tools are larger than Oldowan.

An Acheulean tool is a planned result of a manufacturing process.

The manufacturer begins with a blank, either a larger stone or a slab knocked off a larger rock.

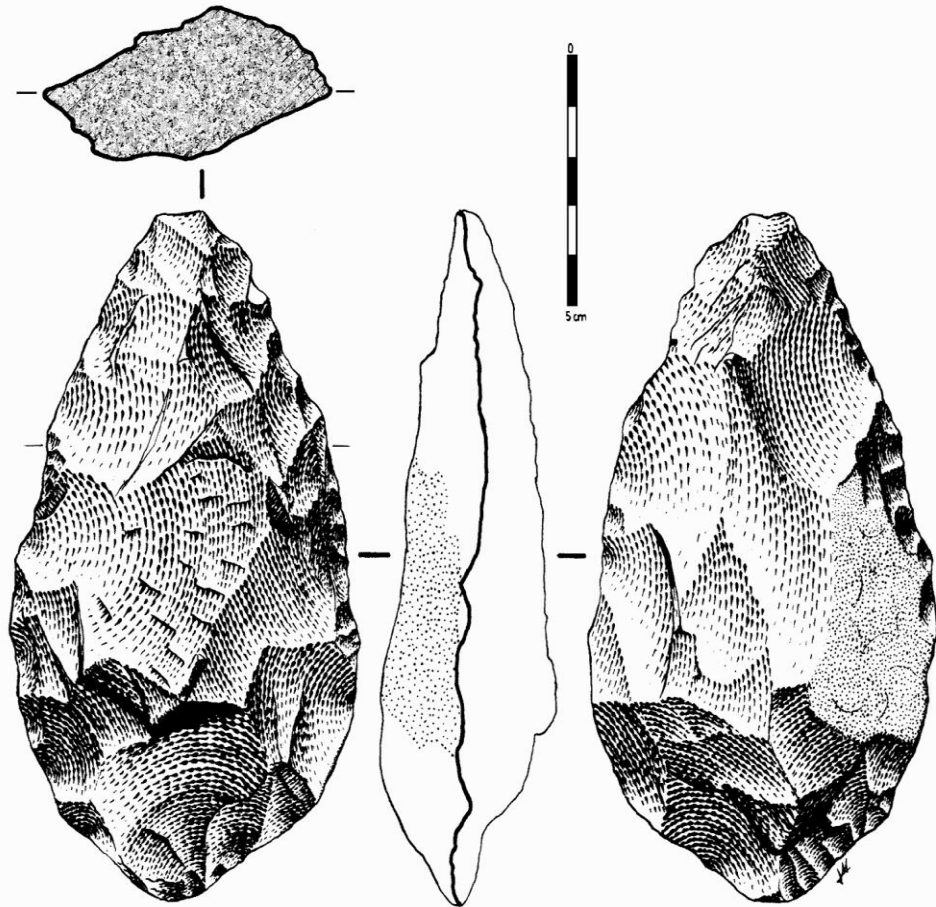
From this blank he or she removes large flakes, to be used as cores.

Standing a core on edge on an anvil stone, he or she hits the exposed edge with centripetal blows of a hard hammer to roughly shape the implement.

The blank was ported to serve as an ongoing source of flakes until it was finally retouched as a finished tool itself. Edges were often sharpened by further retouching.

Such a tool is used for slicing; concussion would destroy the edge and cut the hand.

A typical Acheulean handaxe; this example is from the Douro valley, Zamora, Spain.



