UNIT 2 TOOL FAMILIES

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Suggested Reading

Sample Questions

Learning Objectives

Once you have studied this unit, you should be able to:

- understand the selection of raw material and fabrication of the tools;
- discuss different types of techniques; and
- describe the evolution of the tool types and techniques.

2.1 INTRODUCTION

Tool is a smallest unit of *Culture*. Cluster of tools made at a place during a particular time is called an *Industry*. A cluster of industries of a particular locality belonging to a particular time is called a *Culture* in prehistory. Again a cluster of a number of cultures of a given locality forms a larger unit called a *Civilization*. Therefore tools and tool families lead one to understand the different *Culture* of early man and so the knowledge of tools helps in knowing both the tangible and the non-tangible aspects of a *Culture*.

Tools differ from culture to culture and so its making. Tools develop in conformity with the regular upward trend of physical and technological evolution. *Chopper* is a tool on pebbles both small and large and appeared during the early part of the Palaeolithic times followed by the *Chopper-Chopping* tools, and *handaxes, cleavers and disc* occur later. All these are classified as *Core tools* or *heavy duty tools*. *Flake tools* or *light-duty tools* were made at the end of the Lower Palaeolithic times. Earlier to Lower Palaeolithic, some controversial tools were collected from parts of England, and scholars and researchers belonging to Earth Sciences and history gave them a status with a name called *Eoliths* and the period assigned to them was the *Eolithic time*. Tool families of each and every cultural phase of different ages of humankind reflect different physical features those resulted from the application of a some kind of tool-making method. Prehistorians and archaeologists have given some names to the tools according to the nature of work it performed together with the name of a technique, which was applied in making the particular tool. Therefore tools are time specific.

Large sized tools such as handaxes, cleavers, chopping tools are observed in Lower Palaeolithic stage; flake - tools like scrapers, points and borers etc. found in Middle Palaeolithic stage; and blade tool technology is the characteristic feature of Upper palaeolithic culture.

2.2 RAW MATERIAL

Early man used both perishable and non-perishable materials for making tools for his day-to-day subsistence and for survival as well. Tools of perishable materials like wood and bamboo do not survive in archaeological ruins but from ethnographic sources, evidence about such tools is very much obtainable. Prehistorians and archaeologists could also trace tools from perishable materials amongst the modern primitive communities during their visits on research exploration. In Southeast Asia, chopper is used in making bamboo and wooden tools. On the other hand, plenty of stone tools reach the hands of Prehistorians and archaeologists, and who, on their part do reconstruct the *culture* of early man on the basis of tools unearthed from stratigraphic sequences.

Three basic rocks namely, the igneous, metamorphic and indurated sedimentary were chosen in making a stone tool. But early man's preference primarily pinpointed at the igneous rocks for the purpose of making tools. Flint was the most preferred variety of rock in Europe followed by quartzite in Africa and in Indian Sub-continent. Igneous rock comprises agate, chart, chalcedony, jasper and quartz and other precious and semi-precious stones.

The raw material used to manufacture a given set of tools can show whether this was quarried from distant outcrops or these are merely picked up from available river bed. Former reveals early man's advanced knowledge about a better quality of rock types and the latter was a common source of rock in the form of gravel, boulders and gravels in a river valley.

Name	Cultural Period	Age
Chopper, Chopper-chopping, Cleaver, Disc	Abbevillean/Acheulean	Lower Palaeolithic
Scraper, Mousterian points and others	Mousterian	Middle Palaeolithic
Blades, Points and Bone tools	Aurignacian, Solutrean, Magdalenian	Upper Palaeolithic
Microliths	Mesolithic	Middle Stone Age
Celt (Axe, Adze, Chisel and dothers).	Neolithic	New Stone Age

2.1.1 Tool Classificatory (Basic in brief)

2.3 TECHNIQUE OF MANUFACTURE

The techniques used in fabricating stone tools were recorded on the basis of experiments done by experts from the disciplines of prehistory and archaeology.

