The Illustrated Theory
of
Paleo Basket-Weaving Technology
by Rick Doble

Over 250 Photographs and Pictures

12 Original Articles Concerning
The Paleolithic Development of Woven-Fiber Technology

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FOREWORD

I wrote these seven articles about basket-weaving technology in about a year. These were for my blog, DeconstructingTime, a blog about the human experience of time. I focused on basket-weaving because I felt it must have been an early process along with stone-tool making. And it was my contention that the human invention and use of processes, which proceeded step-by-step, had a lot to do with the development of an understanding of linear time, i.e., time with a past, present and future plus duration.

Each article was meant to stand by itself, to stand alone, so that people did not have to read earlier posts to understand what I was saying. But because of that, in this compiled book form, you will see a number of repititions. However, when I repeat ideas, I usually add some detail that I did not have available the first time I wrote about it.

I began this series of articles with one basic idea -- that basket-weaving or woven-fiber technology as I have called it, must have been very important early because later it was crucial to the first civilizations of Sumer and Egypt. Therefore, I believed it probably started further back in time than was generally thought. So, I wanted to show the wide range and power of this technology. I reasoned that because it was so sophisticated by the Neolithic time period and by the time of the earliest civilizations, it must have begun much earlier.

Then one idea led to another and so this series of articles was born. In the next article I followed up an idea I had come across in my research for the first article. That idea was that basket-weaving probably came from a familiarity with birds' nests. Then to my astonishment I was able to prove, with fossil evidence, that some of the earliest humans lived at the same time and place as Weaverbirds, birds that made the most elaborate nests. You've got to love the Internet for making this kind of research possible.

Next I was able to show that early humans in Africa often camped near Baobab trees which were also the favorite habitat of Weaverbirds. After that I realized that basketry probably did not begin full-blown as we know it now -- it must have started with a more basic design -- and so I researched the "random weave" style of weaving and then locally found a woman who made such baskets and even gave me one. Next, I realized that the full power of basketry and weaving depended on a right-angle structure. For some reason I could find no information about that idea, so it became a concept I decided to explore.

All of this tied in with my ideas about processes, since making a basket required a process. And processes helped humans acquire a sense of time with a past, present and future, along with duration because basket-making required planning and forethought.

And so, to my astonishment, after a year I had mapped out a fairly complete and comprehensive theory about basketry which also had implications for human evolution and human culture as I explain in my article about the tribal-wide use of processes.

Unfortunately, fiber evidence decays so proving that this technology existed in the Lower Paleolithic era is difficult. Yet by piecing together various strands of other types of evidence, it appears quite likely that this technology did develop and developed quite early in the evolution of human beings.

A basket-weaving technology would have given early hominids a significant advantage in their quest for survival and also could have accelerated their evolution which resulted in a much larger brain capacity.

> "It is likely that this phenomenon of accelerated brain expansion in the human lineage was due to the ability of hominins to access higher quality food resources through the use of technology, which allowed for a decreased gut size and increased brain size."
> Schick, Kathy, and Toth, Nicholas. "THE OLDOWAN: Case Studies into the Earliest Stone Age." Stoneage Institute Publication Series, Schick, Kathy and Toth, Nicholas (Eds.). Stone Age Institute and Indiana University, Stone Age Institute Press, p. 35.

Now, of course, I would love it if I were proved to be correct with some of my ideas. But more importantly, I hope I have added something to the dialogue about human origins and if I have managed to become part of that conversation then I have achieved something I believe is important.

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And Abstracts

More than 100 years ago Gustave Chauvet wrote that he believed basketry and simple weaving were present in the Upper Paleolithic sites he had studied. Yet it took almost that long to convince experts that this was the case. The discovery of irrefutable evidence in the form of impressions of weaving in clay provided the proof. Now it is clear that basket-weaving and textile-weaving were not incompatible with the hunter-gatherer Paleolithic lifestyle and did not require the sedentary settled Neolithic way of life as had been assumed. This opens up the idea that basket-weaving or woven-fiber technology as I have called it, could have begun even in the Lower Paleolithic, millions of years ago. What follows in the rest of this article is a summary of my seven articles over the past year in which I outline how basketry could have begun perhaps two million years ago and then how it could have developed until the rise of the great civilizations of Sumer and Egypt which depended on this technology. I conclude with ideas about how to find indirect evidence of basket-weaving in the Paleolithic era.

Around 2 million years ago at the famous Olduvai Gorge, the first stone tools made by hominids, known as Oldowan stone tools, were discovered in what has been designated as Bed I which is the oldest layer at the Gorge. Fossilized remains of Homo habilis (perhaps the earliest hominid) were also found. And in addition, fossilized remains of Weaverbirds (Ploceidae) were found in Bed I. Weaverbirds are known for their elaborate and well-engineered nests which they placed in the open, so they were clearly visible. This means that Homo habilis (and probably other hominids) could have been aware of the nest constructions of these birds and could have used both the shapes and the weaving techniques as models for their own woven objects such as baskets.

The purpose of this article is simple. I argue that early hominids, almost two million years ago, lived in close proximity to Weaverbirds who built elaborate nests. And because of this, it is probable that they learned initial weaving and knot making skills along with basket making, derived from the complex and well-constructed nests of these birds. If this is true, then the origins of basket making and weaving began almost two million years ago instead of tens of thousands of years ago, as is currently believed. And this fundamentally changes the story of hominid technology which in turn affects the narrative of human evolution. In this article, I cite specific scientific evidence, current mainstream thought and expert opinions to make my case.

ARTICLE #4: PAGE 56
THE POWER OF BASKET-WEAVING COMES TO FRUITION
The Invention of Right-Angle Construction in the Paleolithic Era:

We live in a world of right-angle structures. Cloth is made this way, as is furniture, homes, and even skyscrapers. In fact, they are just about everywhere in the modern world. Yet right-angle construction is a human invention and not natural. Nevertheless, there has been virtually nothing written about this important discovery. When early humans began to understand the power of this concept, it was a major advance in their technology. When applied to basket weaving and related crafts, it led to the development of hundreds of products. It gave humankind a powerful tool that helped them survive and prevail and eventually build civilizations.

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Including a picture essay that illustrates the wide range of objects that can be made
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While it is difficult to find physical evidence for basket weaving and woven-fiber artifacts in the Middle and Lower Paleolithic era, there is ample evidence from other sources that point to the likelihood of such a technology. The paper lists the evidence and the argument in favor of that conclusion.

ARTICLE #6: PAGE 118
THE IMPORTANCE OF BASKET-WEAVING AS A PROCESS
The Importance of Processes in the Paleolithic Era

A sense of linear time with a past, present, and future plus a sense of duration was an essential element of behavioral modernity. Modern human behavior could not have occurred without it. This sense of time was necessary for planning and coordination. But how did Homo sapiens develop this sense of time that was so different from the animal world that they were a part of? In this paper, I argue that the hominid sense of time developed over millions of years and developed because of their familiarity with processes such as stone-tool making. I am assuming that they developed a variety of other processes as well and each process had a step-by-step way to proceed. I am also assuming that as processes developed, they became more complicated and in addition, a proto-language and a concept of time immerged which gave them greater control and also the conceptual tools to modify and improve these processes. In short processes with their step-by-step structure became the model for linear time and time duration.

ARTICLE #7: PAGE 132
AN ARGUMENT THAT BASKET-WEAVING WAS A TRIBAL-WIDE SKILL WHICH INFLUENCED THE TRIBAL CULTURE: The Tribal-Wide Use of Processes in the Paleolithic Era
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I have argued that the use of processes such as stone-tool technology in the Paleolithic era was critical for the development of behavioral modernity. In this article, I argue that the entire tribe used other processes as well, such as the location, harvesting, and preparation of food by women. And because of this, the step-by-step nature of processes became a point of reference that everyone could refer to, which eventually led to a full sense of linear time (time with a past, present, and future) unlike the immediate time of the other animals.

ARTICLE #8: PAGE 141
OVERCOMING GENDER BIAS IN PALEOLITHIC RESEARCH:
Gender Bias May Have Prevented Paleolithic Basket-Weaving Technology from Being Recognized
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An early invention of basket-weaving technology was not considered possible until recently. There were two principal reasons. The first was that no evidence of basketry had been found that was older than about 15 kya. And the second reason, which was consistent with the first, was that baskets would only have been made in the Neolithic agricultural time period because this time-consuming craft would not have been practical in the earlier period of the Upper Paleolithic nomadic hunter-gatherer tribes. Making baskets would have required too much time and therefore was incompatible with the constant search for food in mobile nomadic cultures. However, both of these ideas were seriously flawed. No evidence of basket making or weaving was found because fiber materials would have decayed. And the second reason was an assumption that was not based on fact and was later proven to be wrong.

But there was a third and I believe more important reason which no one articulated and which was an unconscious bias. Around 1900, when these ideas were being formulated, basket-weaving was seen by the men, who were excavating caves, as 'women's work'. And the work of women was not considered important. In addition, few men were familiar with even the most basic basket making skills. For these reasons the importance of basket-weaving was dismissed out of hand until positive proof was found that it existed much earlier -- proof that would be almost impossible to find -- but which now has finally been found.

However, around 1900 there was ample evidence that clearly pointed to the possibility that basket making had occurred very early and needed to be considered. In this article, I discuss Native American Indian basket making skills, skills that were used extensively by pre-Neolithic nomadic and semi-nomadic hunter-gatherer tribes. And I also detail the large number of basket-making tools that were found in Paleolithic caves and sites but which were not identified as such.

It might be vitally important to understand when basket-weaving began because the technology, and development of basket-weaving may have affected human evolution and human culture in much the same way as stone tool making. My contention is that gender bias prevented this important line of inquiry from going forward.

NEW EVIDENCE SUGGESTS BASKET MAKING MAY HAVE BEGUN 2 MILLION YEARS AGO

Recent excavations at the Olduvai Gorge in Tanzania, Africa have revealed new information about some of the earliest hominins, probably Homo habilis, from 2 million years ago. For the purposes of this article, the main point is that these early humans walked 12 km or 7.5 miles to gather specific stones that they used for making Oldowan stone tools and for putting together a toolkit. And these specific stones made up the majority of stones found. They did this for several hundred thousand years. I argue that to do this, they probably had containers or early baskets to help them carry a large collection of stones back to their settlements, since walking that far would have been counterproductive if they only gathered a few stones. Next in this article, I show how very simple carriers could have been from natural plant materials, carriers that might have been like some of the earliest baskets.

BASKET-WEAVING EDUCATION & ITS COGNITIVE ASPECTS

Basket-weaving classes, programs, and instruction books for ages 3 to 18 years old may provide insights into the cognitive demands of basket-weaving and the development of those skills. An understanding of the cognitive skills as related to basketry may apply to the possible early use of basket technology by Lower, Middle or Upper Paleolithic hominins such as Homo habilis 2 million years ago.

THE NEED TO CHANGE THE TERM 'BASKET WEAVING'
TO THE TERM 'WOVEN-FIBER TECHNOLOGY'

I am suggesting that the term 'basket weaving' be replaced with the term 'woven-fiber technology' when talking about baskets and fiber constructions in prehistory. I say this because the term 'basket weaving' may be outdated. While it once may have been a general term for all kinds of weaving that resulted in a wide variety of products, most people today think of it as meaning baskets only. Furthermore, while basket weaving was a technology and baskets could be thought of as tools and basketry was clearly an industry, none of these words are associated with Paleolithic or Neolithic basket weaving (see Google searches) although all these terms are used when discussing or researching stone tools from those periods. In the discipline of paleoanthropology, this becomes a serious problem as it tends to limit the scope of research and funding for research. I suggest that the term basket weaving should be replaced with a more inclusive term that also emphasizes that the weaving of fibers was a technology and an important one that may have begun early in the development of hominins. The term I suggest is 'woven-fiber technology'.

ARTICLE #12: PAGE 265
THE CRUCIAL IMPORTANCE OF BASKET WEAVING TECHNOLOGY
FOR THE WORLD'S FIRST CIVILIZATIONS

The rise of the world's first civilization, that of Sumer in Mesopotamia, could not have occurred without a fully developed basket weaving technology that was available from the beginning. This technology may have reached a high point thousands of years earlier as shown by the Ain Ghazal statues which had a sophisticated woven reed core. While this was not the only developed technology at the time, it was crucial. In this article, I make two main points.

#1. There is now clear physical evidence of basket weaving technology or reed craftsmanship (as the Sumerians also called it) long before the start of the Sumerian civilization. I list three examples of this evidence.

