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CULTURAL EVOLUTION OF MAN DURING PALAEOLITHIC PERIOD

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Abstract:

In large measure, the development of culture during Paleolithic times seems to have been profoundly influenced by the environmental factors that characterize the successive stages of the Pleistocene Epoch. Human evolution advanced through an interaction between physical traits and cultural development. No one knows for certain how this interaction began, but one view of how it might have come about, the seed-eater hypothesis, fits some of the evidence and accounts for many distinctively human traits. There was a complex interaction involving culture, increase in brain size through natural selection for cultural ability, and the mobile social groups in which these early hunters lived. This article presents an overview of Cultural Evolution of Man during Palaeolithic Period. For this the researcher discuss about the concept of cultural dimensions of Lower palaeolithic period and its representative Homo erectus its physical, social, cultural activities and technological evolution, also discuss about cultural dimensions of Middle and Upper palaeolithic period with explanatory notes on its technological evolution, evolutionary changes in Settlements pattern, religion and economic evolution and abstract thought.

Keywords: Evolution, Palaeolithic Period, Technology, Religion & Economy.

1. Introduction:

Human evolution advanced through an interaction between physical traits and cultural development. No one knows for certain how this interaction began, but one view of how it might have come about, the seed-eater hypothesis, fits some of the evidence and accounts for many distinctively human traits. This view holds that a diet based on seeds led the earliest hominids to live in the open grassland and to develop, through natural selection, the traits characteristic of the family [1]. Hominidae, including reduced canine and incisor teeth, hand-eye coordination of a very developed sort and, possibly, others.

An alternative reconstruction of the beginning of distinctively hominid evolution holds that some tool-using capacity is a very ancient primate trait and that those primates which moved into savanna regions millions of years ago derived important reproductive advantage from tool use. Selection increased this ability and thereby initiated the physical cultural feedback that has characterized hominid evolution [1, 2].

We cannot know what social groups existed among the earliest primates, but we have some evidence from non human primate groups. One view is that the earliest hominids had a baboon like social organization, and another is that there was a child like organization. Both views emphasize the importance of the sexual division of labour and of maintaining ties over a wide territory [3]. In trying to reconstruct the culture of the early hominids we have the evidence provided by the products of part of that culture, tools.

Our first direct evidence of the presence of shared understandings is crude stone tools from 2.5 million years ago. These tools imply very simple culture that endured over the 2-million-year span during which the tools were the only ones humanity had. Around one-half million years ago or, perhaps, 7,00,000 years ago, there was the beginning of a rapid development of stone tools, and by implication, culture.

Concurrently, the human brain was increasing in size [3, 4].

During this period of dawning human social organization and culture, distinctively human physical traits were developing. Ramapithecus is considered by many authorities to be the first known hominid and is often accepted as being 14 million years old, but there is disagreement about both the form's membership in the family Hominidae and its age. The first universally accepted hominid is a specimen from Kenya dating at about 5.5 million years ago. This form is a representative of the genus Australopithecus. This genus has two allomorphs, one robust and one gracile [3].. Authorities do not agree about the significance of the difference between the two forms, but both made crude tools and walked upright with a fully striding, human gait, Hunting was important to the economies of these peoples, but a great deal of their food came from vegetables. Their tools were useful for preparing this type of food as well as meat. It is unlikely they often killed big game, but they killed small animals and scavenged larger ones [4].

Around 1 million years ago, Australopithecines were succeeded by Homo erects, a creature found in a much larger part of the world than Australopithecus was. Homo erects was more like modern humans in many respects than the Australopithecines were. He had a brain size whose average was in the lower part of the modern range, and his height and weight were roughly those of Homo sapiens [3,4]. At the same time, he resembled Australopithecus in some characteristics, so he has a truly intermediate form. Homo erects may be nearly as old as 1 million years and is surely not less than 1/2 million old. He was a true big-game hunter, and the two tool traditions associated with him, the Acheulian and the Choukoutien are much more varied than the Oldowan of the australopithecines [5].

