THE ART OF THE PALAEOLITHIC STONEWORKER.

NARRATIVE.	FILM SCENE.
Archaeologists investigating man's origins have now shown that the earliest human fossils and tools lie deeply buried in old lake sediments in tropical Africa and are some two million years old.	2 or 3 stills of East African sites (Olduvai, Olorgesailie, Isimila).
While much of the equipment of early man must have been made from wood, this has only very rarely survived the vicissitudes of burial and of time so that it is the imperishable artifacts made from stone that are the archaeologists' chief clue to the behaviour of these early hominid populations.	2 stills of Kalambo Falls wooden tools.
The making of a stone tool may result in much waste in the form of flakes, cores and lumps struck from the tool in the course of manufacture and the camping places of the Stone Age craftsmen are often littered with large quantities of such waste.	The waste from Bordes' working showing flakes coming off and lying on the ground. Workshop waste on a prehistoric site - stills.
It was not until some 5000 years ago, with the discovery of how to smelt metals, that man turned from stone as the most important material available for a variety of purposes - chiefly cutting, scraping, gouging and so on.	Could show these activities - chopping a bough, cutting, scraping, etc.
A study of the stone tools themselves, of the camping places of the makers, provides some of the most constructive evidence on human behaviour and skills.	
From 1857, when the discoveries of handaxes and fossil animals by Boucher de Perthes in the gravel pits of the Somme at Amiens in France, were first accepted by the scientific world, archaeologists have been concerned to establish the relative and absolute age of the remains they are studying as well as the way of life of the makers. The time scale that has resulted places all these remains in their correct relationship one to the other.	Still of Boucher de Perthes. Diagrammatic time scale of Palaeolithic and Mesolithic with dates and main cultures shown. Sketches to show main tool types.

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NARRATIVE.	FILM SCENE.
The Palaeolithic, or Old Stone Age, is divided into three stages - lower, middle and upper - each of which has a number of characteristic cultural assemblages and individual tool forms, from which can be seen the gradual but steadily increasing complexity of the stone technology.	The main stages to be pointed out with arrows. Could use still reconstructions of a camp scene in Lower, Middle and Upper Palaeolithic.
The Mesolithic was a time of cultural re-adjustment to the amelioration of the ecological conditions of post-glacial time when man became an advanced and specialised hunter, fisher and gatherer.	Still of lakeside fishing camp reconstruction.
The Neolithic, or New Stone Age, began about 7,500 B.C. and saw the flowering of settled community life with the domestication of plants and animals and the development of fully food producing economies.	Still of a Neolithic settlement site (excavation) and a reconstruction of this or another.
Up to the beginning of Neolithic times changes in technology must have been more or less universal and approximately contemporary but after the development of agriculture considerable cultural disparity becomes common. Thus today we find hunting-gathering groups of Bushmen, Pygmies, Australians and South American peoples who preserve the way of life of earlier prehistoric times. These, as well as many authoritative accounts of North American Indian and Eskimo populations, provide clues to the patterns of livelihood of some of our Palaeolithic and Mesolithic ancestors.	Stills of Bushmen, Pygmies, Australians and Eskimo.
At the same time as anthropologists study the existing Stone Age populations to learn how particular tools are made and used and their economic importance to the group, archaeologists have carried out experiments in the flaking of stone to determine the techniques involved as well as the degree of skill and time required to make them.	
One of those who has not only experimented but become proficient in reproducing the handiwork of Palaeolithic man is Professor Francois Bordes of the University of Bordeaux who can manufacture tools that stand up	Close up of Bordes and shots of working.

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NARRATIVE.

FILM SCENE.

to the closest comparison with the originals.

The basic principles of working stone are not complicated but the skill needed to reproduce stone tools only comes from long practice and experiment.

To remove a flake the block of stone must be struck a glancing blow which permits the force to travel away from the centre of the block.

Section here on what the various pieces are called - core, flake, platform, etc.

By varying the force and direction of the blow and the nature of the implement with which it is struck, a number of techniques become possible each producing characteristically distinct results.

Diagrammatic cartoons showing block of stone (struck) - cone of percussion - a genuine cone. Diagrammatic striking of a flake - the actual striking of a flake (percussion) - demonstration of the features exhibited by the flake.

Stone is most commonly worked by percussion, either by striking the piece being worked - the nucleus or core - with various kinds of hammers; by hitting the core on an anvil flakes will be removed by the direct percussion method. If the core is rested on the anvil and then struck, flakes will be removed from the edge that is in contact with the anvil by indirect percussion. Another method of indirect percussion flaking is by using an intermediary punch of bone, stone or hardwood between the core and the hammer.

Demonstrate indirect anvil technique.

Demonstrate punch technique.

More refined work can be produced by pressing off flakes in various ways.