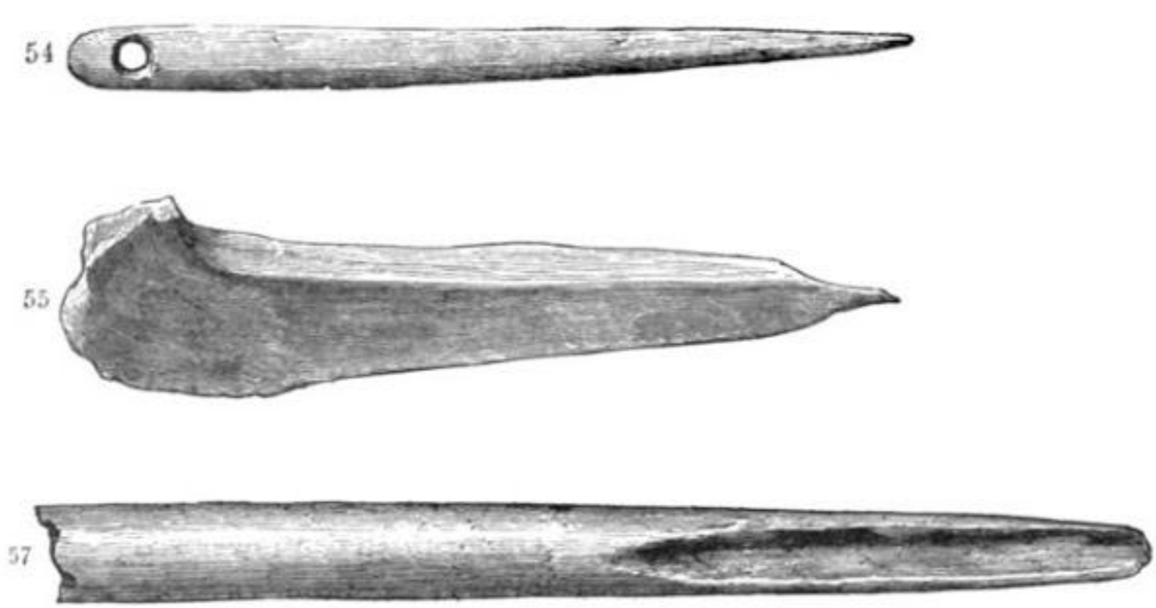
#2. The Sumerians were able to use their highly developed reed craftsmanship to establish the world's first civilization in part because of their weaving skills and because they had access to an unlimited number of reeds, plus mud, clay, and bitumen. In this article, I cite numerous studies and experts to further my argument. I cover sea-going reed ships, irrigation, agriculture, home building, mass-produced bricks, the importation of copper, and more. I also include an appendix in which I list more than 100 words relating to basket weaving technology, words that were used for thousands of years in Mesopotamia, indicating the importance of this technology.

Article #1
The History and Final Acceptance of a Rejected Idea: Basket-Weaving in the Paleolithic Era

"Many...creation myths place basketry among the first of the arts given to humans."
Basketry. **Editors, Encyclopedia Britannica. (https://www.britannica.com/art/basketry)**

INTRODUCTION

After reading an almost forgotten book by noted French archeologist Gustave Chauvet, Dr. Paul Bahn wrote in 2001 that, "It is a long overdue development that, 90 years after Chauvet's publication, prehistory seems ready to at last accept the probably HUGE IMPORTANCE OF BASKETRY [ED: my emphasis] **and simple weaving in the Upper Palaeolithic." [1]**



54: Bone Needle 55: Bone Awl 57: Rod of Reindeer Antler
A Paleolithic basket-weaving toolkit?

This picture, from a book by William Boyd Dawkins in 1880, shows bone tools found in the Church Hole cave in Britain.[2] These were dated to the Magdalenian era, i.e., to the end of the Upper Paleolithic about "12,500 and 12,200 years ago" according to the Durham University Website.[3] These implements were found 30 years before Chauvet suggested that baskets might have been made during this time period.

These Magdalenian, Upper Paleolithic tools shown above, are entirely consistent with tools used to make baskets. (A stone cutting tool needed for basketry was also found in the cave but not pictured here.) As the California Parks website stated when writing about *American Indian Basketry* and the Indian way of life -- which is considered to be very similar to European Upper Paleolithic,[4] -- "Whether coiled, twined, or plaited, baskets were woven...with little more than an awl and knife."[5] The book *Basket Making* of 1901 added that a single large knitting needle was also useful.[6]

The tools pictured here are similar to what Chauvet found and were from the same period, the Magdalenian, that he had studied in the Grotte du Placard in France and on which he based his ideas of the existence of basketry in the Upper Paleolithic.[7] But his ideas were ignored for 90 years until there was irrefutable proof.

This photo shows an almost complete contemporary basket-weaving toolkit.
The tools are a knife, awl, curved awl, and rapping iron.
It is from the basket making website of Willow Basketmaker (https://www.willowbasketmaker.com) reprinted by permission.
A small number of tools are all that is required to make baskets and woven objects. All of these tools or similar tools could have been made by Paleolithic people, as their basic design is not difficult. So it is possible that many of the unidentified tools that have been found in Paleolithic caves could have been basket-making tools.

A NEW STORY OF THE DEVELOPMENT OF HUMAN TECHNOLOGY

The acceptance of evidence about basket-weaving in the Paleolithic era rewrites a considerable amount of history and changes basic assumptions that have been around for at least 150 years. Furthermore, it could alter the story of human evolution, human cognition, and the development of culture along with our understanding of who we are, what we believe, and how we got where we are today.

Recent discoveries have more than confirmed Chauvet's intuition. He was talking about weaving in the Magdalenian era which is 17,000 - 12,000 BP, the period just before the Neolithic farming era. But today recent discoveries have confirmed that weaving and basket

making existed about 27,000 BP, a time period firmly in the Paleolithic era when humans were hunter-gatherers and long before they began the sedentary lifestyle of farming.[8] Moreover, the sophistication of the discovered weaving indicated that it had begun many thousands of years earlier.[9]

And this is one of the key points. Until this idea was accepted, the general assumption was that basket-weaving and textile weaving were too labor-intensive to be compatible with the mobile nomadic hunter-gatherer lifestyle.

"The conventional wisdom has been that a time-consuming task like weaving would only be practiced by sedentary, agrarian cultures. [ED: i.e., Neolithic societies]" said Dr. Adovasio in an interview with *Discovery Magazine*.[10] However, this was only an assumption which evidence did not justify. And later it was discovered in a study of contemporary Philippine groups that hunter-gatherers actually had a lot more leisure time than farmers.[11]

So for almost 100 years, it was assumed that basket-weaving and such could only have begun when people settled down to farming in the Neolithic era. And while clear evidence of basketry and weaving was found in the Neolithic time period, nothing obvious was found in the Paleolithic era -- so this confirmed everyone's assumptions.

The odd thing is that virtually everyone agreed that there had to be other technologies in the Paleolithic era that were based on wood and plants, but they were reluctant to venture a guess or to find ways to look for them.

Absence of evidence is not evidence of absence.
Carl Sagan

> "In whichever way archaeological remains are interpreted, one must always be aware that the vast majority of the materials with which prehistoric people were surrounded and with which they worked is lost to us today. ...organic materials start to decay as soon as they are deposited in the ground." [12]
>
> "This lack of archaeological visibility contrasts with the importance attributed to these perishable materials and techniques in some ethnoarchaeological studies, which highlight the extremely high proportion of objects made with them and the techniques compared to those made from stone and bone."[13]

Pre-conceptions and presumptions are sometimes more of a barrier to scientific inquiry than a lack of evidence. In a famous historical example, Darwin realized that his theory could only work if evolution occurred over millions of years and not the six thousand years that most experts assumed was the age of the Earth, which had hampered geological science for centuries.

The absence of evidence does not indicate evidence of absence as Carl Sagan used to say. While looking for evidence of plant material that has completely decayed is virtually impossible, there are other indirect ways that can give clear indications. In the case of Drs. Soffer and Adovasio, who proved that weaving occurred in the Paleolithic era, they found clay

fragments that held distinct impressions of weaving.[14] In another case, wear patterns on bone tools pointed to the use of fiber ropes.[15]

So today researchers are open to the possibility that basket-weaving and textile technologies began many more years ago in the Upper Paleolithic or as long ago as 40 kya although evidence gets harder to find the further a researcher goes back into the past.

But this discovery by Drs. Soffer and Adovasio has even greater implications. Accepting the fact that hunter-gatherers utilized basket-weaving and simple textile weaving opens the door to a much greater time span for the development of these technologies. Before the acceptance of this idea, the assumption was, as I said, that a sedentary Neolithic lifestyle was required, but now that this barrier has been overcome, I believe the entire Paleolithic period of the hominid hunter-gatherer existence should be examined -- meaning Upper, Middle, and even Lower Paleolithic.

This is important because finding evidence in the distant past could change our view of human development. For example, if basket-weaving began one million years ago with Homo erectus, it might lead to major changes in our understanding of human cognition, evolution, and culture.

NEW QUESTIONS

SO, NOW THERE ARE A NUMBER OF NEW QUESTIONS:

#1. When did basket-weaving, or weaving or textile weaving start and how long did each stage take to develop?

#2. How did it begin and how did it develop?

#3. Where did it start and where did it spread to?

Over the last year, I have written seven articles about the possible early beginnings of basket-weaving and its importance to the human narrative. While I am certainly not the first person to suggest that basket-weaving began much earlier than previously thought and that it was perhaps a key technology that affected human development, I may be the first to attempt a general outline of how basket-weaving could have begun a million or so years ago, much earlier than previously thought. And then I outlined how the technology could have developed at different points on the timeline and in successive societies. Because it is one thing to show that this technology existed around 27,000 years ago but another thing to describe a possible scenario of its earliest beginnings and development.

THE ORIGINS OF BASKET-WEAVING

Please Note: The following endnotes 16-19, 21, 23 link to and refer to my detailed articles about different aspects of prehistoric basket-weaving.

In the scenario I have proposed, basket-weaving was the mother art form. All other fiber arts including textiles and cordage came from basket-weaving.

Basic basket-weaving could have begun in any of the Paleolithic periods, but the following scenario takes the technology back to the earliest days of humankind.

I believe that basketry could have begun almost 2 million years ago using a basket model derived from the complicated woven nests of Weaverbirds. I have been able to prove that Homo habilis (or Oldowan toolmakers) lived in Olduvai Gorge on the savanna in Africa at the same time as Weaverbirds according to the fossil record.[16] And I have also shown that early hominids lived in close proximity to Weaverbirds since they both congregated around Baobab trees.[17]

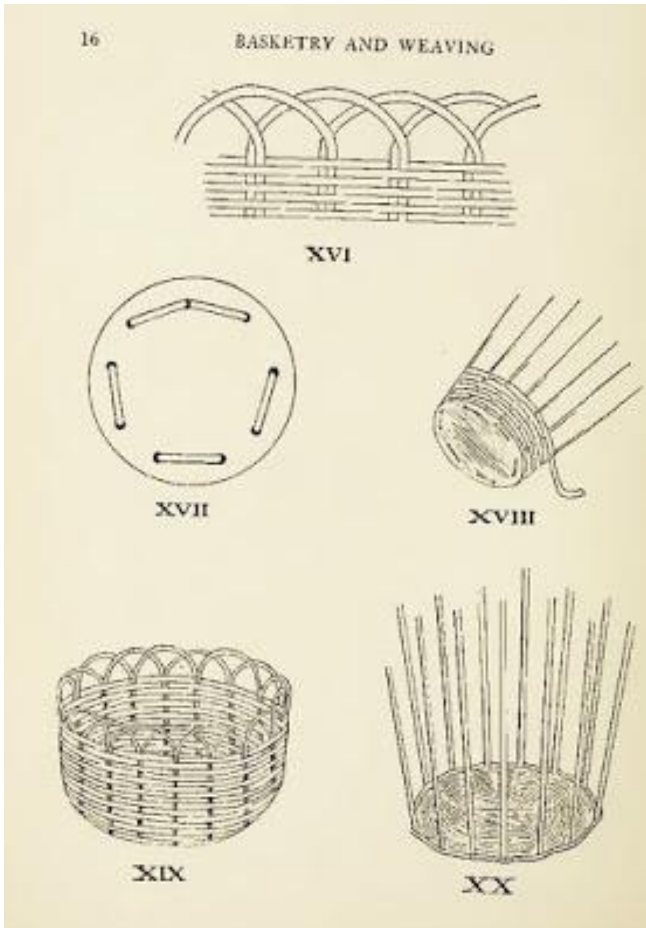
I believe that hominids with an upright stance and two free hands would have seen the advantage of carrying baskets and been inspired by the Weaverbirds. The construction of the first baskets would have been based on a 'random weave'.[18] Such baskets could be quite strong and light. These baskets would have given early hominids a survival advantage since it meant that they could gather abundant food and different food far from their camp, for example, which would not have been worthwhile without these baskets. Without baskets, they would have spent more energy getting to the food than they got eating the food.