Tool Families

Techniques were learnt amongst the primitive communities learnt in Pacific regions, Southeast Asia, Andaman and Nicobar, Africa and many territories of the globe.

To know the stone fabrication techniques, go through the relevant portion on tool technology from Unit 3.

2.4 STATE OF PRESERVATION

Antiquities are deposited by one or more natural activities. Very often these are carried by river and are rolled. At times fine deposition of line encrustation or iron, aluminium or chromium patination can be seen spread over the surface of the tool. It is an accepted methodology in Archaeology to use these or other degrees of rolling, patination or encrustation to decide the relative antiquity of the discovered specimens. It comes quite handy when one needs to separate a group of tools which have got mixed with another fresh looking group of tools.

2.5 TOOL TYPES

One needs to delve into the fact that both tool types and their method of manufacture have a kind of observed hierarchisation. For instance, core tools characterise Lower Palaeolithic and even in this one can say that stone hammer technique occurs earlier than cylinder hammer techniques. In the same way flake tools characterise Middle Palaeolithic and Thick blade tools (not fluted blades but punched blades) characterise Upper Palaeolithic.

Pebble tool

This term, in a strict sense, does not refer to any specific tool type. There are many kind of tools that can be prepared on pebbles. However, many authors use this term to include two tool types. These are Choppers and Chopping tools.

Chopper

The term chopper was first used by Hallum J. Movius Jr. for the first time in 1942 while describing tools collected from Sohan Valley, then in North-West India. Subsequently this term is used all over in European, African and Asian prehistory.

A broad and thick pebble which is broken transversely is chosen. Then with this transverse-end as platform few scars are removed from one of the surfaces in such a manner that the remaining part of the platform appears projected as a transverse cutting edge. Generally all choppers have a transverse cutting edge, but if the flaking produces a pointed end such a type can be called a pointed chopper.

Sometimes the flaking is done alternatively from both the surfaces of the pebble. These were termed chopping tools by Movius. A chopping tool also has a transverse working end but this border is sinuous because of alternate flaking. Since both these types are essentially similar in morphology and technique of manufacture except for the fact that a chopping tool is bifacial, many authors today do not count these as two separate types and call them as unifacial and bifacial choppers respectively.

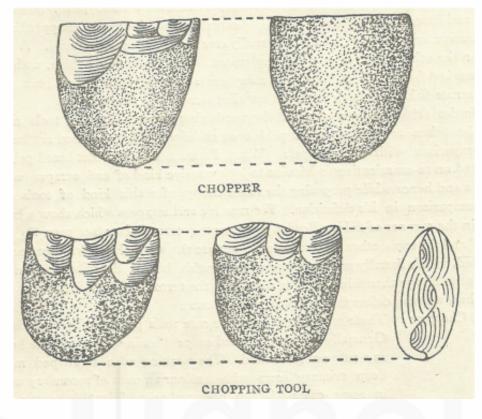


Fig. 2.1: Chopper and Chopping tool

Choppers are one of the predominant too types in Lower Palaeolithic of East Africa and here these are also called *Oldowan* after the name of Olduvi Gorge where these occur through several levels. In Europe these describes from Clactonian in England as also from Central Europe. Mostly these are all grouped together in a techno-complex termed Mode I.

Core tools

Every piece of stone has two surfaces, two borders and 2 ends. If both these surfaces are worked and hence covered with flake scars, such a specimen is called a core tool. If both the surfaces are not worked (i.e., maintains original cortex) but only borders are worked then also this specimen will get classified as a core tool.

Basically there are three major types that will get classified as core tool. These are:

- i) **Discoid core:** These are circular cores, as the name suggests. Flakes are removed from all around the circumference. The maximum thickness of the tool is in the centre. It can be worked unifacially or even bifacially. These can be profitably used for cutting or shaving wood.
- ii) **Handaxe:** Handaxe is one of the most prolific tool type found all over the world during the entire length of lower Palaeolithic. However, this tool type is not quite common in all the south east Asia. It is also designated to form the techno-complex, Model II.