The Acheulian is the second longest lasting tool tradition, after the Oldowan, beginning no later than 1/2 million years ago and continuing after Homo erectus had been succeeded by Homo sapiens of archaic forms, until as recently as 60,000 years ago. The cruder tools of the Choukoutien tradition lasted almost the same length of time [5].

The crude Choukoutien tools cannot be taken to indicate a significantly less developed culture than in the Acheulian areas, for the Choukoutien users, like the Acheulian, were using fire hundreds of thousands of year ago [4]. Since Homo erectus could not make fire but only use it, it is clear that this first human's culture had a rich collection of understanding that made it possible for group to keep a fire going and that these were probably prescriptive. The importance economy of these earliest humans was in hunting as well as warmth, and they even cooked at least some of their food, increasing the scope of their diet. The construction of dwellings was another of the accomplishments of Homo erectus and, in fact, he developed a fully human culture [4, 5].

There was a complex interaction involving culture, increase in brain size through natural selection for cultural ability, and the mobile social groups in which these early hunters lived. The male-female children unit was the basis for occasional larger groupings, and the family provided the same arena for learning culture modern humans have. The hunting life led to selection for individuals and groups with knowledge of large areas and ability to transmit that knowledge by communicating with others [3,5]. The cultural accomplishment of Homo erectus outlasted him by many thousands of years, and even the archaic forms of Homo sapiens were still using the tools he developed.

2. Cultural Dimension of Palaeolithic Period:

The Earth is nearly 4000 million years old. The evolution of its crust shows four

stages. The fourth stage is called the Quaternary, which is divided into Pleistocene (most recent) and Holocene (present); the former lasted between 1,00.000 and 10,000 years before the present and the latter began about 10,000 years ago. Man is said to have appeared on the earth in the early Pleistocene, when true ox, true elephant and true horse also originated. But now this event seems to have occurred in Africa about 2.6 million years back [6].

During much of the Pleistocene (also known as the age of Glaciers), large areas of the northern hemisphere were covered with enormous masses of ice, which advanced and retreated as the temperature fell and rose. Until recently, European glaciers were considered to be four in number: Gunz, Mindel, Riss, and Warm [1, 6].

At one time, the Plio-Pleistocene boundary was defined by the appearance of certain mammals believed to identify the beginning of the Pleistocene. Since the appearance of these mammals: modern cow, modern horse, India elephant occurs at different times on different continents, this criterion could not be used on a worldwide basis. What was need was an event that occurred everywhere on earth at the same time, and just such an event has been found in the reversal of the earth's magnetic field [5,6]. The study of such reversals is called paleo magnetism and is used to cross-check other dating techniques.

We have known for a long time that the earth's magnetic field has frequently been reversed, during the reversal period, what we consider to be the North-Pole became the South Pole, and a compass needle would have pointed south instead of north as it does now. Earth scientists have now succeeded in dating these reversals, which are worldwide events. The reversals now serve as markers to correlate geophysical activity in different parts of the world.