LEFT: A Weaverbird nest.
RIGHT: A random weave basket made by a human being. It is both strong and light and capable of carrying up to four kilograms (about 9 pounds). Photo and basket by Nan Bowles.

As many anthropologists have suggested, a technological advantage such as this would have helped in the evolution of hominids leading to a bigger brain and a smaller gut size. In addition, the cognitive skills basketry required would also have had a significant impact on evolution and culture as well.[19]

> As Kathy Schick and Nicholas Toth pointed out, "It is likely that this phenomenon of accelerated brain expansion in the human lineage was due to the ability of hominins to access higher quality food resources through the use of technology, which allowed for a decreased gut size and increased brain size."[20]

Then over perhaps the next million years, the powerful right-angle design of baskets (the spoke strands and the weaver strands at right-angles to each other)[21] would have developed which then allowed an almost limitless number of items to be made in various sizes and configurations. Once mastered a wide variety of items could have been made from mats to sandals and hats to houses and boats. These products were both highly functional and durable.



The right-angle design of baskets. An instruction page for school children showing the right-angle construction of basket-weaving.[22]

Cordage probably began about the same time as the first baskets, but textiles probably did not develop until basketry was quite advanced although it appears (according to the clay impressions found) it had begun by the Upper Paleolithic era.

Textiles seem to have developed rapidly in the Neolithic era along with a full range of related basket-weaving techniques designed for farming, food processing, thatching roofs, building houses, walls and fences, and for numerous other necessities.[23]

This is a model of the Tigris, a large reed boat. Built by Thor Heyerdahl of Kon-Tiki fame, the Tigris was 18 meters (about 60 feet) with a crew of eleven. It was a recreation of a 5000-year-old design used by Sumerian sailors and traders in the earliest days of civilization. Constructed with weaving technology, it was capable of carrying 50 tons of cargo according to Heyerdahl. It sailed from southern Mesopotamia to Pakistan and after six months was still in excellent condition.[24]

Basket-weaving and related skills then became fully developed with the rise of the great civilizations of Sumer and Egypt. These civilizations could not have functioned without basket technology as they were used throughout agriculture, fishing, and also in the storage of grain.

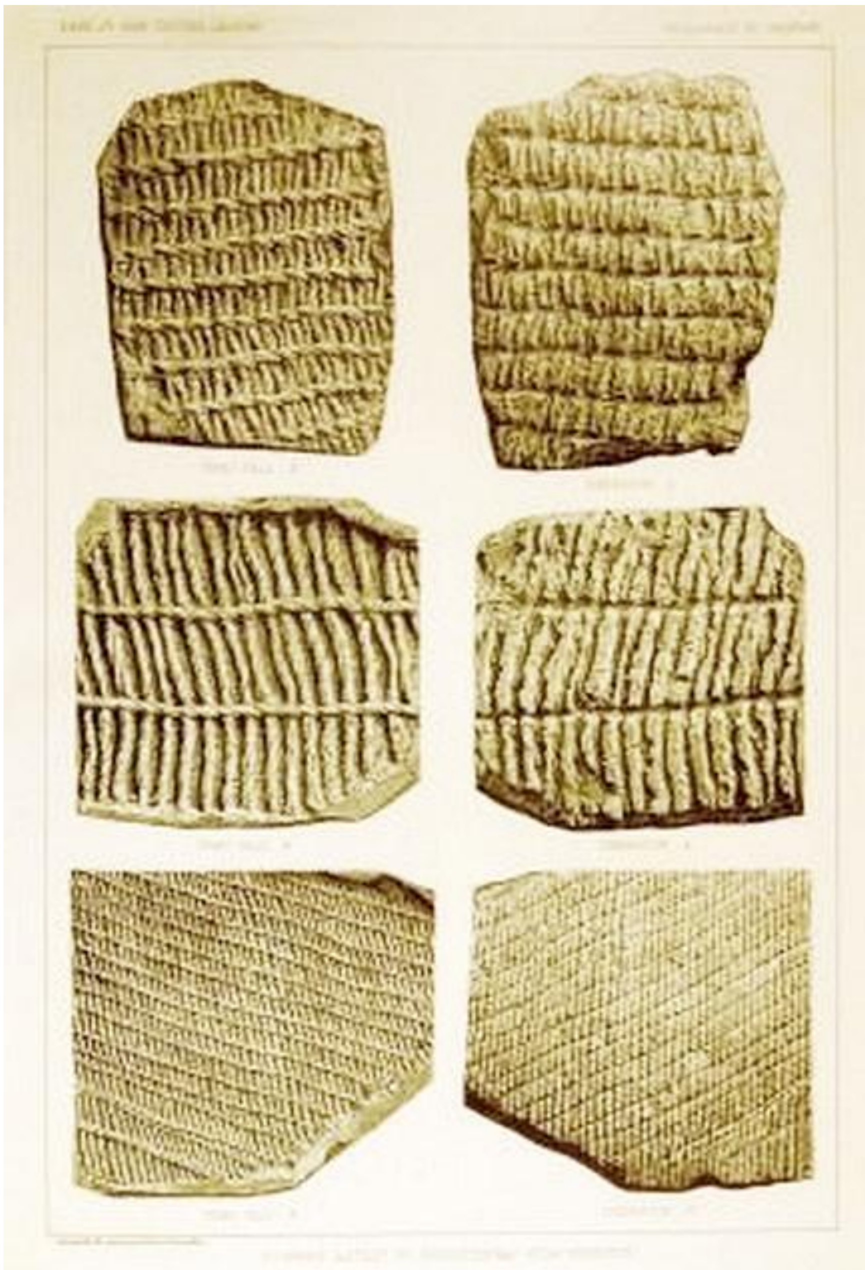
Egyptian agriculture used woven-fiber sacks and baskets for planting, harvesting, transporting, storing, and processing. Without woven-fiber technology, Egyptian civilization could not have functioned.
(Left) Ancient Egyptian model of a granary with scribes. This model was found in a tomb and shows men delivering grain in woven sacks, which is being recorded by scribes.
(Right) Ancient Egyptian painting of men carrying and delivering sacks, from the Tomb of Oumsou.

I realize that I am suggesting a scenario that goes way beyond what most researchers have considered. Yet it is a start -- which I am sure will need to be modified or discarded.

I invite others to come up with alternate scenarios that describe the earliest beginnings of what I have called woven-fiber technology and its development and then describe how the other related technologies developed later.

FINDING EVIDENCE

Having said all of this, I realize that a major problem, the problem that has always dogged this subject, still remains. And that problem is how do you find clear evidence of basket-weaving or woven-fiber technology? Weaving impressions in clay -- since clay and baskets were often used in combination [25] -- and wear patterns on tools seem to be the most promising indicators.[26]



Impressions of weaving in clay.
From *Prehistoric Textile Fabrics Of The United States, Derived From Impressions On Pottery* by William Henry Holmes, published in 1884.[27]

Writing about the very early Oldowan tools of a million or so years ago and their use on the African savanna, Dr. Toth of the Stoneage Institute said, "As plant processing in Oldowan times is a nearly invisible activity due to the general lack of preservation of macroscopic plant remains, this microwear evidence provides an invaluable window into this aspect of early hominin adaptation. The plant-cutting knives show classic 'sickle gloss,' indicating the gathering or processing of soft plants, whether for food, bedding, or other purposes." And African savanna grasses were also ideal for basket-weaving. [26]

Experimental Archaeology

In addition, techniques from experimental archaeology might yield some insights. A contemporary basket maker could try to make random or regular baskets with stone and bone tools copied from Lower, Middle, and Upper Paleolithic tools. They could construct the basket with plant materials that were available during these periods. And trying to recreate possible Paleolithic baskets might spark some new ideas about finding evidence.

This Acheulean handaxe is about 15 cm long (about 6 inches)
and 6 cm (about 2.5 inches) wide at the top.
"Acheulean handaxes were multi-purpose tools used in a variety of tasks. Studies of surface-wear patterns reveal the uses of the handaxe included the butchering and skinning of game, digging in soil, and cutting wood or other plant materials."[28][29]

For example, I would like to see what a modern-day basket maker could do with an Acheulean handaxe made by Homo erectus (or another hominid) about 300 kya, such as the one pictured above. Handaxes with a characteristic teardrop shape might have functioned as basket making tools. The teardrop shape is similar to that of an awl which is one of the few essential tools needed for making baskets. But in addition, the handaxe could have been used to cut plants and also to process the plant material for basket making.

Ethnoarchaeology

Since virtually all societies make baskets, contemporary members of various societies from hunter-gatherers to traditional farming cultures should be consulted. Traditional basket-

weavers might be able to identify which Paleolithic tools were probably used to weave baskets along with an understanding of how they were used.

Computer Simulations

Another approach could be computer simulations and "what if?" scenarios. For example, what if Homo habilis made random weave baskets that could carry up to 4 kilos. How would that affect their survival and evolution?

This is similar to other such ideas that have been developed recently. [30]

This is not going to be easy. But perhaps paleoanthropologists have taken the first step. And that step is to acknowledge that such evidence might exist. I believe you cannot find something if you aren't aware that it could be possible.

Now people are aware. And that is half of the battle, so to speak.

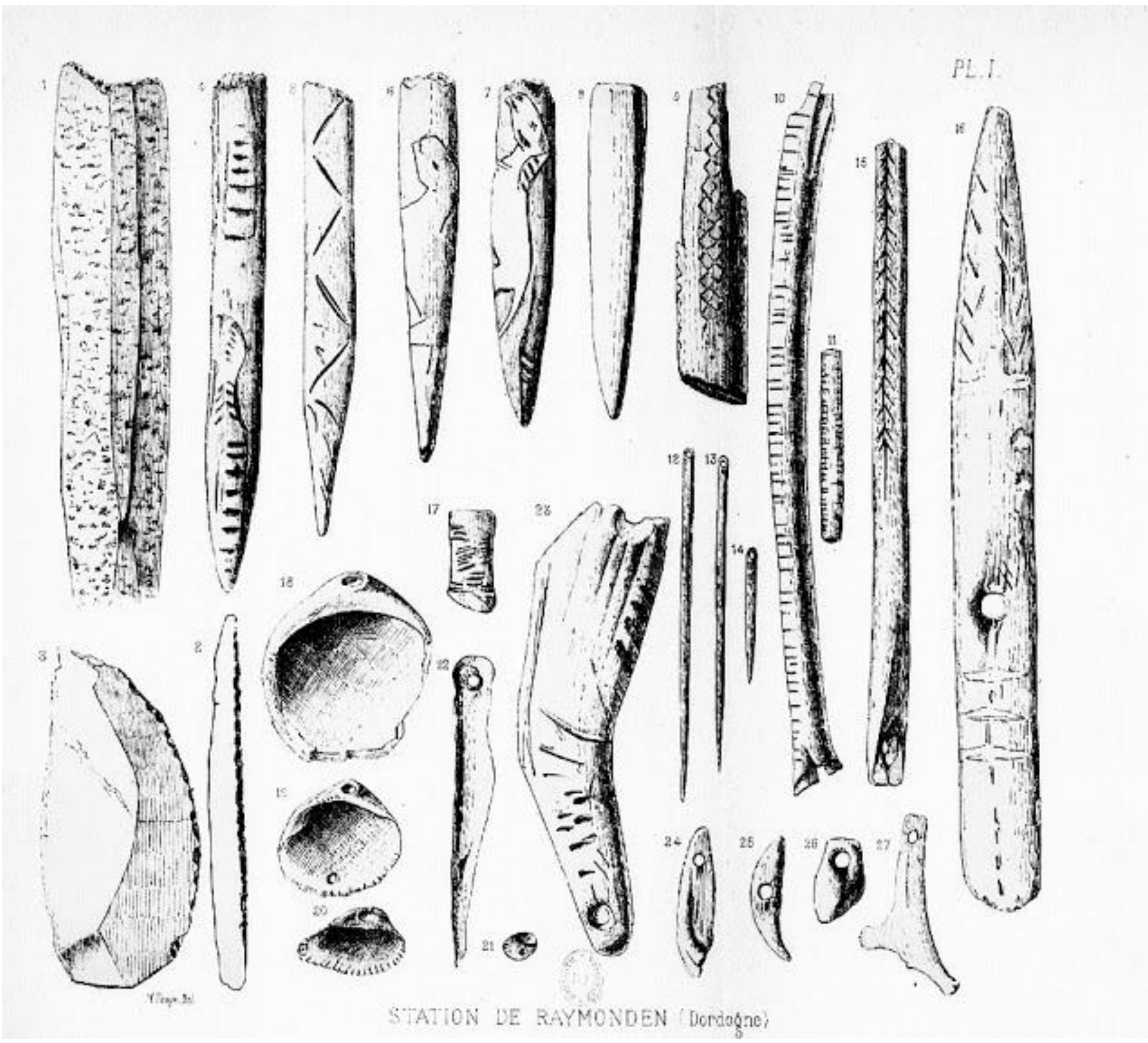
MORE INFORMATION/BACKGROUND ABOUT POSSIBLE BASKET-WEAVING TOOLS IN THE PALEOLITHIC ERA

Please Note: Due to copyright restrictions I am limited to the pages I have posted in this article. However, thousands of bone, stone, and other tools have been documented but are under copyright.