It is essentially a biface prepared in such a manner that one end of the specimen is broader and thicker while the other end is narrow and sharp. It is because of this sharp and pointed end that many authors started calling the "working end". The opposite end which is often thick and bulbus was called the "butt-end'. However, since these terms refer to assumed function strict structuralist prepared to call them the anterior and the posterior ends, respectively.

When the handaxe prepared is massive and the technique used is block-on-block or stone hammer technique such handaxes are taken to characterise lower Acheulian tradition. These specimens are often more than 15 cm in length and maintain sinuous working borders. The reduction sequence and planning of these tools show a great deal of perfection and planning with distinct cognition of the resultant.

Once the technique shifts to cylinder hammer all the rough edges are regularised and smoothened by careful series of retouchings. The handaxe now become 6-14 cm in length and are as perfect in shape as to be compared with an almond (amygdaloid), a lance head (lanceolate) or even a heart (cordiform). Some of the middle to Upper Acheulian Handaxes also show a distinct extended S-twist as the lateral or working border. One of the most evolved of these handaxe is an Ovate. This is a type where the maximum thickness shifts from the proximal or butt end to the centre. The shape of the tool is slightly elongated elliptical. The entire tool is covered with extensive dressing all along the circumference. In shape these compare with the sports item discuss that is used as a missile. The only difference is that the Ovate is not circular.

If a core has been shaped like a handaxe but one of the surfaces is entirely original cortex then such a specimen can be called a proto-handaxe. This is mainly because handaxe by definition has to be a biface. Thus, leaving an entire surface untouched shows that it has not been finished, hence the name. If, however, one of the surfaces has single flake scar with a positive bulb of percussion then this needs to be called a flake handaxe. In some countries in the old world flake handaxes are quite common in middle and upper Acheulian evidences.

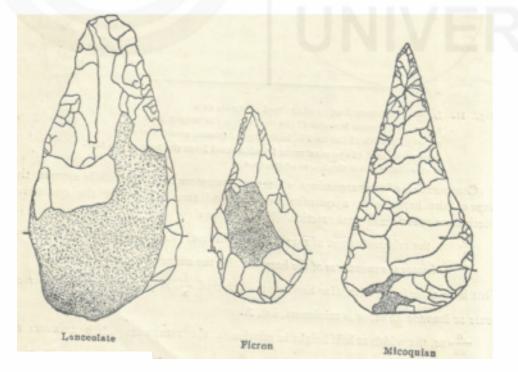


Fig. 2.2: Different types of Handaxes

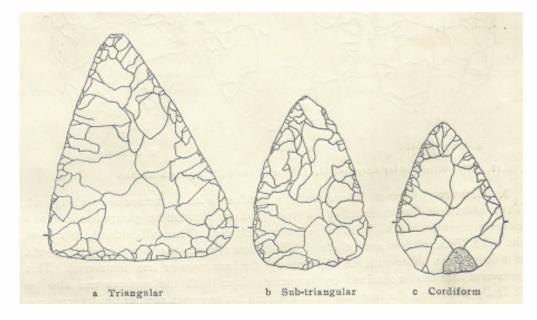


Fig. 2.3: Different types of Handaxes

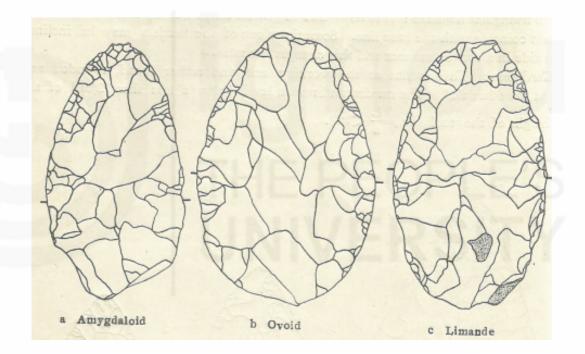


Fig. 2.4: Different types of Handaxes

Cleaver

This is also a biface like a handaxe, with the only difference that here the working end is broad, transverse and not pointed. The difference between this type and handaxe is so little that Francois Borders suggested that these should not be counted as two separate types. The generic type was named 'Biface and handaxe' and cleavers are re designated as two sub types of this.