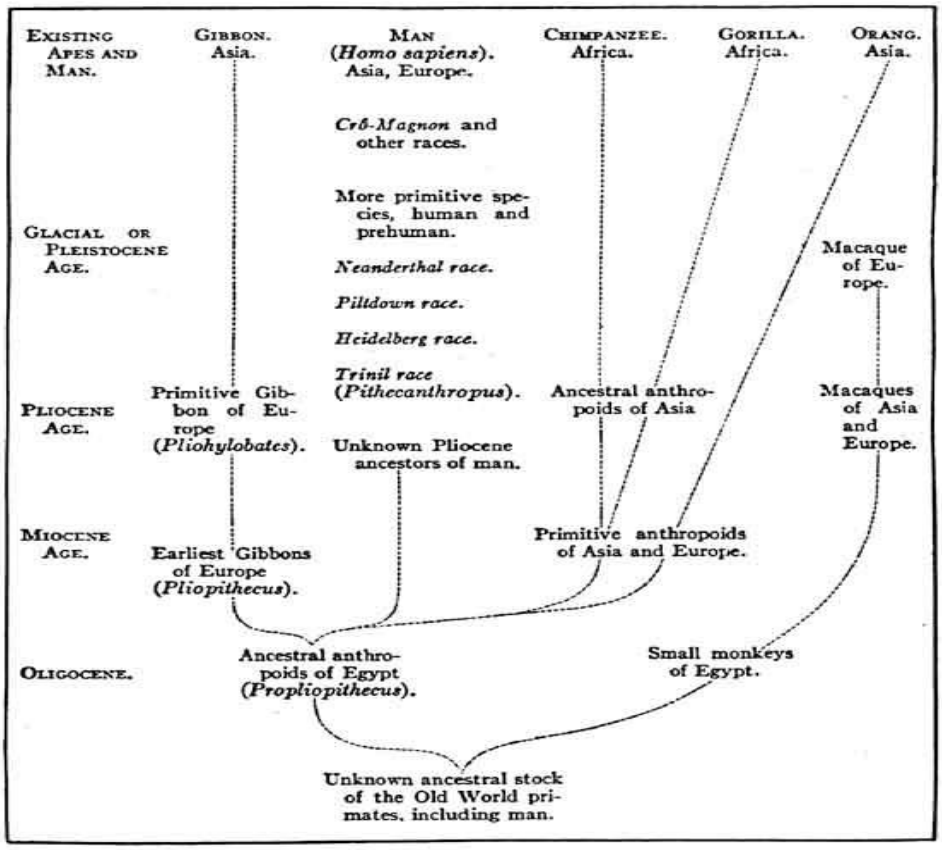

Figure 1: Human Evolution Through Ages

Although differences of opinion exist concerning the boundary between the Middle and Upper (or Late) Pleistocene, we shall use the widely accepted figure of 12,500 years correlated with the beginning of the Riss-Wurm interglacial [7].

The Pleistocene, which lasted almost 2 million years, was an important time in hominid evolutionary history, Homo erectus appears. From their brain size and tools, we can clearly see that this from, using culture as their strategy of adaptation, should be called human. By the time the Pleistocene terminated, modern humans had already appeared. Dependence on culture as the human way of life had dramatically increased, and domestication of plants and animals. One of the great cultural revolutions of human history was either about to commence or had just been invented [8]. With this background of the time span in which Homo erectus evolved and developed, let us examine more closely the hominid to which we owe so much.

3. Cultural Dimensions of Lower Palaeolithic Period and its Representative Homo Erectus:

3.1 Physical:

From the physical point of view, Homo erectus is already notably similar to modern populations. The erectus femur/pelvis complex may be somewhat different from our own, but if it were possible to observe Homo erectus walking away from us, it is unlikely that we would remark a stride noticeably different from those around us. An erectus individual would not slouch forward and walk with bent knees. The stride would compare with ours; the arms would not be especially long, nor would they swing from side to side instead of front to black; and the lags would not be proportionately short [1].

3. 2 Technological:

Growth of the brain enabled H. erectus to develop a more sophisticated tools kit. The important change was a core worked on both sides, called a biface. The biface has a flatter core than, and is a change for from, the roundish earlier Oldowan pebble total. This change enabled the stoneknapper to carefully shape the edges straighter and sharper into a more efficient implement [8]. This Acheulian stone tool becomes standardized as the basic erectus all purpose tool, with some modification, for more than a million years. It served to cut, scrape, pond, dig, and more a most useful total that has been found in Europe, Africa and Asia.

Like their species elsewhere, Homo erectus in China manufactured chopper and chopping tools as their core tools, and like other erectus tool makers, fashioned scrapers and other small tools, but they did not manufacture biface.

Scholars have noted the remarked stasis of the physical and cultural characteristics of Homo erectus populations, which seemed to change so little in the more than a million years of their existence. However, there were some changes; the brain of later erectus was large, the body not as robust, and there were modifications in their stone technology.

In the early days, tool makers employed a stone hammer to percuss flakes from the core, thus leaving deep scars. Later, they put to use other materials such as wood and bone. They learned to use this new material in the manufacture of softer hammers, which gave them more control over the flacking. These left shallow hammers which gave them more symmetrical forms that appears to us to be esthetically more pleasing [9]. Toward the end of the Acheulian industry, tool makers blocked out a core with stone hammers, and then switched to wood or bone for refining the edges.