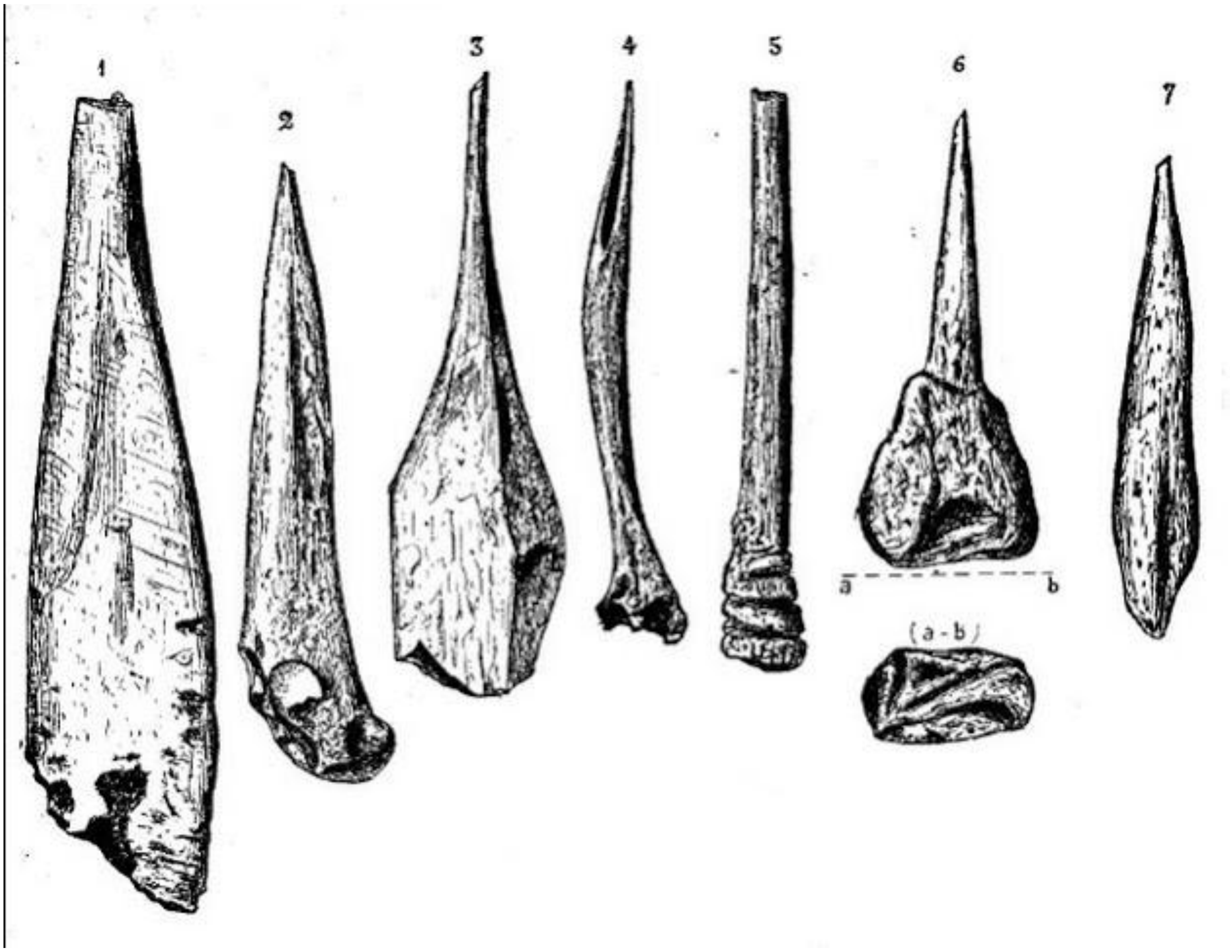
Both of these Venus figures are from the Upper Paleolithic and are at least 25 kya.
LEFT: The Venus of Brassempouy, discovered in 1892, is carved in ivory.
RIGHT: The Venus of Dolní Vestonice is a ceramic figurine discovered in 1925.

The sophistication of both of these female figures indicates that by 25 kya (or at least 8,000 years older than the Magdalenian culture that Gustave Chauvet was writing about) Upper Paleolithic peoples were capable of complex, sophisticated, detailed, precise objects. Therefore, it stands to reason that they would have been able to make baskets and other related woven-fiber objects.

The following page shows tools and instruments that were discovered in the Raymonden cave in France. The cave was found by Michel Hardy in 1876 and these pictures are from his book about the cave. The finds in the cave have been dated to the Magdalenian, the same time period that was studied by Gustave Chauvet who believed that people of this era were capable of basket-weaving.



These implements pictured above are entirely consistent with the types of tools needed to make baskets. While this does not prove that they were, in fact, used this way, it does suggest that researchers need to study these tools carefully to see if there are any indications about how they might have been used to make baskets and/or weave other objects.[31]



From the 1903 book by M. l'abbe A. Parat, entitled *Les Grottes de la Cure (cote d'Arcy).*[32]

Many awls from different periods are often found in Upper Paleolithic caves. This page of awls (above) is from the Trilobite Cave in the Arcy-sur-Cure cave site in France. Two of the awls in this picture (#1 and #5) are from the very old Aurignacian period (43,000 to 26,000 years ago) and the others from the Magdalenian and other Upper Paleolithic strata in the cave, This page illustrates how common the awl was to Upper Paleolithic peoples. And, as I have pointed out, the awl is one of the few essential tools needed for basket-weaving.

The above photo could be of a multi-purpose tool for making baskets. It is made out of mammoth bone and is dated to about 25,000 BP.[33] It is from the Kostenki (or Kostjonki) Upper Paleolithic culture in Russia. This is the same culture that made a newly discovered huge building out of mammoth bones as early as 25 kya. If they could make such an elaborate and sophisticated building, isn't it possible they could make baskets as well? Anthropologists can only guess how the roof was put together over the building's framework of mammoth bones. “I cannot possibly imagine how they would have roofed over this structure,” said Alexander Pryor, the lead author of a study of this new discovery.[34] I would suggest that the roof could have been a thatched kind of roof, utilizing woven-fiber technology.

While it is good that basketry technology in the Paleolithic era is now accepted, I have to wonder why it took so long, about 100 years. I believe it is clear from the facts presented in this article that:

#1. Paleolithic people were skilled and intelligent.

#2. They had the tools that were needed for basket-weaving and other woven objects and these tools were found by anthropologists.

#3. They had the plant materials -- as all locations in the world have plants that can be used for woven objects.

#4. They had the need -- to gather more food or to carry tools.

#5. Anthropologists agreed that Paleolithic peoples must have utilized plant materials for tools -- although evidence had disappeared due to decay

#6. It was generally known among experts that virtually all 'primitive' cultures had a basket-weaving technology. For example, baskets, wickerwork, and the like were mentioned more

than 75 times in Sir James George Frazer's monumental work about 'primitive societies', *The Golden Bough*, which was first published in 1890. [35]

#7. It was clear that direct evidence of basketry was going to be almost impossible to find due to the decay of plant materials.

#8. It was/is well established that from the time of early hominids there were sophisticated stone-tool technologies such as the Oldowan and Acheulean. It stands to reason that if there was a technology that we do know about, there could also have been other technologies we do not have clear evidence of.

#9. Other sciences have ways of dealing with unknown factors in their concepts. For example, in astronomy, dark matter and dark energy are largely unknown but considered essential for an understanding of the structure and dynamics of the universe.

Therefore, logically, basket-weaving as a technology should have been on the list of likely technologies that Paleolithic peoples employed. So instead of denying that such a possibility could have existed, I believe that basket-weaving should have been accepted as one possible theory -- subject to change. Accepting it as a possibility meant that archeologists might have been more aware and more tuned-in to indirect evidence, such as wear patterns on tools. Now, as a result, we are, perhaps, 100 years behind in our understanding of the development of early hominid technology.

> Speaking about the lack of archaeological interest in basketry, mats and textiles, Grace M. Crowfoot wrote the following in *A History of Technology, Volume 1.* "In considering gaps in the knowledge of textiles, it must be remembered that there are vast areas where little archaeological study has been undertaken...Surviving pieces of rag were often rejected as without interest...Determination of the exact botanical origin of the fibres used in basketry and weaving has only quite recently been recognized as of archaeological importance."[36]

AFTERWORD

COGNITIVE, SOCIAL, CULTURAL, AND RELIGIOUS IMPLICATIONS

If basket-weaving began a long time ago, this has huge implications for cognitive, social, cultural, and religious development.

It is important to understand that in the past basket-weaving was a general term that was applied to woven-fiber items, not just baskets as we think of them today. It is also important to note that basket-weaving was not just a convenience, it was crucial. As you will read next, baskets were used to gather food, process food, and to cook food (Native Americans cooked with baskets, e.g.). They were also used to store food plus special baskets and woven nets were used to trap small game and catch fish.

NOTE:

I use Native American culture and basketry as an example because many tribes were particularly skilled in basket making and many anthropologists believe that their hunter-gatherer lifestyle was similar to that of the Upper Paleolithic in Europe.[37]

Basket-weaving skills were central to many if not most Native American cultures. "Tribal women provided almost all household tools and utensils, storage containers, cups, and cradles by using one art: basket-weaving."[38]

Morse, T. Vernette, Mrs., *Basket Making (How To Do It Series).*
Art Craft Institute, Chicago, 1902, p.6.

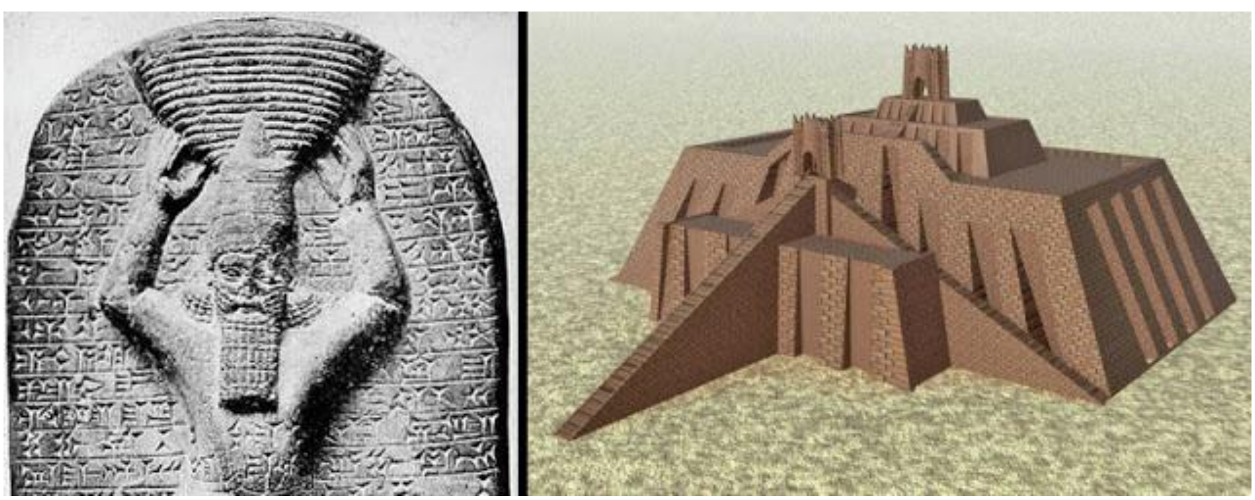
As can be seen above in this image of Native American baskets, quite a few configurations were possible. This has cognitive implications because a basket-weaver would need to have a clear idea of the final product before gathering the materials and starting on the construction.

While stone tool making might have been confined to hunters, basketry could have been tribal wide, and also children may have been instructed in basketry from an early age such as finding plants, preparing plants, and making simple baskets. Basket-making in the past has not been confined to one gender, so it is likely that both males and females and girls and boys made baskets.

To this day both males and females, young and old make baskets. There does not seem to be a gender distinction. However, textiles in ancient times and the goddesses of textiles were almost entirely women.

The fact that basket-weaving was probably tribal-wide meant that it was a common experience that all could relate to. So, there could have been metaphors about baskets which became part of the language.

We also know that in many early cultures, baskets had a ritual and religious quality, so it may have been part of their belief system.