In India and Africa a large majority of cleavers are prepared on medium sized flakes. A flat and sloping scar is so removed from the anterior end that this intersects with scar of detachment of the under surface to give rise to a transverse working end. The lateral borders are worked in such a manner that the cross section of the tool appears like a parallelogram.

Thus, whether on a core or on a flake the cleavers generally will have parallel side represented by lateral borders culmination into a sharp border across the axis at the anterior end. These cleavers as a rule have a shape like a 'U'. In some cases the sharp border is not actually across the mid axis and is inclined to the right or left. Such cleavers are designated as a cleavers with inclined working edge. There are yet some cleavers where the posterior end is both thick and also pointed. Such cleavers are called 'V' shaped cleavers is contradistinction to what has earlier been described as 'U' shaped cleavers. Both these varieties of cleavers can be either made transverse or inclined.

For statistical analysis as also for computation of proportion of core tools to flake tools, handaxes and cleavers made on flakes are classified within core-tool category.

Flake tools

A flake can be big when detached from massive cores. But such massive flakes are seldom used to make flake tools. These are usually made on flakes which do not exceed 8 to 9 cm in length. The larger flakes are often the staring point for preparing a handaxes or cleaver but not what is understood by the term flake tool.

A flake becomes a tool only when it is worked and very precisely 'retouched' along any one or the both the longitudinal edge. The area so worked determines the type of a flake tool. Here a word of explanation is required for the word "retouching." A series of nibblings executed in a contiguous manner along a border is called retouching. A flake tool seldom shows any kind of attention to its surfaces. (Refer to relevant portion on tool technology from Unit 3.)

In case of a piece of flake tool, a bulb of percussion appears on the main flake surface at the point of impact of the hammer blow, characteristically both of them remain untouched excepting employment of retouching on the edges. On the other hand opposite surface will show some flake scars of earlier workmanship or the traces of original pebble cortex, and largely remained untouched. In case of levalloisean flake, of course, the entire dorsal surface will show the centrally directed flake scars removed before the 'flake' was detached from the parent lump of stone or a prepared core.

There are four predominant flake tool types. These are (i) side scraper, (ii) point, (iii) Borer and (iv) Knife.

Side Scarper: This is the most prolific tool type of the Middle Palaeolithic period. A simple flake is taken and retouching are delivered along one of its borders. This is designated as a 'single side scraper' when one border is retouched. This border can be convex, concave or straight. To determine if the border is convex etc. a simple method is prescribed. Bring a pencil or a scale and touch the retouched border. If it touches the straight pencil at one point then call this border convex. If it touches at two points then call the border concave. If it touches at more than two points call the border straight. Thus, we see that a single side scarper can have three sub types. These will be written as 'Single Side Scraper Convex', 'Single Side Scarper can be when two of its borders are retouched in such a manner that they do not meet. Such side scrapers will have six possible sub-types. These will be written as 'Double Side Scraper bi-convex'

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or 'double side scraper concave-convex' and so on. If the two scraping borders meet at a point then such side scrapers are termed 'Convergent side scrapers'. In this category we do not count size sub types. Here concave is taken as the most dominant feature, straight the next dominant and convex the least dominant. So that if the two borders in a convergent side scraper are straight and convex it will be called straight. In the same way, if the two borders are straight and concave it will be called concave. Thus convergent side scarper straight will have only two convergent borders. In a tabular form it will be as follows:

Convergent side scraper convex

Convergent side scarper straight -

-a) Convex + straight

- Convex + Convex

b) Straight + straight

Convergent Side Scraper Concave – a) Concave + Concave

- b) Convex + Concave
- c) Straight + concave

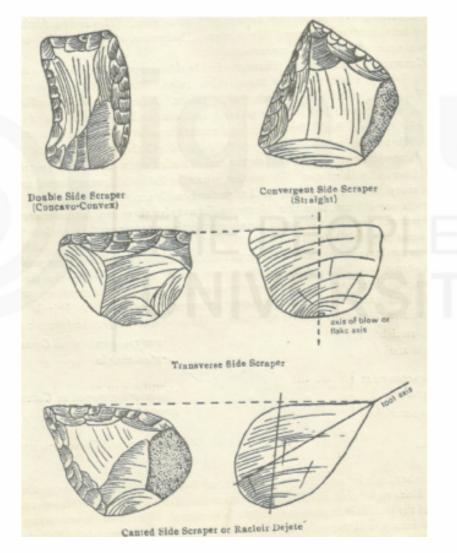


Fig. 2.5: Different types of Side Scrapers

Finally, a fourth variety of side scarper is also described. This is called 'Transverse Side Scarper'. If the retouched border of the flake is situated across the positive bulb of percussion (which is usually situated in the under surface) such a type is called Transverse Side Scraper.

The relative frequencies of all these varieties of side scrapers, their manner of preparation and the various sub types provide a very useful tool that demonstrates regional variations in respect of adaptation and skill as also the fashioning trends.

Point: A flake is so retouched along its two converging borders that a pointed end is projected anteriorly. The emphasis of this point is more sturdy than sharp in Middle Palaeolithic. In Upper Palaeolithic these points are both thinner and sharper. In many cases the converging borders are not more towards the pointed region. The base of this triangle shaped can also be given a lateral in curve like a shoulder. Such specimens can be called single shouldered point. If a similar shoulder is made on the other side of the base it will be called a double shouldered point or an arrow head (Aterian culture in North Africa abounds in this tool type). As mentioned, varieties of points dominate in European Upper Palaeolithic after the Mousterian Culture of the same territory. Authors of the former were the Homo Sapiens sapiens i.e. the Cro-Magnon, Grimaldi and the Chancelede whereas Homo sapiens i.e. *Homo Neanderthalensis* ruled the latter.

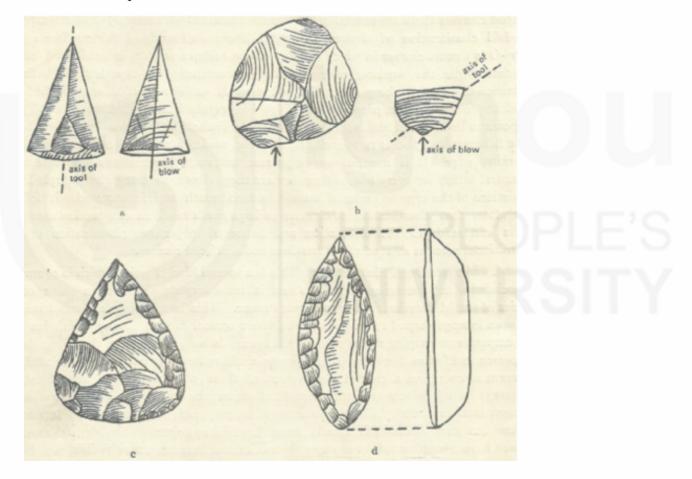


Fig. 2.6: Different types of Point

iii) Borer

These are usually prepared on sturdy flakes. Two lateral in curves are made in such a manner that a part of the flake projects out in the manner of a spike. Some times on suitable flakes only one lateral in curve is enough to get the boring edge project out. Such borers are termed 'atypical borers'.

The method of producing lateral in curves on the border of flake is also termed as a *Notch*. Such types can be prepared both on a flake as also on a blade. If two

or more notches are prepared in a contiguous manner such a type is called a *Denticulate*. Like in the earlier case a Denticulate also can be prepared on both flakes as also on blades.

iv) Knives

'Knife' as a type of flake tool was not recognised till about 1965 when Francois Borders published his recommendations for Lower and Middle Palaeolithic tool types. This is prepared on a thick elongated flake. One of the lateral edges or borders is thick and is blunted by removing several step scars. The other edge or the border is sharp and runs along the lengthwise axis of the flake. The two surfaces of the flake intersect and thus produce a sharp cutting edge to work with. The finished specimen looks exactly like a single pool of a common orange. The thicker edge is meant for holding in hand of the worker and the opposite sharp in cutting and scraping. It also designated to form the techno-complex, Mode-III.