Also introduced by Homo erectus was the cleaver. Instead of coming to a point, like the hand axe, one end of the cleaver was blunted, giving the appearance of a modern axe head. It was probably used in the butchering-chopping and breaking the bones-of

large animals.

Evidence of butchering is widespread in Homo erectus sites and, in the past, has been associated with hunting. However, this assumption has been challenged, especially by archaeologists who believe the evidence does not prove the hunting hypothesis, but believe instead that erectus was primarily a scavenger.

3.3 Social:

One of the fascinating qualities of Homo erectus was a penchant for travel. From the relatively close confines of East African erectus became a world traveler, and by the time H. sapiens appears, 1.5 million years later, Homo erectus had travelled to vast points of the earth. Moving north from East Africa, erectus could have chosen several directions. One was eastward over the land bridge that joined East Africa at that time to the Arabian Peninsula [7]. Land bridge was exposed in many areas of the world during glacial times, when so much ocean water was locked up in the glacial ice.

The life of hunters/scavengers is nomadic and the woodland and savanna that covered the southern tier of Asia bordering the Indian Ocean, from East Africa to Southeast Asia, would have been an excellent environment for Homo erectus, similar to the Econiche of his African ancestors. As the population grew, small groups budded of the band and moved further ahead to find their own hunting area [9]. This process, repeated again and again, led erectus east to India and, with mountains to the north, through the southern route across the sunda shelf to Java, arriving there several hundred thousand years later.

Once in Java, it would have been impossible to take a further step, since there was no land bridge that joined Australia to Java. However, it would have been possible to push north through Malaysia, Thailand, skirt the Northern mountains and travel east to southern China, where Lantian Man lived 700 to 800 m.y.a [5].

A different route took Homo erectus to Europe through Israel, Turkey, and then Balkans. Homo erectus migrants could have turned west from Egypt and crossed the Mediterranean over the land bridge from North Africa to Sicily, then to Italy. There is evidence of fire and Oldman tools in several caves in southern France with dates of over one million years, but these dates have been questioned. However, by about half a million years ago, archaic sapiens (H. erectus) was living in sites across Europe [3].

Why did Homo erectus leave home? We will never know for certain, but there were climatic and geographic changes that may have been responsible. It was a time of heavy precipitation, which fell as snow in the Northern Hemisphere and created the great glaciers of Europe and North America. In tropical areas, heavy rainfall produced rivers, lakes and new grasslands. With additional food sources available, a population increase may have led splinter groups to seek their own areas.

If the new groups succeeded, eventually other small groups budded off these, and so the process continued as erectus moved farther and farther away from their ancestral home, ultimately reaching Java and China to the east, North West Africa to the west, and Europe to the north.

Although there is no way of knowing with a high degree of accuracy how Homo erectus lived, we can make pretty good guesses on the basis of the available evidence. As a hunter of animals often quite larger than they were, erectus males hunted in small groups, planning their hunt, organizing themselves and their group on some basis to cooperate in butchering, distributing their catch, and making a variety of decisions.

Since there was no predictable surplus, there was no division of labour except between males and females. All adult men were responsible for the same activities, making their own weapons, collecting their own materials, obtaining food for

themselves and the group, and so forth similarly, each woman had her individual responsibilities.

Were there chief and or shamans or other outstanding individuals of some sort? The evicted does not inform us on this point. Nor is there evidence of ritual or belief in the supernatural power although the distortion of skulls has been interpreted as cannibalism and the cannibalism as ritual but this idea has been rejected by many scholars. That was a time of glacial advances and retreats very cold weather interrupted by temperature weather, and many animals were available for hunting or scavenging, or both.

3.4 Cultural Activities:

We also know something of the cultural activities of these preneaderthals they built shelters, although it is not known how common these were. The only shelter that has been described was found in the Lazaret cave, in the city of Nice, Southern France, not far from Terra Amata where there is also evidence of shelters. The Lazaret shelter, about 36 by 11 feet is built against the cave wall [10]. And skins were probably hung over a framework of poles for the shelter walls. The base was supported by rocks and large bones.