LEFT: A Mesopotamian king depicted with a basket on his head performing the basket-bearer ritual which was always enacted before the building of a temple, a ziggurat.[39]
RIGHT: A computer reconstruction of the Ziggurat of Ur. A ziggurat was a Mesopotamian temple that was at the center of each city.

And -- since this article is part of my writing about the human experience of time -- baskets and the process of making baskets might have been models for time itself. The process of making a basket involved a conception of time and an understanding of the step-by-step

procedures. Baskets were divided into grids, each of which took a certain amount of time to make. The steps in making a basket could have eventually become time metaphors, for example.

American Indian Basketry

California Department of Parks and Recreation

https://www.parks.ca.gov/?page_id=24166

Baskets were used for utilitarian and ceremonial purposes. They were well suited to a seasonal subsistence lifestyle once practiced by many Indian tribes because they were light and durable. Various basketry forms were used in the gathering, processing, and cooking of food resources. Important events such as rituals, weddings, and other rites of passage were celebrated with gifts of beautiful baskets decorated with feathers, beads, wool and shell pendants. In all of their forms, these baskets demonstrated the great artistic skill and attention to detail that went beyond their actual usefulness.

Whether coiled, twined, or plaited, baskets were woven from a variety of native plant materials, with little more than an awl and knife. Weavers and their families tended and harvested numerous plants on a yearly basis throughout basket-making communities.

The preparation of weaving materials often took as long as the actual weaving process itself.

ENDNOTES

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[32] Picture information: Grotte du Trilobite, Arcy-sur-Cure, Yonne, Burgundy, France. Taken from Abbé Alexandre Parat, *Les Grottes de la Cure (côte d'Arcy):* La Grotte du Trilobite, plate 3 (between pp. 32-33). Bone tools. https://commons.wikimedia.org/wiki/File:Grotte_du_Trilobite_-_Arcy_-_os_ouvr%C3%A9s,_planche_3.jpg

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Article #2

Paleolithic Evidence Shows That Homo Habilis Could Have Learned Weaving From Weaverbirds (Ploceidae)

Additional Evidence That Basket-weaving May Have Begun in the Early Paleolithic Era

INTRODUCTION

I have argued that basket-weaving and a woven-fiber technology began very early, as early as Homo habilis or earlier, perhaps two million years ago. I have asserted this, in part, because these relatively intelligent creatures (Homo habilis or other hominins) who were walking upright, could have seen well-built birds' nests in their environment as a model for containers that they could make and use to carry large amounts of vegetables or fruit or fish with their free hands. 'Weaverbirds' or Ploceidae, common in Africa today, make the best-engineered nests which could have served as a model for early humans if fossil evidence could be found that confirmed they lived at the same time as early hominins.

SUMMARY OF THE EVIDENCE FOR AN EARLY WEAVING TECHNOLOGY

Around 2 million years ago at the famous Olduvai Gorge, the first stone tools made by hominins, known as Oldowan stone tools, were discovered in what has been designated as Bed I which is the oldest layer at the Gorge. Fossilized remains of Homo habilis (perhaps the earliest hominin) were also found. And in addition fossilized remains of Weaverbirds (Ploceidae) were found in Bed I. Weaverbirds are known for their elaborate and well-engineered nests which they placed in the open, so they were clearly visible. This means that Homo habilis (and probably other hominins) could have been aware of the nest constructions of these birds and could have used both the shapes and the weaving techniques as models for their own woven objects such as baskets.

EVIDENCE

The Time Period For Oldowan Stone-Tool Making By Early Hominins

"For the period of human evolution between 2.5 and 1.5 million years ago, Oldowan lithic artifacts [ED: discovered in Bed I at the Olduvai Gorge] remain a primary indicator of human behavior."
Reti JS (2016). "Quantifying Oldowan Stone Tool Production at Olduvai Gorge, Tanzania." PLoS ONE 11(1): e0147352. https://doi.org/10.1371/journal.pone.0147352

About The Oldowan Stone-Tool Industry

"Such implements were made by early hominins (probably Homo habilis at Olduvai Gorge, Tanzania)."
Oldowan Industry, Prehistoric Technology. Encyclopaedia Britannica, https://www.britannica.com/topic/Oldowan-industry. Accessed 10/26/2019.

Fossilized Weaverbirds (Ploceidae) Found In The Bed I Layer At Olduvai Gorge

"Passeriformes are one of the most common groups at Olduvai during **Bed I [my emphasis]** (NISP: 3683 in Matthiesen, unpublished conference notes), with at least 11 families including ...**the Ploceidae [ED: Weaverbirds]** (Brodkorb, 1985)..."
Prassack, Kari A., Pante, Michael C., Njau, Jackson K., de la Torre, Ignacio. The Paleoecology Of Pleistocene Birds From Middle Bed II, At Olduvai Gorge, Tanzania, And The Environmental Context Of The Oldowan-Acheulean Transition. Journal of Human Evolution, Volume 120, July 2018, pp. 32-47. Accessed
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ABOUT WEAVERBIRDS

"The idea of interlacing materials together to create a weave was probably inspired by nature; by observing birds' nests, spider webs and various animal constructions..."
"The History of Weaving". Wild Tussah, 2014. https://wildtussah.com/history-weaving-2/. Accessed 10/26/2019.

Weaverbirds build their nests out in the open, so early hominins or Homo habilis would almost certainly have been aware of them.

"The weavers build their homes quite in the open where they can be seen of all men."
"As a preliminary to the construction of the nest proper, the birds wrap a considerable amount of fibrous material around a chosen limb or frond...The small strips are not only wound round the branch but are plaited together so securely that it is impossible with ordinary effort to separate them." "In every large colony are found what look like unfinished nests--that do not in building get further than this perch or roost stage, looking, as Jetdon says, like an inverted basket with a handle."
Wood, CA. "The Nest of the Baya Weaver Bird." The Auk, Vol. 43, No. 3 (Jul., 1926), pp. 295-302. Oxford University Press, DOI: 10.2307/4075422. https://www.jstor.org/stable/4075422

A cluster of Weaverbird's nests showing how visible they are/were.

"Weaver birds build exquisite and elaborate nest structures that are a rival to any human feat of engineering."
"Having selected a good location for his nest, the weaver bird starts to loop and weave strands of grass or strips of leaves around the ends of one or two branches in a tree. Having created a looped basis for the nest body, the weaver bird then builds the hollow body before adding the tubular entrance last."
"Weaver Birds," Eden, UKTV, https://eden.uktv.co.uk/animals/birds/article/weaver-birds/. Accessed 10/26/2019.

"Weaver birds use a variety of plant materials to build their nests, including strips of grass, leaves, twigs and roots. A weaver bird has a strong, conical beak, which it uses to cut blades of grass that it will use in nest-building. The weaver bird can tie real knots in nest material with its beak and its feet."
Weaver Birds - Animal Facts, Ploceidae.
AnimalFacts,https://www.animalfacts.net/birds/Weaverbirds.html. Accessed 10/26/2019.

A Study In Cameroon Shows The Wide Variety Of Materials Used

"...plant-types on which Weaverbirds were commonly observed nesting or picking nesting materials, oil-palm (22.9%), coco-nut (13.5%), maize (16.6%), Elephant-grass (10.7%), pear(8.5%), mango(9.4%) and plantain(10.0%)."
Melle ekane Maurice, Nkwatoh Athanasius Fuashi, Viku Bruno Agiamte-Mbom, Tim Killian Lengha. "The nesting ecology of Weaverbirds in Ekona farms, Southwest Region, Cameroon." International Journal of Environment, Agriculture and Biotechnology (IJEAB), Vol-2, Issue-5, Sep-Oct- 2017, ISSN: 2456-1878. Department of Environmental Science, University of Buea, Cameroon. http://dx.doi.org/10.22161/ijeab/2.5.29

"Take a look at the knots the Red Headed Weaver can tie...
Using his beak and feet! They seem rather complex not to mention strong."

One species of Weaverbird uses, "...remarkable nest construction [; it is in the] behaviour of Malimbus Rubriceps in which nest material is “prepared” for use in building before the bird takes it to the nest." "The fabric of the nest is often remarkably strong and pliant."
Crook, John (2008). A Comparative Analysis of Nest Structure in the Weaver Birds (Ploceidae). Ibis. 105. 238 - 262. 10.1111/j.1474-919X.1963.tb02498.x. https://doi.org/10.1111/j.1474-919X.1963.tb02498.x


Building a nest from scratch (left to right).


Adding to the early structure.


A more advanced stage of the construction.

The finished bird's nest.

Detail of the above finished bird nest.

HOMO HABILIS AND WEAVERBIRDS

These birds were quite clever, and their construction methods were excellent models for hominins. Many anthropologists believe that early humans had the ability to imitate and to learn. If Homo habilis was good at imitation, then it is quite likely that they were able to imitate the designs and constructions they saw in nature. An early simple basket could have begun as a copy of a bird's nest.

Learning And Teaching Via Imitation

According to the *Evolution of Culture*, very few animals possess the ability to learn via imitation. But the genus Homo was/is one of them. (*The Evolution of Culture*, Volume 4. Linquist, Stefan, Editor. Rutledge, 2017.)

> "The first obvious signs of imitation are the stone tools made by Homo habilis about 2.5 million years ago, although their form did not change very much for another million years. It seems likely that less durable tools were made before then, possibly carrying baskets, slings, wooden tools and so on."
> Blackmore, Susan. "Evolution and Memes: The human brain as a selective imitation device." Cybernetics and Systems, Vol 32:1, 225-255, 2001,Taylor and Francis, Philadelphia, PA.

Imitation And Homo Habilis

> "In a study of teaching novices to produce Oldowan-like artifacts, Morgan et al. (2015) examined the premise that, in view of its probable social transmission, stone toolmaking spurred the evolution of teaching and language in our lineage..."They concluded, however, that Oldowan toolmaking may have depended on imitation and emulation (observational learning) for transmission among groups and across generations, which they refer to as “low-fidelity social transmission” and suggest this as a reason for the relatively low rate of change in the Oldowan over many hundreds of thousands of years, while contending that Acheulean technology may have required teaching or “proto-language.”
> Toth, Nicholas & Schick, Kathy (2018). "An overview of the cognitive implications of the Oldowan Industrial Complex, Azania: Archaeological Research in Africa." 53:1, 3-39, pp 17-18. DOI: 10.1080/0067270X.2018.1439558

> "What was it these early stone-knappers knew that chimpanzees can't get?" Wynn asked. "I think one thing was that early hominids were much better at copying motor procedures — we can watch an individual perform a motor task and mimic it. Chimpanzees are terrible at that — they see a task and have to reinvent the wheel. This gets back to mirror neurons and the copying of behavior." Quotation from paleoanthropologist Thomas Wynn of the University of Colorado at Colorado Springs.
> Choi, Charles. "Human Evolution: The Origin of Tool Use." LiveScience, November 11, 2009. https://www.livescience.com/7968-human-evolution-origin-tool.html. Accessed 10/26/2019.

Since we know for certain that hominins could make stone tools, it is reasonable to assume that they could also create other objects as well.

Therefore I believe it was virtually impossible for early hominins to have been unaware of the bird nests made by these birds and in addition, they probably observed the methods these birds used such as tying knots, splitting grass and using a variety of light fiber materials.

These nests not only served as examples and models for weaving and baskets, but the birds also showed hominins how to create such a structure. In the following picture gallery, you can follow how a bird starts with a few simple strands that are added onto until a large enclosed object is created. Today basket weavers call this a 'random weave' because there is not a basic overall structure, the way basket-weaving is practiced today.

Weave A Basket Out Of Vines:
The Random-Weave Technique

A complete tutorial from *Mother Earth News*
"Even first-timers can create intricate baskets with the random-weave technique."
https://www.motherearthnews.com/diy/weave-a-basket-zmaz93asztak

The Weaverbirds offered Homo habilis a complete tutorial on fiber construction. Watching a bird making a nest showed exactly how to build such a structure. The birds found and used a mixture of light materials which they interwove into a strong and resilient object. They split fibers with their beaks and attached fibers using strong knots. So Homo habilis would have

seen the steps it took to build, the materials needed, and the weaving techniques to hold it together in a solid structure.

Occasionally these nests would fall to the ground so Homo habilis could have seen and examined these close up. It is also possible that Homo habilis was able to knock some of these down from the trees where they were hanging and used them for containers and baskets by themselves.

A nest that fell down. Notice the wide strands that were used to make the nest.

The Importance Of Walking Upright With Two Free Hands

Walking upright meant that early hominins such as Homo habilis had two free hands. It is logical to assume that baskets or containers would have been adopted early as they allowed hominins to carry more goods which would increase their chances for survival.