Of course nature can imitate all the techniques used by prehistoric man. Pebbles can be split by percussion as a result of falling over cliffs or waterfalls onto rocks below or by being shattered by blocks falling on them from above, or again by wave action on the sea shore. A scree or talus deposit, compression of debris or slumping by underground collapse in a limestone cave or sinkhole will produce well trimmed edges by pressure flaking.

Still of a waterfall or gorge and sea-shore followed by demonstration of beach cobble and pebbles broken in gorge.

Still of a scree.

Still of a limestone cave with deposits or a section drawing of same (Bethlehem).

NARRATIVE.	FILM SCENE.
Not infrequently such naturally fractured stones are mistaken for man's early and crude attempts at tool making. They can always be distinguished, however, if the nature of the deposit in which such specimens occur is known as well as the agencies responsible for its accumulation.	Show one or two that look like human work.
Also, since naturally worked pieces never show any consistent design or shape, the flake scars exhibit varying stages of wear and weathering since they were not all produced at the same time;	Demonstrate with the finger comparing with a handaxe or other tool.
also the edge of pressure flaked examples is steep while in human work the retouched edge is on an average much more acute.	Demonstrate with the finger. Demonstrate, comparing natural and artificial retouch.
The oldest tools are simply split and flaked pebbles or lumps of stone and they are found at what were once temporarily exposed mud flats round the edge of a former lake at the Olduvai Gorge in northern Tanganyika. They are made from lavas and quartz, sometimes carried in from several miles away.	Stills of Olduvai Gorge - general view and close-up of living floor with tools.
The removal of only one or two flakes is all that is necessary to make an effective chopping or cutting tool. If the pebble is flat it can best be shaped by working from one side only. If it is thick it is necessary to work it from both sides. At the same time the flakes so removed were used as cutting tools.	Demonstrate the flaking of pebbles from one and two directions and the results.
Rough hammer and bashing stones for breaking bones and pounding roots are also found.	Demonstrate bone breaking and pounding with stones.
These tools belong to what is called the Oldowan Culture which lasted for about one million years undergoing gradual but very slow development.	
Add something here about the makers if necessary).	
By approximately one million years agotool making hominids were spread over most parts of the unglaciated regions of the Old world. Culture, brain size	

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NARRATIVE.	FILM SCENE.
and increased efficiency developed from mutual interaction and in the Middle Pleistocene a small but significant number of recognisable and standardised stone tools were being made.	Show a group of Chellean tools.
One characteristic form is the Handaxe, another the cleaver and these belong with a host of small flake tool forms to what has sometimes been referred to as "The Great Handaxe Culture".	
In the earlier stage (Chellian or Abbevillian) the pebble choppers have developed into more pointed forms which become gradually more shapely through time. They have been worked, either by using a hammerstone or by striking the tool on a round stone anvil.	Making of an Abbevillian handaxe.
The flakes so removed are broad and thick with a wide striking platform while the scars left on the bifacial tool itself are deep. In profile the edges are sinuous or wavey.	Show the flakes. Show side view of tool.
Increased technical skill and experimentation in the later or Acheulian stage of the Handaxe Culture enabled man to make often very shapely handaxes by what is known as the cylinder hammer technique. Here the areas of hammer and core that come into contact are minimal and if a softer hammer is used - such as a wooden, antler or bone billet - the force of the blow is diffused along the immediate surface of the tool producing a thinner and longer flake than by the stone percussion method. Such a technique is believed to have been used by the flint-using Lower Palaeolithic inhabitants of Europe and the Near East.	Show a bar hammer Demonstrate making a handaxe. Show the finished tool and the resulting flakes.
In Africa and India where hard rock - quartzites and lavas - were commonly used tools were more often made from large flakes obtained by anvil technique. Finely finished handaxes and cleavers - with axe-like cutting edges-were made, even in these	Show a large flake ready for use.