Inside the shelter were two hearths. The hearth charcoal indicates they used slow burning oak and box wood, with embers easy to rekindle. Very little stone waste was found inside the shelter, suggesting they manufactured tools outside, where there was light. Also, outside the cave are traces of a series of tents and just inside the door of each tent was wolf skull. The exact significance of the wolf skulls may never be known, but they were surely symbolic and possibly indicative of a ritual.

Geographic differences appeared among human beings as they adapted to different environmental conditions. It was also during this time that humans first began to occupy caves extensively as well as open sites. Archaeological evidence makes it clear that many different food sources were being utilized, such as fruits, vegetables, seeds, nuts, bird, eggs and so forth, each in its own seasons [9]. Marine life was exploited. From Grotte du Lazaret, in southern France comes evidence for freshwater fishing.

Changes in total technology also appear. In addition to new styles of stone tools, new materials, such as bone and antler, are utilized. Not many hunting tools have been found, which suggests the possible use of wooden projectile points, or perhaps nets or traps were used. It is also possible that scavenging was important as a source of meat.

We have seen that after a million years and more of a fairly stable H. erectus grade of evolution, there is movement toward a sapiens grade. In Europe, the evolutionary course appears to have culminated in Neanderthals, may/ or may not have continued to evolve to H. sapiens [10]. Recent evidence suggests that a human may have evolved elsewhere, very likely Africa, and also perhaps, independently in Asia.

4. Cultural Dimensions of Middle Palaeolithic Period

Neanderthals, who lived in the culture period known as the Middle Palaeolithic, are usually associated with the Mousterian industry which has its roots in the second interglacial, or even the Riss glacial. In the early Warm, Mousterian culture extended from the Atlantic Ocean across Europe and North Africa to the Soviet Union, Israel, Iran, and as per east as Uzbekistan and, perhaps, China.

4.1 Technology:

Mousterian people specialized in the production of flake tools based on the Levalloisian methods, a prepared core technique that originated perhaps as much as 200 mya. A chunk of flint was chipped all the way round and on top resembling a turtle in from, and then rapped on the side to produce a flake ready for use [8].

Neanderthals improved on the Levalloisian technique by inventing a variation. They trimmed the flint needle around the edges to form a disc-shaped core. Each time they struck the edge, they produced a flake until the core become too small and was discarded. Thus, the Neanderthals were able to obtain more flakes per core than their predecessors. They then trimmed (retouched) the flake into various forms such as scrapers, points, knives, and so on.

Neanderthal crafts people elaborated and diversified traditional methods and there is some indication of development in the specialization of tools used in skin and meat preparation, hunting, wood working, and perhaps hafting. They may have made some use of new materials, such as antler and hone, but their specialization and innovation cannot be compared to the next culture period, the upper Palaeolithic Nevertheless, the Neanderthals advanced their technology, which tended to be similar in typology, over great geographic distances, for beyond that of H. erectus [11]. It is quite likely that their modifications in technology laid the basis for the remarkable changes of the Upper Palaeolithic.

4.2 Settlements:

People of Mousterian culture lived in a variety of open sites, caves and rock shelters. Living in the open on the cold tundra suggests the erection of shelters, and there is some evidence of such structures, although the last glaciations must have destroyed many open sites. At the side of Moldova 1, in the Ukraine region of the erstwhile Soviet Union, Archaeologist found traces of an oval ring of mammoth bones, enclosing on area of about 26 by 16 feet, which may have been used to weight down the skin walls of a temporary hut or tent as a support pillar[8]. Inside the ring are traces of a number of hearths, hundreds of tools, thousands of waste flakes, and many bone fragments of animals probably brought home for comfortable dining around the fireplace.

Evidence for life in caves is abundant, and Mousterian's must have occupied them extensively. Windbreaks of poles and skin were probably erected at the cave mouth for protection against the weather. Fire was in general use by this time, of course and no doubt used for cooking, for warmth, and for keeping dangerous animals at bay.