> "The single most important physical specialization that our ancestors the australopithecines evolved was the ability, unique among mammals, to habitually walk on two legs. "Whether this adaptation was in response to the encroaching savanna, the need keep a cool head, or - more likely - to free up their hands, it happened millions of years before the sudden acceleration of our brain growth. When the weather became seriously worse 2.5 million years ago, their behaviour and physical form were appropriate for the next step. Their hands were free, their

head was smart and cool, and their intelligent, cooperative exploitation of a wide range of foods, including meat, was still the rule. The dry climate merely turned up the selective pressure on the savanna primates to make the best of diminishing vegetable resources..."
Oppenheimer, Stephen. "Origins." Extract taken from 'Out of Eden' 2003. Bradshaw Foundation.
Paleoanthropology, http://www.bradshawfoundation.com/origins/origins_big_brains.php.www.bradshawfoundation.com/origins. Accessed 10/26/2019.

"In *The Descent of Man*, Darwin (1871) explained that hominids started walking on two legs in order to use their hands. He states in his book, ‘However, the hands and arms could hardly have become perfect enough to have manufactured weapons, or to have hurled stones and spears with a true aim, as long as they were habitually used for locomotion.’
"Some might acknowledge that the evolution of bipedalism is responsible for the supposed superiority of humans as compared with other animals, because it permitted the manipulation of nature at will."
Ko, Kwang Hyun. "Origins of human intelligence: The chainof tool-making and brain evolution." ANTHROPOLOGICAL NOTEBOOKS 22 (1): 5–22. ISSN 1408-032X. Slovene Anthropological Society 2016.

Baskets Are Tools

"Tools may have allowed hominids to be more adaptable, extract food from a greater range of areas." Quotation of Thomas Plummer, paleoanthropologist at Queens College, New York.
Choi, Charles. "Human Evolution: The Origin of Tool Use." LiveScience, November 11, 2009. https://www.livescience.com/7968-human-evolution-origin-tool.html. Accessed 10/26/2019.

If Baskets And A Woven-Fiber Technology Are Also Seen As Tools
(Along With Stone Tools) It Might Explain Gaps In Our Understanding Of Evolution

"Tools are the products of our brains, and we have millions of stone tools," Wynn added. "What we need are more creative ideas on how to extract understanding from them, and what they tell us about our evolution." Quotation from paleoanthropologist Thomas Wynn of the University of Colorado at Colorado Springs.
Choi, Charles. "Human Evolution: The Origin of Tool Use." LiveScience, November 11, 2009. https://www.livescience.com/7968-human-evolution-origin-tool.html. Accessed 10/26/2019.

AFTERWORD

However, I also argue that this did not lead directly to basket-weaving as we know it today but rather baskets that were made with a "random weave" which is more in keeping with the bird nest model, as mentioned earlier.

And while basket making probably did develop, the baskets might have been quite simple.

Simple Timor basket for drinking.

Simple basic basket with narrow strands.

Simple basket made with wide strands.

I believe that random weave basket making and simple basket construction may have continued for a million or more years.

Then perhaps after a million years hominins (possibly Homo erectus) began to understand the power of the right-angle weaving design in which one set of fibers was placed at right-angles to another set of fibers or one set of tree branches was placed at right-angles to another set of branches. This discovery was remarkable because this structure was not common in nature.

"There are no right-angles in nature."
Antoni Gaudi, architect.

The discovery of right-angle structure was one of the most important discoveries ever made. Today, for example, the framing in modern skyscrapers is constructed using the same basic horizontal and vertical design.

A spider web may have been an inspiration for weavers.
Here is a traditional basket as seen from the bottom showing its similarity to a spider web.

This fundamental and crucial idea of right-angles gave objects both strength and flexibility. The inspiration for this innovation could have been gleaned from spider webs that are constructed in this manner.

This simple idea eventually led to the construction of not just a huge variety of baskets, but a slew of objects from small to large, from sandals to boats and houses. And it is the fundamental structure of all fabrics and clothing. Of course, we know this happened, however, we just don't know when it began and how long it took to develop.

Article #3

Evidence That Paleolithic Hominins Lived in Close Association With Weaverbirds and Their Basket Making Skills

Baobab trees in Tanzanian scenery.

INTRODUCTION

"It is likely that many new Oldowan occurrences will be discovered in this century and that a range of new theoretical and methodological approaches will be applied to the earliest paleolithic record. These new lines of evidence should give us a clearer understanding of the complexity of the Oldowan archaeological record and a greater appreciation of the range of adaptive behaviors in the emergent tool-making and tool-using hominins that ultimately led to the modern human condition." (Schick/Toth, 35)

The purpose of this article is to cite scientific evidence plus generally accepted paleoanthropological thought and concepts to support the idea that hominins on the African savanna were in close contact with Weaverbirds almost two million years ago and that, as a result, hominins learned rudimentary basket, weaving and knot making skills.

> This is important because it affected human evolution. As Kathy Schick and Nicholas Toth pointed out, "It is likely that this phenomenon of accelerated brain expansion in the human lineage was due to the ability of hominins to access higher quality food resources through the use of technology, which allowed for a decreased gut size and increased brain size." (Schick/Toth, 35)

In this case, baskets, for example, would have allowed hunter-gatherers to collect and bring back greater amounts of food -- and greater amounts of quality food that grew far from their camp -- than was possible without baskets.

DIRECT EVIDENCE FROM THE PALEOLITHIC

Fossilized Weaverbirds (Ploceidae) Were Found In The Oldest Layer, Bed I Layer, At Olduvai Gorge

Fossilized Weaverbirds were found in the same layer as Oldowan stone tools, indicating that Homo habilis lived there during the same time period about two million years ago.

Earliest Evidence Of Humans Thriving On The Savanna

> "Humans were living and thriving on open grassland in Africa as early as 2 million years ago, making stone tools...That's according to powerful evidence from artifacts found at Kanjera south, an archaeological site in south-west Kenya."
> "To investigate whether they were standing on the site of ancient grassland, Plummer's team analyzed the ratio of carbon-13 to carbon-12 in the soil and in the tooth enamel of the fossilized animals. Grass has a higher ratio than trees and shrubs. Both the soil and the tooth enamel of fossilized animals had similarly high ratios."
> "'These tests showed that the Kanjera site was over 75 percent grassland 2 million years ago and that the wider area was teeming with zebras, antelope, and other grazers,' says Dr. Plummer."
> Barley, Shanta. "Earliest evidence of humans thriving on the savanna."
> New Scientist, 2009, https://www.newscientist.com/article/dn18018-earliest-evidence-of-humans-thriving-on-the-savanna/#ixzz6Iv2exzul
> Accessed 4/7/2020.

EVIDENCE FROM CONTEMPORARY HUNTER-GATHERERS

Contemporary Hunter-gatherers as Models for Paleolithic Behavior

"Using modern primates and hunter-gatherers [ED: such as the Hadza] as models, most paleoanthropologists believe the bulk of the diet of early hominin populations consisted of plant resources such as berries, fruits, nuts, leaves, pith, flowers, shoots, seeds, and gum, as well as underground resources such as roots, tubers, corms and rhizomes." (Schick/Toth, 31)

About The Hadza

"The Hadza's homeland lies on the edge of the Serengeti plains...close to Olduvai Gorge, one of the most important prehistoric sites in the world, where Homo habilis – one of the earliest members of the genus Homo – was discovered to have lived 1.9 million years ago. Genetically...they are one of the 'oldest' lineages of humankind.They speak a click language that is unrelated to any other language on earth. [ED: It is considered a 'language isolate'.] "
THE HADZA
https://www.survivalinternational.org/galleries/hadza

While Toth and Schick mentioned fruits only in a general way, the following observers during the last century specifically mentioned Baobab fruit as being a major part of the Hadza diet.

Hadza Diet, Baobab Fruit, and Paleo-diet

At the end of the article entitled, "Why the Hadza are Still Hunter-Gatherers" is "Table 1. Descriptions of the Hadza through time." In these descriptions by ten different observers for about a century (1911- 2002) fruit from the Baobab tree was mentioned as a key part of their diet. Two other observers who did not mention the Baobab fruit specifically used only general terms for foraged food such as fruits. Also at the end of the article (Figure 2) a pie-chart stated that the Baobab fruit averaged 13.5% of the Hadza diet and honey averaged 21.4% of their diet -- the honey being most often found in crevices of the Baobab tree. (Marlowe, Table 1, Figure 2)

"The Hadza of Tanzania are the world's last full-time hunter-gatherers. They live on what they find: game, honey, and plants, including tubers, berries, and Baobab fruit."
Gibbons, Ann. "The Evolution of Diet." National Geographic,
https://www.nationalgeographic.com/foodfeatures/evolution-of-diet/
Accessed 4/7/2020.

In the following discussion of Oldowan tools and culture, Dr. Plummer makes the assumption that Baobab trees were part of the Paleo-landscape and uses the way of life of contemporary African Hadza hunter-gatherers to illustrate his points and to suggest that Homo habilis and/or Homo erectus may have done the same millions of years earlier.

"Woody plants that are likely to have provided food to hominins (E.G., Adansonia digtata, Baobab, providing fruit...) are widely distributed across Africa today (O'Brien and Peters, 1999; Peters and O'Brien, 1994)." (Plummer, 123)

Both the fruit and the seeds in the fruit were/are important to the Hadza

> "The fruit and seeds from the Baobab tree (Adansonia digitata) are important dry-season food for the Hadza (Schoeninger et al., 2001a). The fruit...provides energy as well as calcium and vitamin C. Seeds from the fruit are pounded into flour and when eaten provide a rich source of fat and protein (5 of 8 essential amino acids) (Schoeninger et al., 2001a)." (Plummer, 149)
>
> "Data on Hadza ethnobotany not only provides invaluable and timely cross-cultural information on plant use, but also enhances our understanding of early hominin paleoecology." (Crittenden, 319)
>
> "Baobab fruit (Adansonia digitata) is consumed throughout the year and comprises 14% of the annual diet. The fruit has an inedible hard, green outer shell that accounts for approximately 50% of the total weight of the fruit (Nour et al. 1980). The inside of the fruit is composed of approximately 15–20 seeds which are covered with dry, white, chalky pulp that may be consumed in four ways: (1) directly out of the shell, discarding the hard seed inside the pulp, (2) pounded into a flour, removing the seed husks by winnowing on the surface of small piece of animal hide, (3) combining the flour with water and/or berry juice to create a sweet paste, or (4) removing the intact seeds from the dung of baboons, sun drying, and then pounding into flour. The fruit pulp alone is low in fat, protein, and fibre whereas the pulp flour (seed and pulp combined) is relatively high in fat, protein, and fibre. The fruit pulp and pulp flour are both high in simple carbohydrates (Crittenden 2009)." (Crittenden, 322)

ABOUT BAOBAB TREES, HOMININS, & WEAVERBIRDS

About The Baobab Tree

The Baobab tree is remarkable, so much so I will devote an entire article to this tree that played a key role in human evolution and survival. Suffice it to say, the trees were spread across the Paleo-savanna millions of years ago. The trees seemed permanent and stable to humans as many lived a thousand years or more and each large tree provided fruit, often honey, shade, and even shelter and water. And Weaverbirds often made the branches a place for their nests.


Baobab trees on the savanna.

Baobabs dotted the African savanna while our ancestors still lolloped along on four legs. The trees would have provided them with easily gathered fruit, while branches gave shelter from rain, sun and predators. As man gradually started to stand upright (some four million years ago), it freed up his hands to shape tools...
(Watson, Kindle Locations 64-72)

The world of primitive African man spread as far as his furthest travels. The biggest thing that moved in it was the elephant, and the biggest living thing that didn't was the Baobab. The trees were as near to permanent as any living thing could be. (Kindle Locations 64-72)

Take away the Baobabs, and a whole community disappears with them. Shade, shelter, food, breeding places, hunting lookouts; the loss of a Baobab is much more than the loss of a tree. (Kindle Locations 1376-1387)

About Weaverbirds

Baobab tree with Weaverbird nests.

"Three weavers regularly nest in Baobabs, while a few others occasionally do so.
Weavers that regularly breed in Baobab trees:
Red-billed Buffalo-Weaver Bubalornis niger
White-billed Buffalo-Weaver Bubalornis albirostris
Red-headed Weaver Anaplectes rubriceps"
Weavers Breeding In Baobabs. Weaver Watch, weavers.adu.org.za.
http://weavers.adu.org.za/spcat.php?spc=22

"Near human habitation Baobabs are occasionally taken over by...breeding colonies of Black-headed (or Village) Weavers, seeking their protection from predators by proximity to mankind." (Watson, Kindle Locations 1371-1374)

"The Village Weaver inhabits bushy savanna...It is frequently associated with human habitation in west and central Africa."
Village Weaver Ploceus Cucullatus. Weaver Watch, weavers.adu.org.za.
http://weavers.adu.org.za/sp.php?spp=797

Weaverbirds and a finished nest.