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NARRATIVE.	FILM SCENE.
hard rocks, probably by using direct and indirect methods on round or pointed anvils, or even by means of round stone hammers.	Making a cleaver by direct anvil technique and/or by round hammerstone.
	Demonstrate the cleaver.
Such round hammers become more spherical the longer they are used and they must have been employed for a variety of purposes. It is believed that they were later made purposely as spheroids, possibly for use as a missile, as the head of a club or the weight for a bolas.	Demonstrate the technique and some finished spheroids.
Lower Palaeolithic man also made use of many small tools on flakes and chunks for scraping, grooving, cutting and other purposes. They were made by hammerstone and often show careful notching and retouch. Sometimes, as in southeast England or the Far East, these, together with choppers, are the only stone tools found.	Show some of these small tools.
This hammerstone technique is known as Clacton technique from the site at Clacton-on-Sea in Essex and it occurs from the beginning to the end of the Stone Age.	Show hammerstone technique and anvil and the resulting flakes and cores.
Add section on the attributes of the Clacton flake if necessary.	Point out the features of these flakes.
During later Acheulian times an ingenious but simple way of obtaining large and reasonably thin flakes was evolved and is found in several parts of the world, notably in western Europe and South Africa. It can be seen to have evolved from making the large bifacial tools. This method is called the Levallois technique after the Parisian suburb of Levallois-Perret.	Show Levallois core and demonstrate points as mentioned.
It consists of carefully preparing an oval core by flat flaking all round the circumference. This is then struck on a platform that usually shows careful preparation, by direct or indirect percussion, in such a way as to remove one large flake which forms a very effective cutting and scraping tool with very little need to retouch it. Such retouch as occurs is of a fine, flat, feather edge or squamous nature.	Demonstrate the making of a Levallois core and striking of the flake. Show resultant flake and core form.
	Retouch by wood demonstrating the result.

Add ref to Levallois Convergent/Parallel cores

Demonstrate

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NARRATIVE.	FILM SCENE.
In South Africa handaxes and cleavers were commonly made from large side- and end-struck flakes obtained in this way. This technique continued in use during the Middle Palaeolithic times in Europe by the Neanderthal makers of the Mousterian Culture who also made use of a small discoid core, from which several small flakes could be obtained with different points on the circumference as striking platforms. Such cores might be utilised until they became too small when they would be discarded or re-used for a different purpose.	Site of Combe Grenalle cave and dig. Reconstruction of Neanderthal man. Demonstrate discoid core and method of working.
The type of retouch associated with the Middle Palaeolithic is known as step flaking and can be reproduced by striking the edge with a bone hammer or resting it on a piece of bone and striking the tool with the hammer. The commonest forms of tool at this time were scrapers and points of various kinds.	Demonstrate step flaking and a side-scraper and point.
In most of Africa and southeast Asia the Levallois and discoid core techniques continued in use up to the end of Palaeolithic times but in Europe, northern Asia and the Middle East they were replaced by industries where the tools were made on long, parallel sided flakes or blades. These blade cultures first appear about 35,000 years ago with the arrival of modern man (Homo sapiens) and at the same time antler, bone and ivory came into common use and necessitated the manufacture of special tools for working them.	Still of an Upper Palaeolithic site Vezere valley and Laugerie Haute? Still reconstruction of Upper Palaeolithic cave scene. Show prehistoric core and the blades therefrom. Show stills of some bone tools.
Blades can be struck from long, flat or prismatic shaped cores by direct percussion using a bone or antler hammer. This technique survived until very recently at Brandon in Suffolk where the famous Brandon gun-flints were manufactured.	Demonstrate striking of blades by percussion. Still of Brandon flint knapper.
Some North American Indians used a punch, operated by one or two men working together, to remove blades of this kind and it has been thought that Upper Palaeolithic man may have done so also.	Drawing of this technique (Holmes).

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NARRATIVE.	FILM SCENE.
Use of a punch produces a very small platform since the punch is rested on the very edge of the core. The bulb is also small but prominent.	Show close-up of a blade and point these out.
These blades were trimmed into a variety of tools which might or might not have been hafted. Scrapers, retouched and backed blades, borers, points and burins or chisels. The latter were used either as an engraving tool by the makers of the magnificent art found on the walls of the caves, on the weapons and tools and on flat sections of stone or bone in the accumulated occupation waste in the rock shelter homes; or as a grooving tool for removing flat sections of antler to make into tools by what is known as the groove and splinter technique.	Show selection of such tools. Show stills or casts of some Upper Palaeolithic art. Demonstrate how burins can be used to engrave. Demonstrate groove and splinter technique or from photos and stills.
There are many kinds of these burins and they are not difficult to make.	Making of a burin.
The retouch on the various scraper and knife blade forms was probably by indirect anvil technique or by pressure.	Demonstrate retouching an end-scraper and a backed blade.
Pressure flaking is first recognised as occurring during the Upper Palaeolithic and is associated with the western European culture called Solutrean after the site of Solutre in central France. By pressure flakes and blades were worked all over both faces to produce thin, lanceolate tools which may have served both as projectile heads and as knives.	Still of Solutré. Demonstrate some Solutrean tools.
The technique survived until historic and recent times in several parts of the world, for example in north America and Australia. It permits the removal of usually only small flakes from the exact point on the tool at which the pressure is exerted. A bone, antler or hardwood flaker was used and the great advantage of the technique is that the worker could remove the flake <u>exactly</u> where he wished.	Stills or action from Barrett's film.