A Biface (triangular) from Amar Merdeg, Zagros foothills, Lower Paleolithic, National Museum of Iran



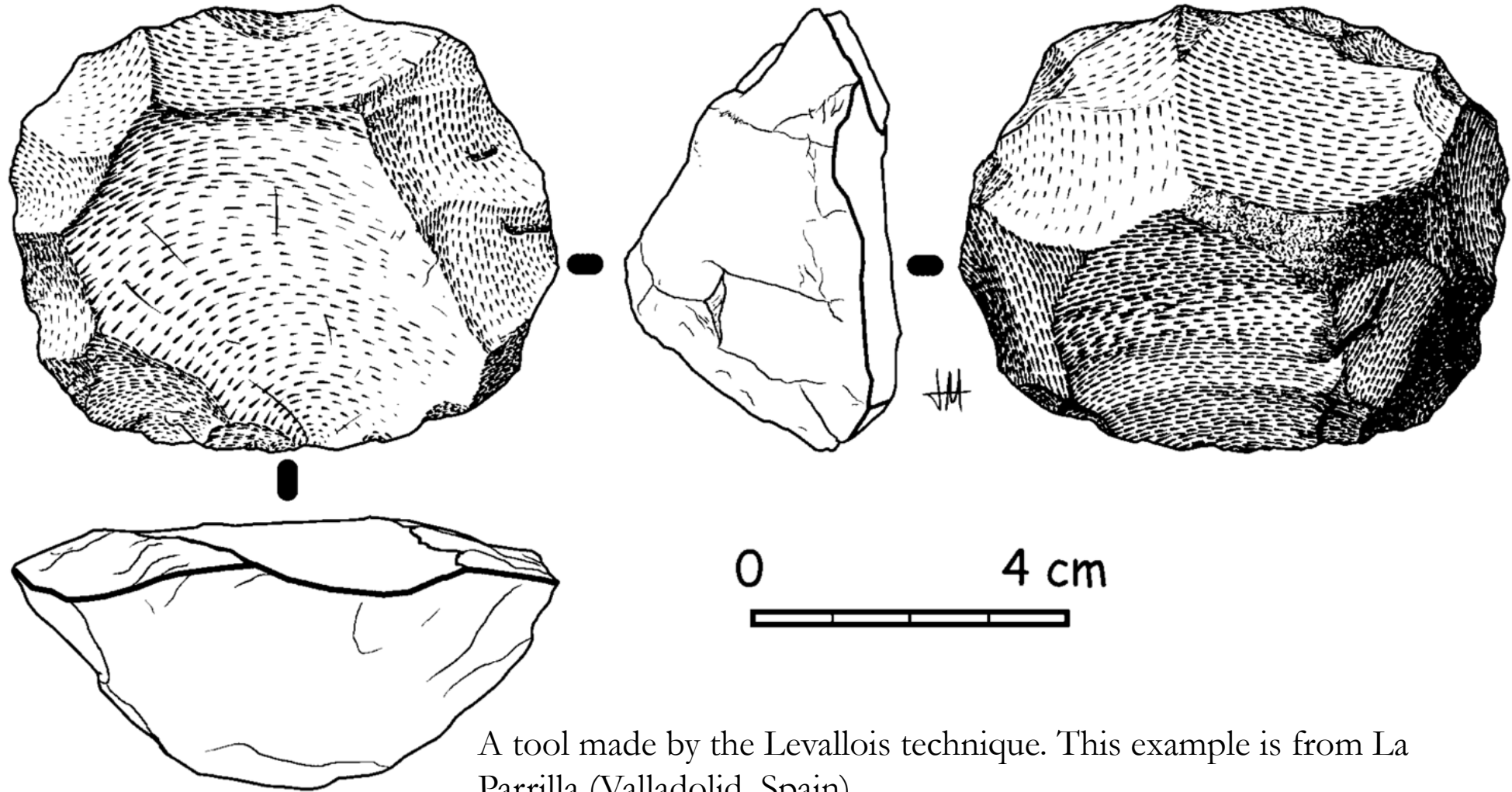
Mode III:
The Mousterian Industry

Eventually, the Acheulean in Europe was replaced by a lithic technology known as the Mousterian Industry.

This was named after the site of Le Moustier in France, where examples were first uncovered in the 1860s.

Evolving from the Acheulean, it adopted the Levallois technique to produce smaller and sharper knife-like tools as well as scrapers.

The Mousterian Industry was developed and used primarily by the Neanderthals, a native European and Middle Eastern hominin species.



A tool made by the Levallois technique. This example is from La Parrilla (Valladolid, Spain).