WHAT WEAVERBIRDS COULD HAVE SHOWED HOMININS

While all Weaverbird nests are well crafted and intricate, the Village Weaverbird nest is the best known and most widely studied. The birds use a variety of techniques and materials to do the job. Early hominins could have learned a number of techniques by observing Weaverbirds building nests and by studying abandoned nests that may have fallen to the ground or that may have been taken from the Baobab tree branches.

(Left) A Village Weaverbird makes a nest. (Right) Detail.

The following gives only the briefest overview of the complexity of a Village Weaverbird nest.

> "The outer shell of the nest is woven by the male of long strips torn by him from the leaves of giant grasses or palms. The general external appearance of the nest...is ovoidal or kidney-shaped in form with a bottom entrance...Just within the roof of the external shell the male thatches a special ceiling of short, broad strips of grass leaves. The ceiling is not woven, and in some parts of Africa may be thatched of dicot leaves in addition to the use of strips of grass." (Collias/Collias, 571) "There are five stages to the building of the outer shell of the nest by the male: (1) initial attachment, (2) roof and egg or brood chamber, (3) antechamber, (4) entrance, and (5) entrance tube." (Collias/Collias, 573)

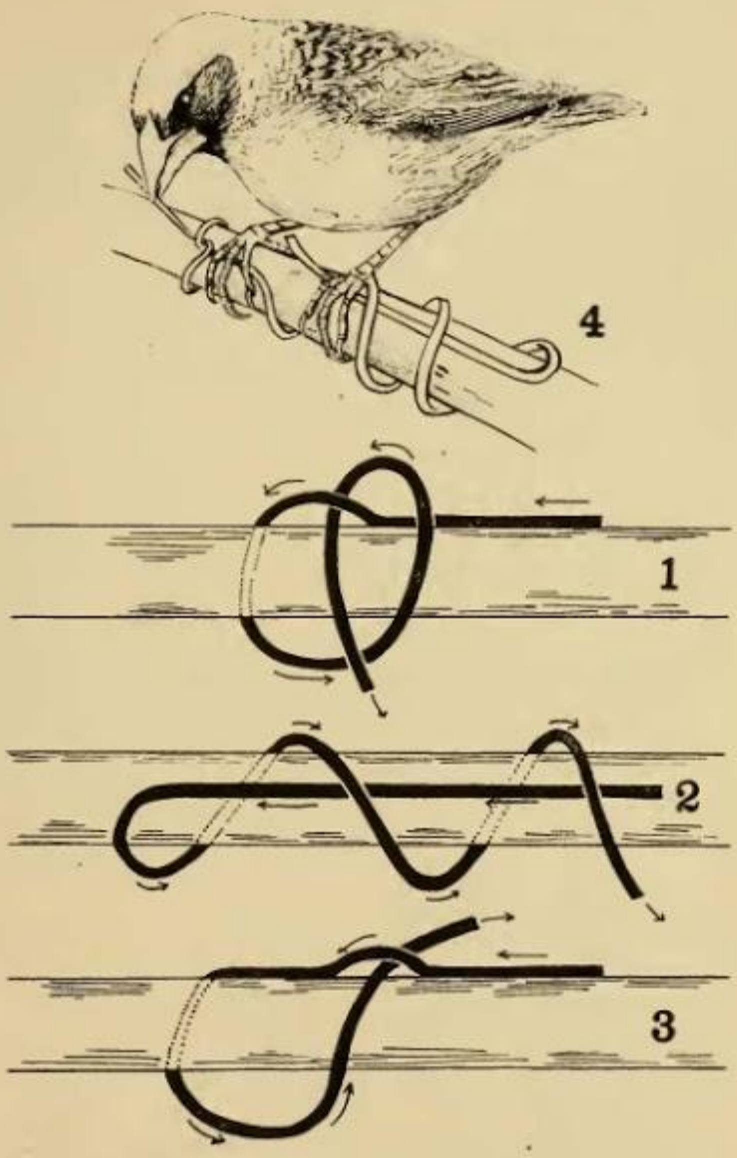

FIG. 132. TYPES OF STITCHES USED BY *Q. QUELEA* WHEN WEAVING AROUND A BRANCH
(4) after drawing by James P. Chapin.

Example of Weaverbird knots.
"The Weaving of the Red-Billed Weaver Bird in Captivity."
(Friedmann, 363)

Weaverbird nests.

SUMMARY

-- Fossil evidence shows that Homo habilis and Weaverbirds lived during the same time period at Olduvai Gorge about two million years ago. Fossil evidence also shows that the savanna environment existed during the same time period.
-- Paleoanthropologists agree that early hominins probably ate fruit from the Baobab tree as a key part of their diet, as contemporary African Hadza hunter-gatherers do today.
-- This means that early hominins were often in the vicinity of Baobab trees.
-- Weaverbirds regularly nest in Baobab tree branches and often prefer to be close to humans there.
-- Therefore: Early hominins were familiar with Weaverbirds and the various nests that these birds made which makes it quite likely that hominins learned how to construct woven fiber containers based on the birds' examples.

CONCLUSION

If it is agreed that early hominins lived in close proximity to Baobab trees, where Weaverbirds also nested, then many things follow from that association. I believe that early humans would have developed an early rudimentary form of basket making based on examples by Weaverbirds who lived in the branches above them. The birds would not only have shown them finished sturdy nests, but how to make these nests, and how to tie secure knots, which materials on the savanna to use, and how to process those materials. In addition, abandoned nests would have fallen to the ground and would have been used and examined.

Containers would have been so useful to hominins who walked upright and could carry these containers or baskets, that it seems unlikely they would not have developed such a technology. In his book, *Human Universals* Donald Brown lists containers as one of the eight universal technologies common to all cultures. Anthropologist Dr. George P. Murdock, who developed the *Cross-Cultural Survey,* lists weaving as one of the four basic universal

technologies in all cultures.

Furthermore, the long-living Baobab tree with its remarkable resources gave hunter-gatherers a stable and predictable environment for generations, and that could be used most of the year if they moved from Baobab grove to grove as the Hadza do today. It is no wonder that this tree is called "The Tree of Life" in Africa.
From my point of view, this means that hominins, starting perhaps with Homo habilis, had the resources, the materials, the models, and even the instruction for basket making -- along with a degree of stability which allowed them to work on the time-consuming skills of basketry.
My theory, however, does not end here. The sequential steps of processing, that basket making involves, led eventually to an understanding of linear time -- unique among the animals. I have written that processes such as basket making and stone tool making led to a sophisticated and unique understanding of time which allowed humans to plan and coordinate their activities.

AFTERWORD

One cannot overemphasize the importance of basket making which may have evolved into weaving. It is now assumed that textile weaving began thousands of years before the latest confirmed find of clay fragments that showed impressions of weaving that were dated at 27kya. These showed sophisticated weaving techniques that must have been developed thousands of years earlier.

But whenever it started, it led to a nunber of complex and flexible technologies. By the Neolithic period shoes, clothes, baskets, fences, roofs, boats, and houses could all be made with a weaving and basket-like technology. For example, large round boats known as 'basket boats' were in use in the earliest days of the Sumerian civilization.

And from its early beginnings basket making would have influenced technology, concepts, metaphors, and language.

> For example, at the *Beyond the Basket* conference in 2009, Mr, Heslop stated: “Beyond its practical uses, basketry has arguably been even more influential on our lives, since it relies on the relationship of number, pattern and structure."
> University of East Anglia. "Basket-weaving May Have Taught Humans To Count." ScienceDaily. ScienceDaily, 8 June 2009.
> <http://www.sciencedaily.com/releases/2009/06/090604222534.htm>.

So it may have also led to an understanding of geometry as well as an understanding of the "grid." The avid basket makers, the Babylonians, were the first to divide the sky into sections based on the circle -- and then further divide the sky into hours, minutes and seconds -- the very first grid and the one that astronomers still use today.

The later basic understanding of putting fibers or materials at right-angles (the key to weaving) was a masterful insight that was critical. While the principle is simple and seems obvious, it was a construct of the human mind.

My guess and this is only a guess, is that basket making began in a fundamental form with Homo habilis or hominins of that time period. These early baskets were probably made with a 'random weave' which involved tangling strands of fibers together along with some basic knots learned from the Weaverbirds. This technique was used to make baskets for carrying berries and foraged food. The right-angle construction of warp and weft (or also called 'woof') which was part of weaving probably did not happen until much later, perhaps with Homo erectus as this would have been a major breakthrough.

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Article #4

The Invention of Right-Angle Construction in the Paleolithic Era

INTRODUCTION

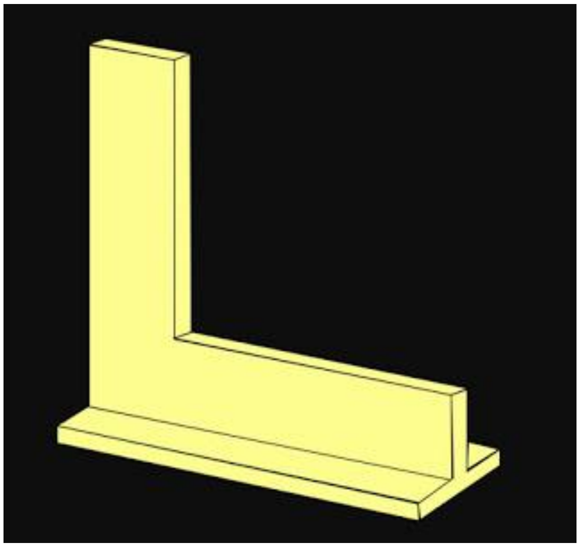
Ironworkers (as these skyscraper workers are called) having lunch on a horizontal crossbeam supported by vertical steel columns 840 feet up. Modern steel-framed construction uses horizontal beams and vertical columns at right-angles to build today's highrise and skyscraper buildings. This picture is from the construction of Rockefeller Plaza in 1932 in New York City. Below the ironworkers is the entire city built with right-angle construction.
Clyde, Charles."Lunch atop a Skyscraper." New York Herald-Tribune, published Oct. 2, 1932.

In the distant past, early humans made a major technological breakthrough that has been overlooked. It is something that we use every day and that in many ways has built the modern world. Because it is everywhere, it seems natural; however, it is anything but. I am talking about right-angle construction -- the structure that is at the heart of weaving and textiles and the clothes you wear, the furniture you sit in and at the center of a skyscraper's construction and even your own home.

I tried to research this idea and could find almost nothing that dealt with this technology as an invention and discovery that humans had made.

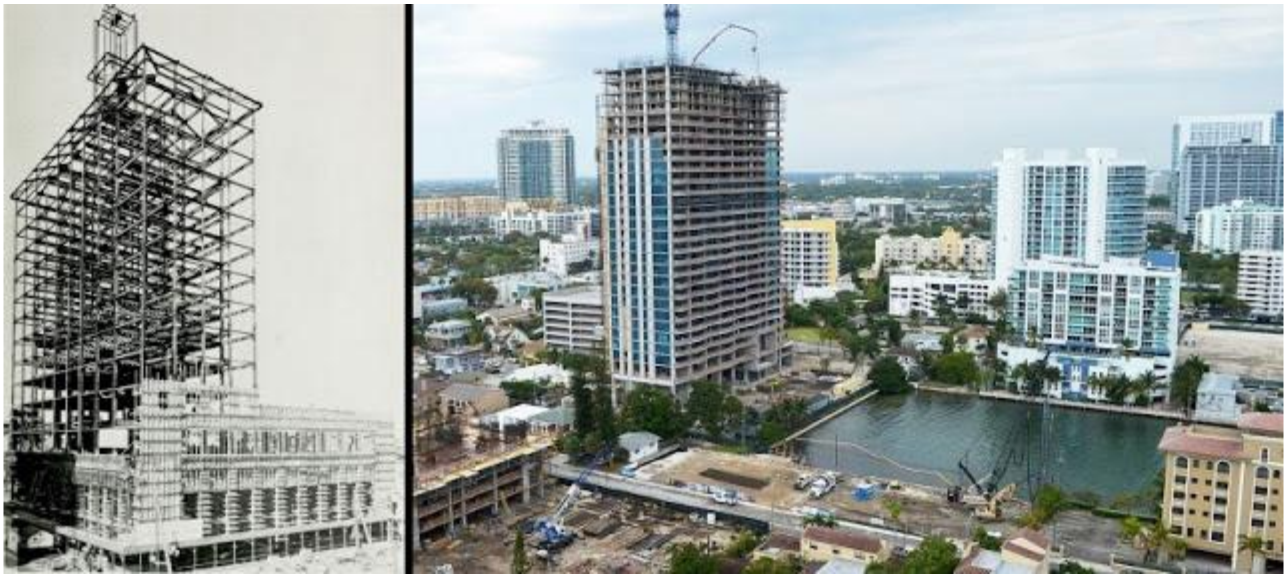
(Left) Painting of Archimedes in deep thought.
(Right) Detail of painting showing right-angle square tool.
Archimedes of Syracuse contemplates the properties of the right-angle. Archimedes is considered one of the greatest scientific thinkers; he was an ancient Greek mathematician, engineer, and inventor.
Painting by Domenico Fetti. "Archimedes Thoughtful." 1620.