4.3 Religion:

An important innovation of the Middle Palaeolithic is deliberate burial, often with indications of funerary ritual. Intentional burials are common, as we have seen, at La Chapel, La Ferrassic, Shandies, Teshik-Tash, and there are many other examples. At Teshik-Tash, we find an interesting ring of goat horns surrounding a child grave, an arrangement that would certainly seems to indicate ritualism of some sort [12].

Similar practices to this occurred in the Guattari Cave, Near Rome, Where Monte Circeo was buried. Not only was the foreman magnum cut away, very likely a ritualistic performance, but the skull's right side was crushed and placed in the center of a circle of stones. Near the circle were several piles of deer, cattle, and pig bones. Apparently, the man had been killed (sacrificed)? Outside the cave, by a smashing blow to the right side of his head. The head was then taken into the cave and placed within the circle of bones [11].

Shanidar IV was buried with flowers, an act which may or may not suggest ritual, but which certainly does suggest a special attitude towards death. A remarkable burial occurs at the La Ferrasic rock shelter perhaps 38 mya [10].. It looks like a family cemetery; the presumed parents are buried head to head and four children are interred nearby. A short distance beyond, a small mound contains the bones of a newly born infant, and a bit further under a triangular stone is the grave of a 6 year-old child.

Besides the clear-cut evidence of burials and probably secondary burial as well, there has been much speculation about other forms of Neanderthal ritual, especially a bear cult. It is reported that a chest containing bear skulls was found in a cave high in the Swiss Alps, with bear skulls placed in niches along the walls. A similar report comes from southern France, where a pit was said to be filled with the bones of more than twenty large bears.

If these reports are accurate, it would not be surprising that bears were the object of special attention. Ceremonial regard for bears have been practiced among some Siberians, the Ainu of Northern Japan (Who Still perform an annual bear dance), and a number of American Indian Tribes, among others).

Similarly with animal cults. Instead of earlier hunting practices of catches catch-can, Neanderthals were beginning to single out certain animals for game. Did they believe they could control their game animals? (If so, did these rituals serve as forerunners of Upper Palaeolithic cave art that also may have been a form of hunting magic?) Were they attempting to help the animals multiply, improve their own hunting success, or increase the chances of their own safety? Do these rituals signify that Neanderthals were becoming aware of their distinctiveness that they were something more than simply animals leave a void in the universe, and it is necessary to propitiate the animals to prevent an imbalance in the physical and spiritual universe?

4.4 Economy:

Neanderthals were successful hunters; as the abundant remains of animal bones at their sites demonstrate. As the evidence Shanidar suggests they probably gathered berries, nuts, and other plants. It does not appear that they sought more exotic, foods, such as seafood or birds.

It is assumed that, in the freezing weather of the fourth glacial, Neanderthals must have worn clothing to survive the winters and they may have developed methods of curing skins. But since there is no evidence of sewing equipment, the clothing was probably of simple design, like a poncho. Nor is there evidence of personal ornaments or individual adornment, although these might be difficult to recognize.

4.5 Abstract Thought:

There was not one Neanderthal culture but "a great variety of loosely related cultures at about the same stage of advancement".

With the complexity of Neanderthal life comes of question of communication, and scholars are not agreed that Middle Palaeolithic people could communicate fluently on a symbolic basis (that is via language). A controversial paper published some years ago claims that Neanderthals were unable to articulate easily, Given Neanderthal brain size, their success in hunting, adaptation to severe weather, their technological improvements, and probably a well-developed social organization, most anthropologists would probably disagree.

5. Cultural Dimensions of Upper Palaeolithic Period:

5.1 Technology and Art:

The upper Palaeolithic period is often defined in terms of the blade. Blades are not unique to this period, but there was high frequency of their use. Blades are flakes with roughly parallel sides. They are manufactured from carefully prepared cores. The result is a blank from which a variety of specialized tools can be made. The edge is extremely sharp, and the blades can be made quickly in great numbers. The manufacture of blade represents an efficient use of natural resources in this case, flint [12]. Francios Bores points out that the upper Palaeolithic blade technique could produce 10 to 40 feet of cutting edge from a pound of flint, compared with only 40 inches using the early

Mousterian technique.