A number of different ways of pressure flaking are known. Most commonly the roughout is held in the hand in a leather pad for protection ot rested on a piece of bark or wood on the ground. The process is slow- taking an hour or longer to make a finished spear or arrowhead - but the result was a tool of finer and thinner proportions than was possible by only percussion methods.

Demonstration by Crabtree.

Show results.

folsom fluting 2-3 ways

Mr Donald Crabtree has found by experiment that if flint is heated before working it flakes much more readily and has a glossy patina that results from alteration of the crystal format- ion of the rock.

Demonstrate.

Some of the finest examples of pressure flaking are the ceremonial knives made by the PreDynastic and early Dynastic Egyptians. The tech- nique is represented on the wall of a tomb at Beir Hassan but is not clearly understood.

Show Dynastic knives with parallel ripple flaking.

Still of Beir Hassan painting.

It is thought that it was a few millennia after Solutrean times - about 15,000 B.C. - that man first entered the New World and some of his earliest tools are beautifully made lanceolate projectile heads, worked by pressure and found in association with kill and butchery places of mammoth, an early bison, giant ground sloth and other large land animals now extinct.

Show map of migration routes across Bering Straits and down the continent.

Still of a kill site.

Show Clovis and Folsom points and other types.

One of the point forms named from the site at Folsom where examples were found with the bones of the early bison shows a single fluting scar on both faces removed from the hollow base of the point presumably to facilitate hafting. The removal of these scars as the final stage in the completion of the tool must have required considerable skill.

Demonstrate Folsom point followed by making of one.

Removing the channelling flakes

In southwest and middle America obsidian was a favourite stone of the Indian populations. Obsidian is a natural glass and is more easily worked than is flint or other stone and in Mexico the Aztec populations were able to press off long blades by means of a long wooden punch with an antler tip.

Show prehistoric blade cores and blades.

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NARRATIVE.	FILM SCENE.
The operator stands upright and, holding the prismatic core between his feet, he presses off from a selected place on the edge, by bearing down on the flaker with his chest, then bringing the whole weight of the body into action. In order to prevent the point of the flaker from slipping, the platform was roughened by rubbing or grinding on a suitable rough rock.	Demonstrate the Mexican method with chest fabricator.
This technique is described by the early Spanish settlers in the New World and Torquemada, Bishop of . . . in the 17th century says. . . Quote.	Still of Mexican Spanish scene 16th century.
By the close of the Palaeolithic and during the Mesolithic, after the end of the last glacial period the competition to extract increasingly more from the natural resources of the environment manifested itself in a variety of new activities requiring new kinds of tools. Tools were now often composite made from two or more different materials and stone was now used in quite small i pieces. This meant that only the best could be selected, reduced weight and enabled broken parts to be replaced instead of having to make a complete new tool. These small trimmed sections of blades and flakes are known as microliths and were often hafted in series with the aid of mastic to form the head and barbs of an arrow or spear or a knife or sickle edge.	Show composite tools and point out the section of a Bushman arrow or a New Guinea spear.
The cores from which the bladelets and small flakes were struck are themselves often very small and there is no certain direct knowledge of how they were obtained. Experiment shows that they may have been produced by resting the core on an anvil and striking the other end with a small hammer thus removing a small blade or blades from one or both ends by direct and indirect percussion. This is known as bipolar technique.	Demonstrate the cores and bladelets. Demonstrate bipolar technique.

NARRATIVE.	FILM SCENE.
Another method may have been very similar to that still used in parts of the Congo basin to make gun-flints. In this case, the worker, seated on the ground, holds the core between his heels and strikes it with a punch or bar hammer. The small blades and flakes were then either retouched directly by pressure or by using the indirect anvil method.	Still of Congo technique and show the results. Close-up of the retouch.
An ingenious way for obtaining small sections of blades that could then be worked into various geometric shapes is known as the micro-burin technique. The blade is first notched by pressure and then, wedged in a vice such as a split in a log of wood, it is twisted sharply, which breaks the bladelet at the notch. The upper section thus obtained is now made into the microlith while the discarded butt end has the appearance of a diminutive burin.	Demonstration of the micro-burin technique. Show upper section then trim it. Show butt section and point out burin edge.
These are some of the main techniques known and proved by experiment to have been used by prehistoric man. The principles of stone working are not difficult to understand but skilled knapping comes only after experience and much practice. A great deal still remains to be learned but by observing the few remaining groups of peoples who are still working stone, by experiment using different materials of varying hardness and sizes and comparing these with the prehistoric tools themselves we come appreciably nearer understanding the ways in which stone was worked, the reason for the selection of particular rocks for special purposes and why there is so much waste with the tools on the living places of prehistoric man.	Still of ?Australian group. Show different tools in different stones. Core-axes in coarse rock, flake scrapers in fine flint. Still of an open site living floor and/or cave excavation showing large quantities of worked stone.

Ce. 29.12.11