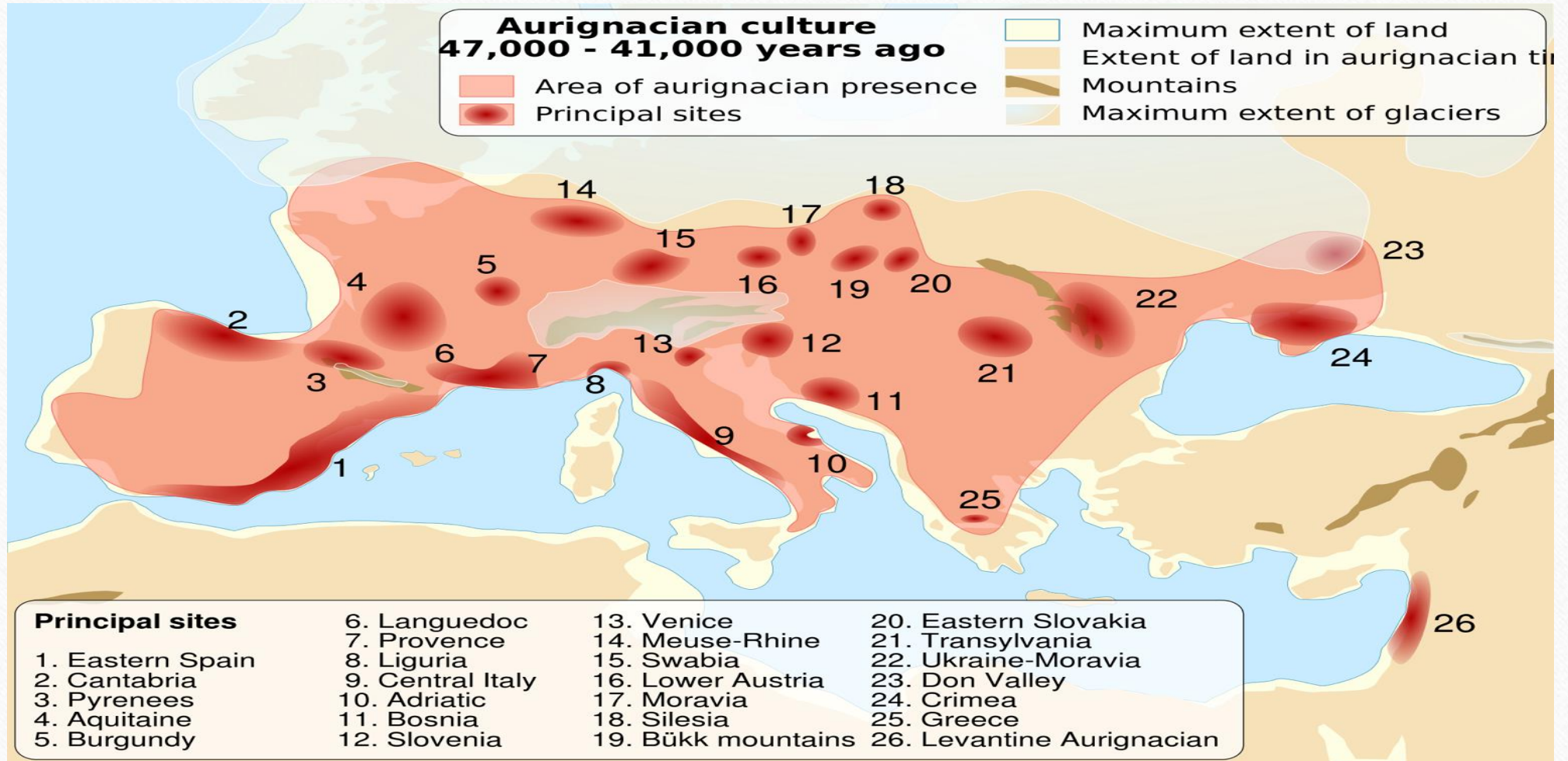
Mode IV:
The Aurignacian Industry

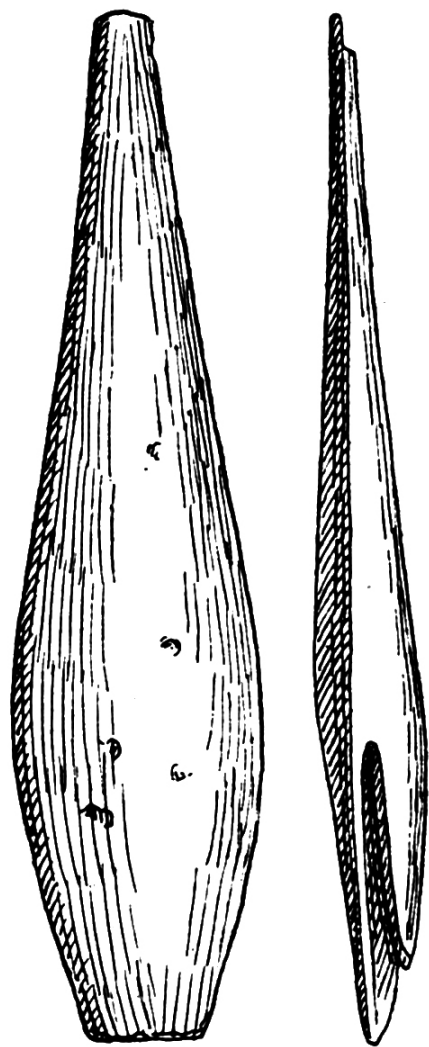
Stone tools from the Aurignacian culture characterized by blades (rather than flakes, typical of mode 2 Acheulean and mode 3 Mousterian) from prepared cores.

Also seen throughout the Upper Paleolithic, between 50,000 and 10,000 years ago, is a greater degree of tool standardization and the use of bone and antler for tools.

Based on the research of scraper reduction and paleoenvironment, the early Aurignacian group moved seasonally over greater distance to procure reindeer herds within cold and open environment than those of the earlier tool cultures.

The Aurignacian culture is a good example of mode 4 tool production





Bone point



Scraper from Aurignac (France)

Dufour bladelet



Aurignacian blades

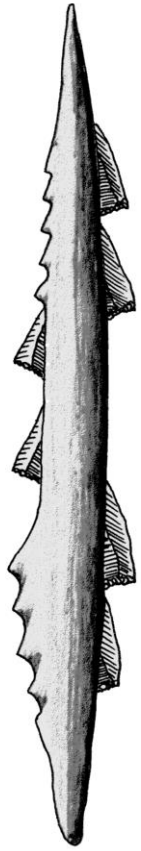
Mode V:
The Microlithic Industries

Mode 5 stone tools involve the production of microliths, which were used in composite tools, mainly fastened to a haft. Examples include the Magdalenian culture.