From the basic blade, a wide variety of highly specialized tools can be manufactured. Unlike the Lower Palaeolithic use of the Upper Palaeolithic used tools designed for specific purpose. A number of these had the primary function of making other tools.

Bone, along with antler, horn and ivory, became a very common raw material. Bone has many advantages over stone. For example, it does not break as easily. The widespread use of bone resulted from the development of the burin; it had a thick point that did not break under pressure. Some of the later upper Palaeolithic cultures became very dependent on bone implements, such as spear points, and stone points practically disappeared.

One of the major reasons for the success of this period was the development of new projectile weapons. These were compound tools, that is, tools composed of several parts. Hafting appears in the archaeological record [13]. The axe is no longer a hand axe but an axe with a handle.

Spears were made with bone points hafted to a shaft. To add to the force of penetration, the spears were often used with a spear thrower Harpoons consisted of a barbed bone point which detached from the shaft after entering the animal yet remained tied to the shaft by some type of cord. The shaft dragging behind the animal would impede its flight [13, 14]. Later in the period, the bow and arrow appear. Several types of fishing gear, such as barbed fish hooks and fish spears also are known.

The upper Palaeolithic is characterized by a variety of artistic methods and styles. Painting and engraving can be seen developing from early beginnings to the colorful and skillful renderings of the Magdalenian people. Realistic, stylized, and geometric, modes were used [12, 15].

Palaeolithic art finds its expression in the modeling of clay, sculpturing in rock, bone, ivory, and, antler, and painting and engraving on large surfaces, such as cave walls, as well as on small objects. Everyday utensils were decorated, but perhaps the most interesting works are the statues and cave painting [15].

Some of the most famous statuary is the female statues, called Venus figurines. They are only a few inches high and are carved in the round from a variety of materials. They have extremely exaggerated breasts and buttocks and very stylized head, hands and feet. Perhaps they represent pregnant women. It has been assumed that the figures had ritual significance, probably involving the concept of fertility, however, this is not necessarily so. Peter Paul Reubens (1577-1640) painted Fleshy women [16]. Was his motivation fertility magic? The point is that it is perhaps not valid to make absolute statements about ancient people's motives. Upper Palaeolithic artists also made models of animals, including the famous set of statues of a bison bull, cow and calf found in France.

The cave art of the Upper Palaeolithic is found in France, Spain, Italy, and the south Urals, The subject matter of most of this art is animals, although humans also are depicted. There were hunting peoples, and art expressed their relationship to the fauna that supported them. Most researchers believe that most representations of nature served magical purposes. Many cave painting are in almost inaccessible areas of the caves, indicating that they were not done for totally aesthetics purposes [13, 14, 17]. The cave art appears to have been used for both hunting and fertility magic. In the first instance, animals were often painted with normal wounds. Perhaps this represents a type of initiative magic in which the "wounded" painting is supposed to have an effect on the animal it portrayed. Animals were often painted pregnant, and along with the statuary,

this might have been on instance of initiative magic applied to fertility. This concept is supported by the suggestion that cave art reached its height when large herd animals were becoming increasingly scarce.

Since 1965, Alexander Marshack has been Studying marks, dots, and lines of various configurations that accompanied Palaeolithic art [18]. He has concluded that random scribbling but the beginnings of calendrics, arithmetic systems, and even writing. If this is true, the origin of these systems is easier than it was considered to be just a few years ago.

6. Conclusion:

Although many species display behavioural traditions, human culture is unique in the complexity of its technological, symbolic and social contents. Is this extraordinary complexity a product of cognitive evolution, cultural evolution or some interaction of the two? Answering this question will require a much better understanding of patterns of increasing cultural diversity, complexity and rates of change in human evolution. Palaeolithic stone tools provide a relatively abundant and continuous record of such change, but a systematic method for describing the complexity and diversity of these early technologies has yet to be developed. Here, an initial attempt at such a system is presented. Results suggest that rates of Palaeolithic culture change may have been underestimated and that there is a direct relationship between increasing technological complexity and diversity. Cognitive evolution and the greater latitude for cultural variation afforded by increasingly complex technologies may play complementary roles in explaining this pattern.

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