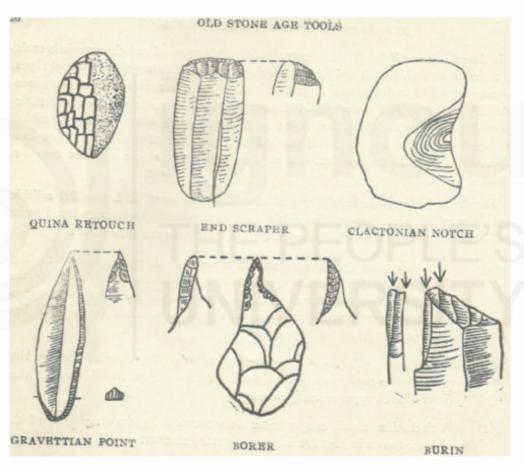


Fig. 2.7: Tool types of Middle and Upper Palaeolithic cultures

Blade tool types

A blade is a long flake that has two parallel margins with the presence of thin elongated flake marks on one of its surface. Normally, it has a length more than or equal to twice its breadth. That is, every blade is essentially a flake but every flake is not a blade. These are usually 8-9 cm in length, 2-3 cm in breadth and 1-2 cm in thickness. The technique of their manufacture is punching, i.e., indirect percussion with an antler used as an intermediate puncher. Since blade is also the term used for microliths produced by fluting technique it is advisable to use the term punched blades or 'Upper Palaolithic Blades' for these thick blades. For those prepared by fluting the term used is either as 'P.S. Blades' (parallel

sided blades) or simply fluted blades. There are numerous types of tools that are produced on blades during Upper Palaeolithic, but the most dominant among them are (i) Retouched Blades, (ii) Backed Blades, (iii) Burins (iv) End Scraper and (v) Leaf points.

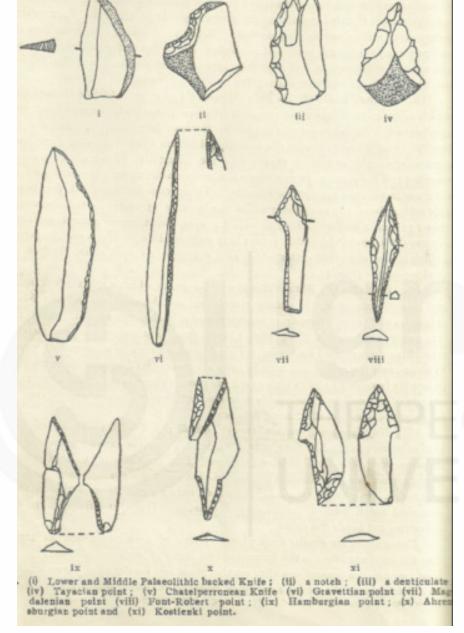


Fig. 2.8: Different kinds of Blade tool types

i) Retouched blades

These are one of the most characteristic types found in the Aurignacian tradition of Southwest France. In fact in European prehistory these are designated as "aurignacian blades'.

A blade can be retouched in two distinct manners: In one case, the edge or the border is so retouched that its sharpness does not disappear but reinforced. This kind of retouching is called *semi abrupt* retouching. Thus, one makes a distinction between Retouched Blade (wherein semi abrupt retouching are executed) and *Backed Blade* (wherein retouching are steeply executed in order to blunt the other border of the blade).

A retouched blade is a thick blade which is retouched in a semi abrupt manner all around the four borders of the rectangular blade. The finished specimen looks like a slug with a flat ventral surface.

ii) Backed blades

These are blades in which one of the sharp borders of the blade is blunted with the help of steep flaking. The manner in which this backing is done determines the type.

- a) If the backing is done in such a manner that the backed border meet the sharp border at a wide angle the type is called *Chattelperronean knife*. Here, it is important to emphasise that we have already defined a type called *knife* in flake tool type. A *Chattelperronean knife* is made on a blade and is an upper Palaeolithic tool, in opposition to the flake knife which is a Middle Palalaeolithic tool type.
- b) If the backing is done in such a manner that the backed border meets the sharp border at an acute angle then the specimen is called 'Gravettian Blade'.