The Magdalenian tool culture is characterised by regular blade industries struck from carinated cores.

Such a technology makes much more efficient use of available materials like flint, although required greater skill in manufacturing the small flakes.

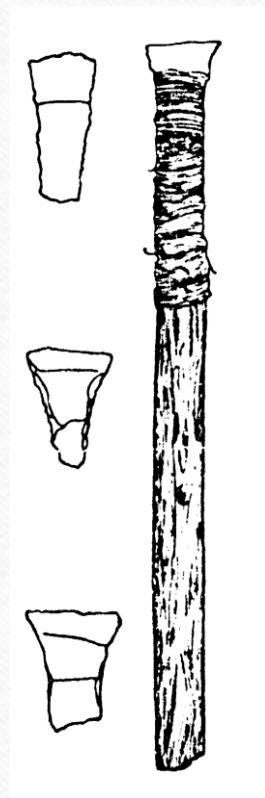
The period is essentially a bone period. The bone instruments are quite varied: spear-points, harpoon-heads, borers, hooks, and needles.



The most widely accepted hypothesis is that geometric microliths were used on projectiles such as this harpoon.



Magdalenian tools and weapons, 17,000–9,000 BCE, Abri de la Madeleine, Tursac, Dordogne, France



Trapezoid microliths and arrow with a trapeze used to strengthen the tip, found in a peat bog at Tværmose (Denmark)

Neolithic Industry

The Neolithic age or the New Stone Age was approximately from 10,000 to 3,000 BCE. The end of this era brought with it the end of the Stone Age and the rise of the Copper Age. However, neolithic tools and weapons laid the foundation for many other inventions and tools for the following eras to come.