Both Chattelperronean knife as well as the Gravettian Blade are the type of tools for an Upper Palaeolithic tradition of France called Perigordian.

iii) Burins

These are blades in the anterior end of which a screw-driver like edge is prepared by the careful removal of two sloping facets. It is done with a vertical blow of a light at one end of a blade held upright. These facets intersect to form the working edge which is equal to the thickness of the blade. Since two facets meeting at an acute angle give rise to the working edge the type is also referred to as 'dyhedral angle burin'. These are large number of subtypes of burins identified in Southwest French Prehistoric time. These are 'Basque Burin', 'Nailles Burin', 'Bec-deflute Burin' and 'Parrot Beak Burin'. Essentially all these subtypes of Burins are all dehyderal angle burins, it is only the manner in which these two hedras are created that separates one type from the other. A Burin is also named as 'graver' and was used in engraving art objects in caves and rock shelters in Western Europe.

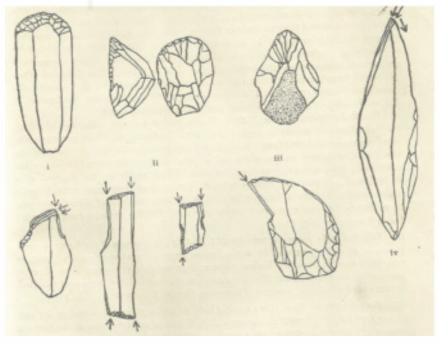


Fig. 2.9: Different kinds of Burines

iv) End Scarper

A scarping border made of the morphological end of a flake forms this type. However, since neither a circular or square flake can have an end it is mainly on a blade that one can have a morphological end. Thus, end scrapers are thick blades in which the terminal end has been given these retouchings.

These are delivered from the flat under surface of the blade in almost a semi abrupt manner. There is another variety of end scarper prepared on thick egg shaped nodules and these are called *Carinated End Scarper*. The egg shaped nodule is first directed in an oblong manner and then with the flat surface so obtained as platform one edge of the circular edge is given steep retouchings. The tool can conveniently be used in the manner of a carpenters push plain. Sometimes two notches are removed from the two edges of the retouched border so that looking from top it looks like a nose. Hence, the type is called Nosed-end scarper (Otherwise it is essentially counted only as a variety of carinated end scarper). The last two tool types are characteristic of French Aurignacian.

v) Leaf Points

This is a very characteristic tool type of Solutrean tradition of French Upper Palaeolithic. Here flat flakes or blades measuring in average $6 \text{ cm} \times 2 \text{ cm}$ are given series of scars on both the surfaces by pressure flaking technique. As a result the blades are so reduced in thickness that they tend to be less than 1 cm in thickness. The anterior end is then pointed. These look like leaves of a tree and hence the name. In France these are called *Laurel leaf points*. In slightly later period these leaf points are short and unifacillay worked. These may or may not have a shoulder also knocked out on them. These are called *Willow Leaf Points*. It also designated to form the technocomplex, Mode-IV.

Microliths: This is a name given to tools which are prepared on fluted blades. As a consequence they are, an average much smaller than the prehistoric tools described earlier. Hence they are named 'microlith'. These are so small that no body can imagine that they could have been used individually. Further, cave paintings as also some evidences from excavated material have now confirmed that these were used by hafting in combination to produce the ultimate weapons to be used as a 'composite tool'. Arrow head and harpoons are two of the most common possible use for them. Microliths start occurring from around 14000 BC and continues till agriculture began during 6000 BC. In fact, in lower frequency, these can be seen to continue even during Iron Age in many parts of the Old World. In India, microliths are known to be used even today by Korwa tribe of Mirzapur district for cutting the umbilical cord of the new born baby. Some authors even identified microliths prepared on glass by some tribes. The glass is obtained from discarded wine bottles by World War II soldiers. Microlithic tool types are mostly prepared by blunting a sharp border. The most common types are Lunates, Obliquely blunted blades and trapezes. Besides these, one can also see some Upper Palaeolithic types repeated on these micro blades. These are end scrapers and burins.