Axes

Axes were one the most important tools for the Neolithic man. They were used for clearing land and cutting down trees for agriculture.

Axes also made excellent weapons to ward off enemies and animals.

The man used other stones firstly to flake it and give it a definitive shape and another stone to grind it and give it a better and sharper finish.

Knives and Scrapers

Knives and scrapers were one of the most vastly found tools even before this time. Knives were used to butcher animals as well as to separate the hide from the meat. The skin/hide would further be used to make leather, while the meat would be eaten.

A scraper, on the other hand, had a longer and slightly curved edge, making it easier for the user to scrape out the meat off the animal.

These tools would be shaped by knapping, i.e., banging off layers of flakes.

Blades

While a scraper can be used for cutting into an animal, a longer, thinner blade can be inserted deeper into a carcass, or run along a bone, and works better for the fruits and vegetables of a settled agricultural life.

Blades are more difficult to make than scrapers; when knapping down to a thin piece of rock, it is easy to snap the piece in two.

Arrows and Spearheads

Arrows and spearheads were made more sophisticated as compared to the previous two ages. The tips were made more delicate and the edges were sharper.

A whole new level of ingenuity was used to make the end of the head slip into the shaft and provide a place that could be used to tie the head into its place.

Spearheads too were made in the similar fashion.

Adzes

The adze is a woodworking tool. It is a flat blade attached to a handle, somewhat like an ax, except that the blade is turned horizontally, somewhat like a hoe. When it strikes a piece of wood it gouges out a chip.

A larger adze also makes an effective tool for digging, removing roots and generally preparing land for planting.

Hammers and Chisels

Chisels were made by attaching a sharp piece of stone to the end of a sturdy stick.

Hammers were mostly used with chisels in woodworking, though the difference between a hammer and a war club is really only in the use.



Early Neolithic tools and points



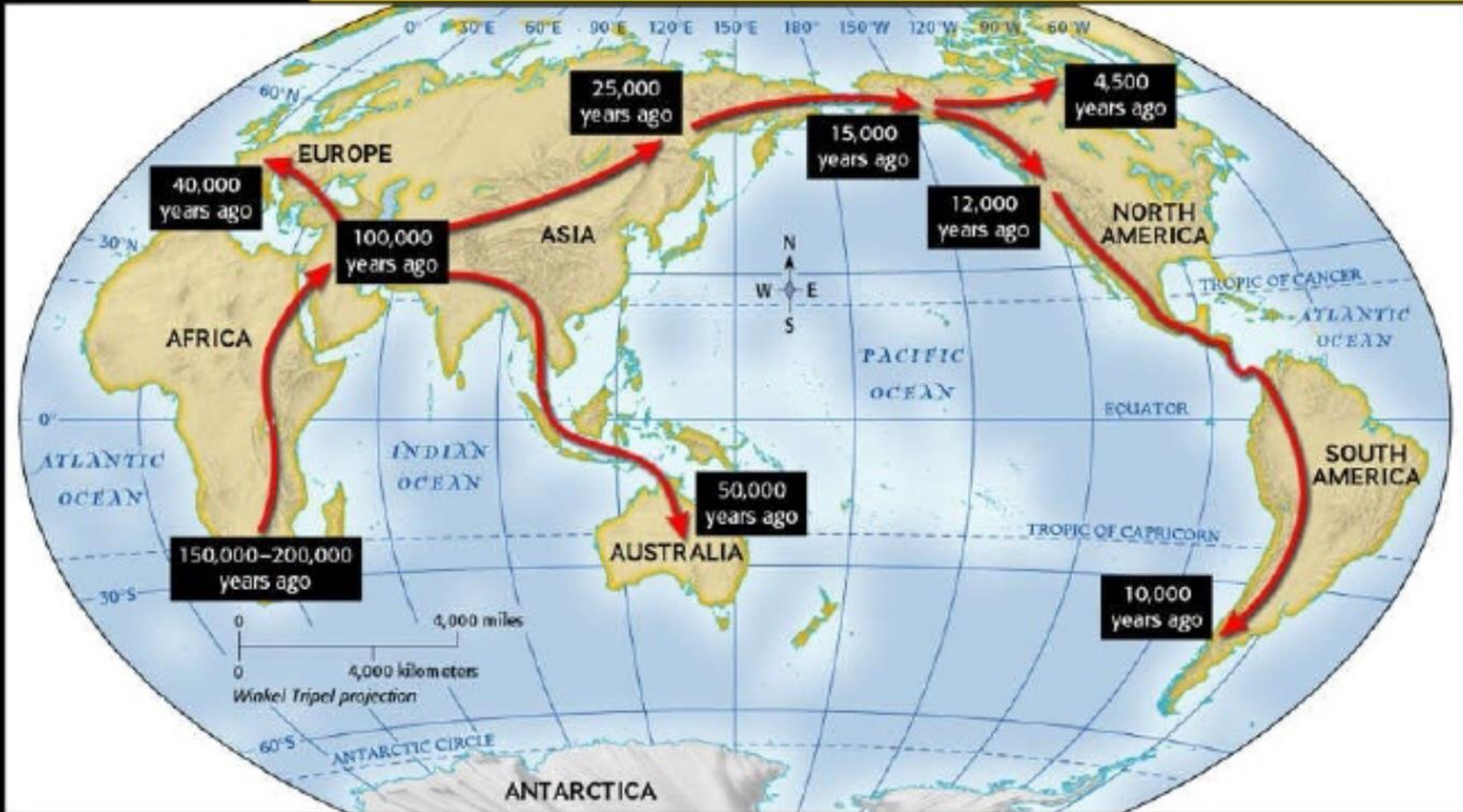
Keilmesser Neolithic
Stone Tool
Neolithic • 30000 BCE



Neolithic age in India

Thank you

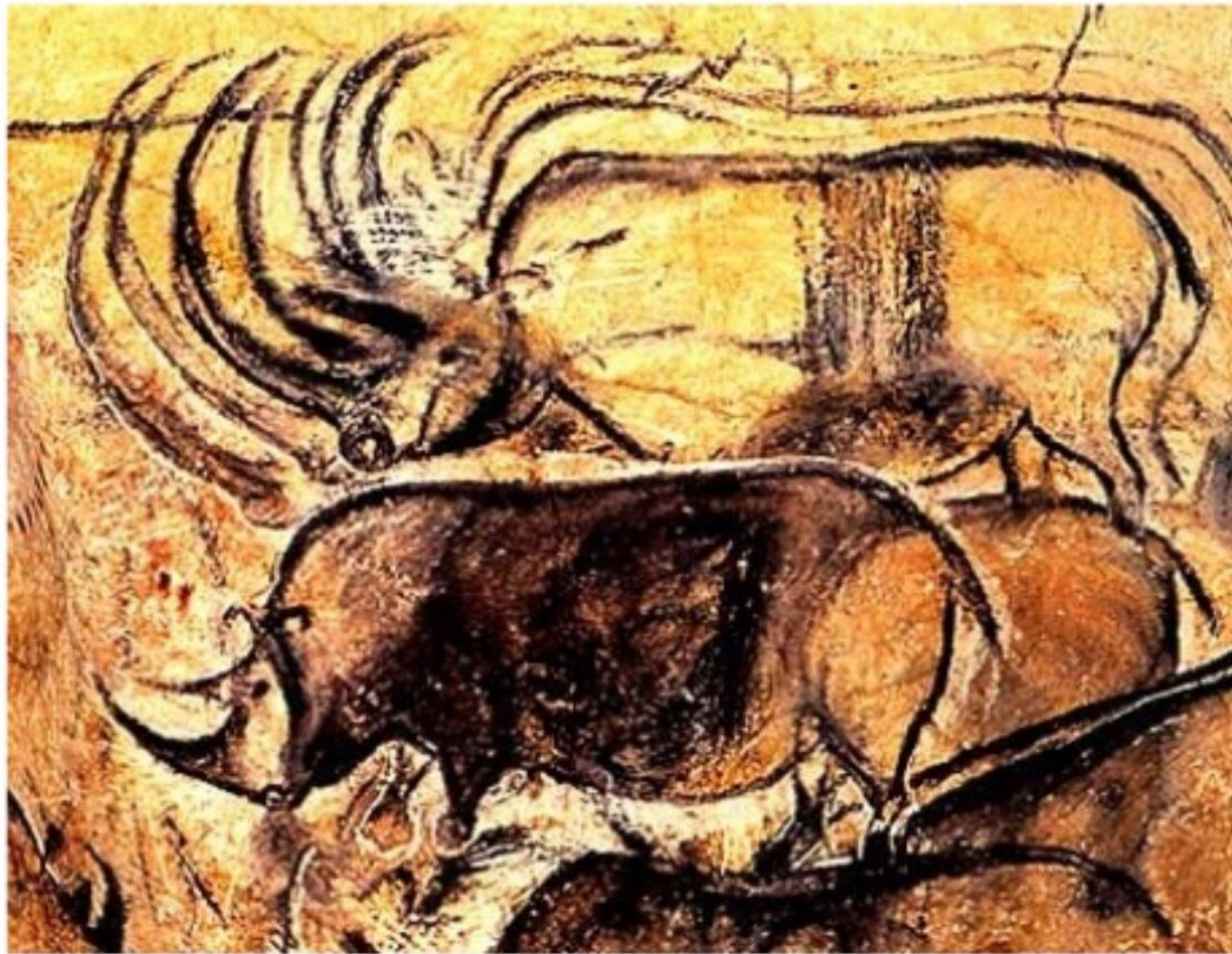
Spread of *Homo Sapiens Sapiens*





This fresco covers about 20 meters & is composed of three groups of animals: horses, bulls and stags.

First 20 meters slopes steeply down to the first hall known as the **Great Hall of the Bulls** = begins with a unicorn-like figure who seems to be chasing a herd of horses. Also visible a large, partially drawn bull towards the back of the hall. On the opposite side = three large wild oxen (now extinct link with a group of small stags painted in ochre. The color black dominates the works: only the group of stags, three bovines and four horses, of which three are incomplete, are colored red.



The **Lascaux Caves**, a cave complex in southwestern France, contain some of the most remarkable paleolithic cave paintings in the world. Known as "the **prehistoric Sistine Chapel**," the Lascaux paintings are at least 15,000 years old.



The **Painted Gallery**, which is about 30 meters long, is a continuation of the same hall. Considered to be the pinnacle of paleolithic cave art, the Painted Gallery covers the entire upper reaches of the walls as well as the surface of the ceiling. The iconography is based on classical prehistoric animal themes: wild oxen, horses, ibexes, the stag and, at the back, the bison. Notable among these are the "Chinese Horses," a triad surrounded by large red cows. At the back a horse seems to be dashing towards the inmost depths of the gallery.

Mesolithic approx. 10,000 - 8,000 BCE.