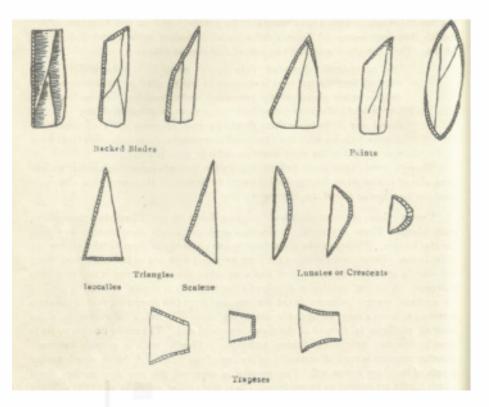


Fig. 2.10: Different kinds of Mesolithic tool types

When no triangles or trapezes are present in a microlithic cluster, it is often designated as 'Non-Geometric Microliths'. In case the cluster has triangles and trapezes this is designated as 'Geometric Microliths'.

Lunate or Crescent: If one border of a blade is so blunted that it is semi circular in shape and meets the sharp border at two points such a type is called 'Lunate'.

Obliquely blunted blades: These are similar to Gravettian points with the only difference that these are prepared on these smaller fluted blades.

Triangles and Trapezes: These are blades blunted in such a manner that they take up these geometric shapes.

Grinding and Polishing: This is a technique that has evolved in the last phase of stone age (Neolithic). It is believed that one of the most important issues linked with survival was to clear virgin forests and create agricultural fields. The sturdy axes they used to know earlier will get stuck within the split of the tree trunk. Consequently they chose to smoothen the surfaces of these axes by what is described as Grinding and Polishing technique. The type which is prepared by this technique is called a *celt*. Celt is a generic name and includes such types as *Axes, Adzes, Chisel, Wedges*.

The technique involves the following steps:

Flakes: A suitable rock is chosen and then it is flaked in the shape of an axe (similar to a cleaver in Lower Palaeolithic).

Pecking: A pointed hammer (mostly an anther tip) is used to systematically break all the ridges on the surfaces of the axe. These ridges are created when two flakes scars intersect.

Grinding: The flaked or pecked flake or core is later grounded on a stone slab to get the required shape and size with the production of a working edge.

Polishing: The axes so prepared are now having a more or less smooth and regular surface. These are now rubbed on hard granite stone with sand and water thrown in from time to time. The result of this action creates on axe which, unless told, can be mistaken as a metal axe. It is so shining.

Usually all axes are biconvex in cross-section. These are, however, some which are plano-convex in cross section. These are believed to be used for chiseling. These are called 'Adzes'. Some Adzes have an elongated body and a slightly narrowed anterior end. These are called 'Shoe-last celts', on the assumption that these were probably hafted as a shoe to the primitive ploughs.

Finally another type that emerges with this technique is called a 'Ring Stone'. There are flat round stones in the centre of which a hole is made using a spindle with hard quartz as the tip. The extremely varied size and shape of these ring stones make it very difficult to comment on their probable function. The general view is that the massive ones were probably used as mace head for pounding crops, while the small ones were probably used as net sinkers in nets used for fishing.

2.6 SUMMARY

In the journey of human evolution if we will see and analyse the past then we can say our ancestors have spent 90% of their life in Stone Age. This lesson basically dealt with the how prehistoric man survived with these simple stone tools. This unit also dealt with cognition of prehistoric mind.

Suggested Reading

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Sankalia, H.D. 1962. *Stone Age Tools. Their Techniques, Names and Probable Functions*. Poona: Deccan College.

Sample Questions

- 1) Discuss the tool types and techniques of Lower, Middle and Upper Palaeolithic Culture.
- 2) Discuss the tool types and techniques of Mesolithic and Neolithic Culture.
- 3) What is Blade tool?