Social Conditions – Transition, “bridge” from hunting-gathering to

cultivating – becoming settled

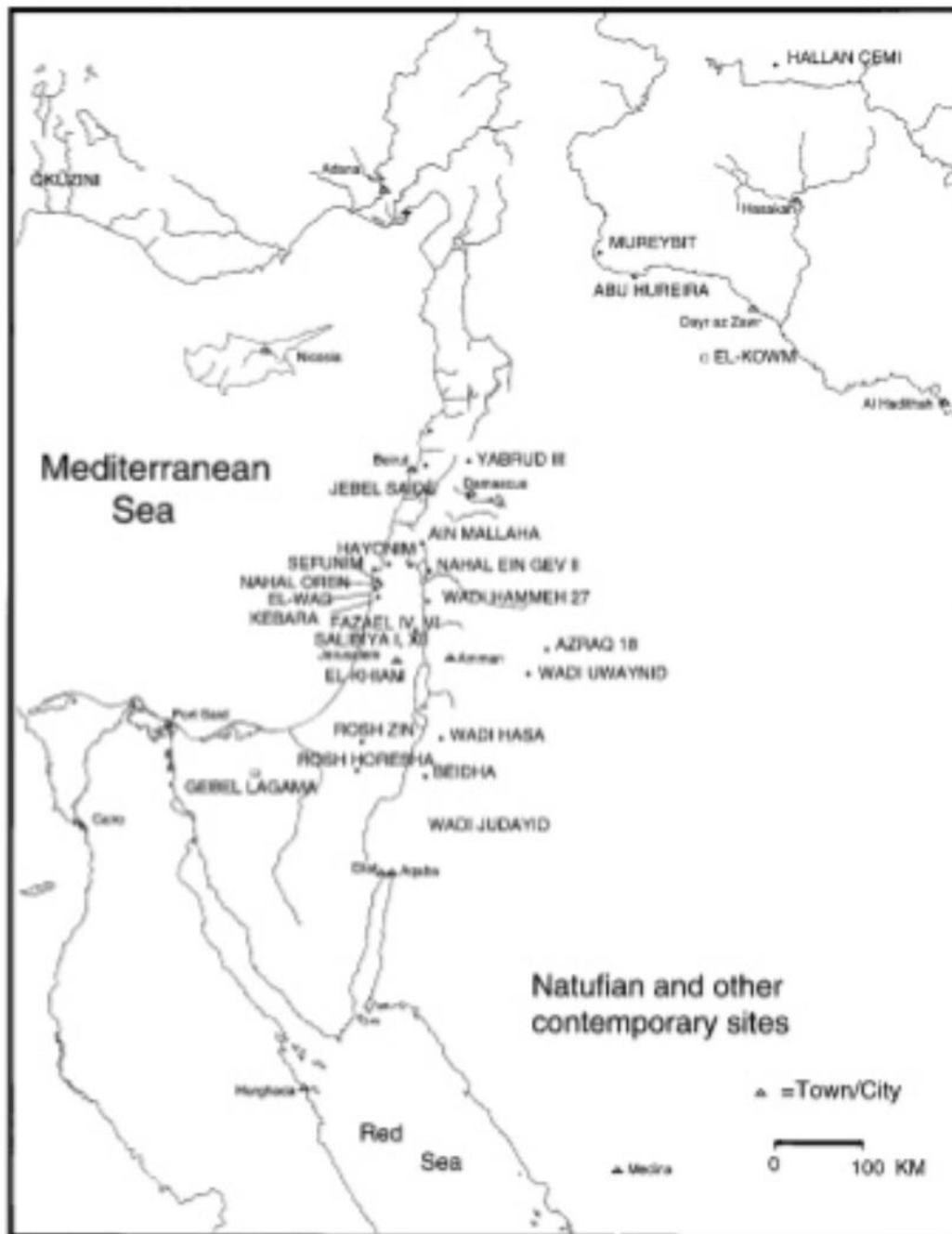
Religious - ancestor worship, veneration of the dead
Imagery

Painting moved out of the caves into the open on rock wall surfaces. Subject changed from animals to groups of people. The humans shown in rock painting are highly **stylized**, rather like glorified stick-figures. These humans look more like **pictographs** than pictures, and some historians feel they represent the primitive beginnings of writing (i.e.: hieroglyphs). Very often the groupings of figures are painted in **repetitive patterns**, which results in a nice sense of **rhythm** (even if we're not sure what they're meant to be doing, exactly).

Natufian **Culture**: precursors to the Neolithic advancements.



four hunters and their chief, painting,
Remisia, Castellón, Spain,
Mesolithic/Neolithic, c. 6,000 B.C.:



Natufian Mesolithic Culture

- many densely populated settlements
- flourished Jordan river valley between 10,500-8000 B.C.E.
- based on cultivation of wild barley and wheat.
- developed advanced agricultural and building techniques
- stratified, matrilineal, and matrilocal
- 9000 B.C.E., climatic change caused site abandonment. Some returned to hunting and gathering; others domesticated wild grains.
- precursors to Neolithic Revolution