“There are no... right-angles in nature,” Antoni Gaudi, the famous Spanish architect, declared.



Square (Tool). A square is a basic and essential right-angle tool used in construction. Carpenters and builders use it to ensure the accuracy of construction right-angles and it is also used for marking lines on materials before making a cut. It is so fundamental it is often used in heraldry and on construction logos.

While Gaudi's declaration is an overstatement, as some trees grow straight up, perpendicular to the ground, and we as humans generally walk at right-angles to the earth, natural right-angle complex structures are almost non-existent. In particular, I am talking about interlocking, interwoven perpendicular structures that do not occur in nature but which humans construct.



(Left) Steel-framed construction showing the basic right-angle skeleton structure.
(Right) A modern complex built using right-angle steel-framed construction.
Most modern highrise and skyscrapers are built using steel-framed construction. A horizontal and vertical steel skeleton is built which is strong enough to support the windows, floors, and walls.

ABOUT RIGHT-ANGLE CONSTRUCTIONS

At some point in the past, humans realized that fiber items made with a right-angle design were strong, durable, and flexible. Moreover, they could be easily made with local plant materials.

NOTE: Of course, with a dome-like structure and non-rectangular shapes, all the elements of a frame or the structure are not always at a strict right-angle in relation to each other, nevertheless a consistent perpendicular opposition is a key part of these structures.

This was a major advance in human technology. When and how this happened is open to debate. But that it did happen is undeniable and most important.

While a number of developing skills may have contributed to this technology, my guess is that basket-weaving was one of the major areas where this insight was both discovered and implemented.

> "From basket-weaving to loom-weaving, the process of weaving was already known in the Paleolithic era, as early as 27,000 years ago. Weaving, the process of joining individual threads together at RIGHT-ANGLES [ED: my emphasis] to one another, has been around for millennia."
> BSAMPLY. "WHAT ARE WOVEN FABRICS?"
> https://bsamply.com/what-are-woven-fabrics/ Accessed August 7, 2020.

HOW WAS RIGHT-ANGLE CONSTRUCTION DISCOVERED?

The discovery or invention of right-angle construction must have been preceded by an earlier woven-fiber technology. I have again searched the Internet and could only find vague references to the origins of basket-weaving or woven-fiber technology, as I have called it, such as the following quote.

> "The idea of interlacing materials together to create a weave was probably inspired by nature; by observing birds' nests, spider webs and various animal constructions..."
> Wild Tussah. "The History of Weaving." September 2014.
> https://wildtussah.com/history-weaving-2/ Accessed August 7, 2020.

If weaving was inspired by nature, the origins of weaving may have begun as follows:

It has been well established [1] that early hominids spent a good deal of time around Baobab trees on the savannas of Africa. This tree was also used by Weaverbirds who built elaborate nests. So, as I have written, it seems quite likely that at some time in the past, hominids learned how to weave by watching Weaverbirds build their nests and by observing the completed nests and handling abandoned nests when they fell down.

Just how much could early hominids have learned from the Weaverbirds and their skills at nest building? Quite a lot.

Weaverbirds building nests.
(Left) A male bird working to complete a nest.
(Right) A completed nest with a male and female Weaverbird ready to move in.

ABOUT THE WEAVERBIRD

> "The nest is made from long strips torn from the leaves of grasses, which are intertwined in a regular lattice formed by passing successive strips over and under, and in a direction orthogonal to, strips already laid. It is held together, and attached to the substrate, by a variety of stitches and fastenings... The bird uses its beak rather like a needle in sewing or darning."Ingold, Tim. "Chapter Nineteen Of string bags and birds' nests Skill and the construction of artifacts." The Perception of the Environment, Essays on Livelihood, Dwelling and Skill. Taylor & Francis Group.

A Weaverbird starting to build a nest. He is creating the basic skeleton that the nest will be built around.

Weaverbirds gave hominids good initial instructions which included most of the basics of basket-weaving such as creating a regular lattice, tearing then placing long strips at an opposing angle to already existing strips, passing the strips over and under and tying this all together with a variety of knots. Eventually, hominids would have been able to expand on this craft.

THE FIRST HOMINID BASKETS WERE PROBABLY 'RANDOM WEAVE' CONSTRUCTIONS

Assuming that the model for early basket-like containers and carriers was bird nests and such, the most likely human-made designs were probably made with a 'random weave.' This is due to the fact that a random weave in many ways imitated the process that birds used to build nests such as the construction process of Weaverbirds who were common in Africa then and now [2].

Two random weave baskets. Photos and baskets by Nan Bowles.

A random weave basket generally starts with a circular or oval bare-bones open skeleton made of strong thick branches or vines which are intertwined. The branches might be green so that they are pliable. The sides are then laced with smaller more flexible (often green) branches and vines that are woven over and under the skeleton frame and over and under each other and at opposing angles to existing strands. When allowed to dry out, a simple basket like this is remarkably strong and can hold two to six kilograms, in my experience. It is also quite light, so carrying it for a long-distance would not have been a problem.

Such technology would have given early hominids a distinct survival advantage. For example, it would have allowed hominins to forage much further from their base because they could bring back a large amount of food from distant locations.

(Left) A fallen abandoned Weaverbird nest. (Right) A simple basket using opposing strands.

Over time this basic construction could have evolved into a more regular and standard right-angle structure, the kind that we are familiar with. And once mastered this design could have been expanded and developed to create a wide range of items.

Master craftsmen, at different stages, weaving baskets and other items.

The principle of regular basket-weaving is quite simple. A set of strands is placed at right-angles to another set of strands. In basket-weaving the vertical stands, known as spokes, are fairly hard. Then the opposing strands, called weaver strands, are more flexible and wrap over and under around the spokes to make the walls of the basket. While the term 'basket' and 'basket-weaving' is used, the ancient craft applies to mats, flexible bags and sacks, wide gauge and fine gauge baskets, different styles of weaving, and a large variety of fiber articles from sandals to boats and houses. In short, the 'basket weaver' was/is a fiber craftsman.

This photo shows the huge variation possible with even a simple basket design.

However, the historic timetable is unclear. When humans first began to make random weave baskets and how long this went on is unclear. Yet, logically, this would have been the craft that preceded sophisticated right-angle woven structures.

It was no accident that the two earliest civilizations Sumer and Egypt employed weaving as a key technology throughout their empires. Both had plants that could be used for a variety of woven-fiber structures. In Sumer, the primary materials were the reeds that grew abundantly in the mashes as well as esparto for rugged baskets and the best rope. In Egypt, it was papyrus and flax which could be used to make sacks, cloth, baskets, sandals, and even boats. Egypt's granaries, for example, were managed with sacks of grain. Quite simply, neither civilization would have been able to function without woven-fiber technology.

> In the *Elementary Sumerian Glossary,* the highly respected 'basket weaver' is defined as: "a reed craftsman, basket and mat weaver"
> Foxvog, Daniel A. Elementary Sumerian Glossary. University of California at Berkeley, revised 2008. SumerianGlossaryFoxvog.pdf

PICTURE ESSAY
SHOWING THE POWER
OF RIGHT-ANGLE CONSTRUCTION

It is my educated guess that humans probably discovered the power of right-angle construction with basket-weaving and then expanded that technology to make larger, stronger, and/or more complex woven structures.

Yet in a sense, it does not matter if this insight came from basket-weaving. What does matter is that at some point it became part of and central to basket-weaving and when it did it allowed a huge variety of objects to be constructed. Then this technology gave humans a distinct advantage in the struggle for survival.

Moreover, we can say with certainty that eventually new woven designs were invented for a wide variety of uses such as making fish traps with an open type of weaving, and hats, and sandals, and mats, i.e., myriads of items small to large. This was possible because right-angle technology was scalable. As you will see in the following picture gallery, small one-person boats could be made with this technology as well as huge boats for commercial purposes. I believe it started small and evolved into many small things and then later evolved into bigger things.

The following images illustrate just how versatile this technology became, a technology that we do know was in place at least by the Neolithic era -- but probably much earlier.

ABOUT THESE IMAGES

PLEASE NOTE: The following photographs and images were found at commons.wikimedia.org with a few exceptions. All images are used with permission.

At the end of this article, I have listed the web link for each image. To get more information about each one, please go to the Internet page for that image.

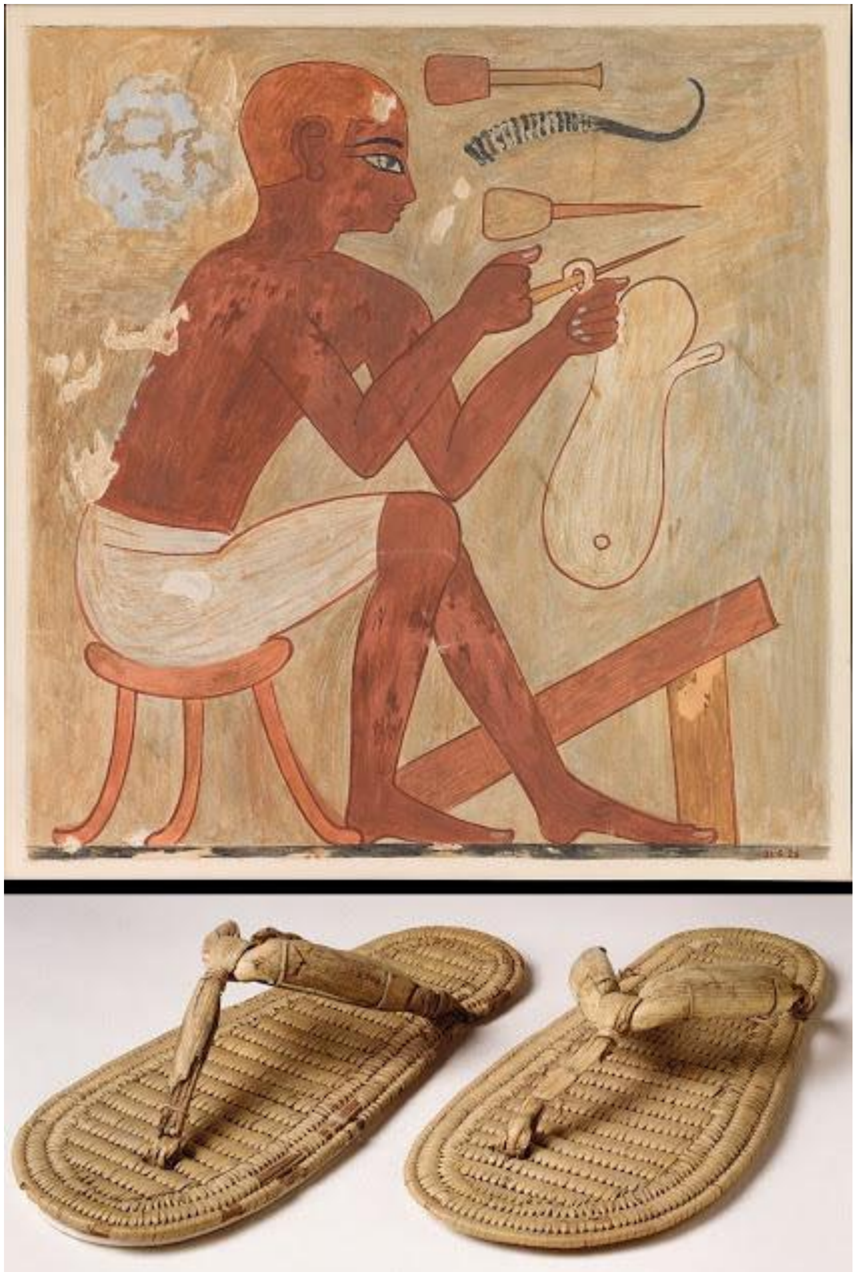
In the following descriptions, phrases in quotes are quoted from the original image description.

SCALABLE: Many right-angle woven-fiber designs can be made in a wide range of sizes

(Left) Small Neolithic baskets, about 5000 years old. They were found in a dry cave, Cueva de los Murciélagos (Albuñol, Granada), which is why they are so well preserved.
(Middle) Working medium-sized traditional panniers baskets on a donkey (the second basket is not visible on the other side of the donkey).
(Right) Large baskets in a boat, ready to be filled with grain.

VERSATILE: Right-angle woven-fiber technology can create a large number of shapes and configurations

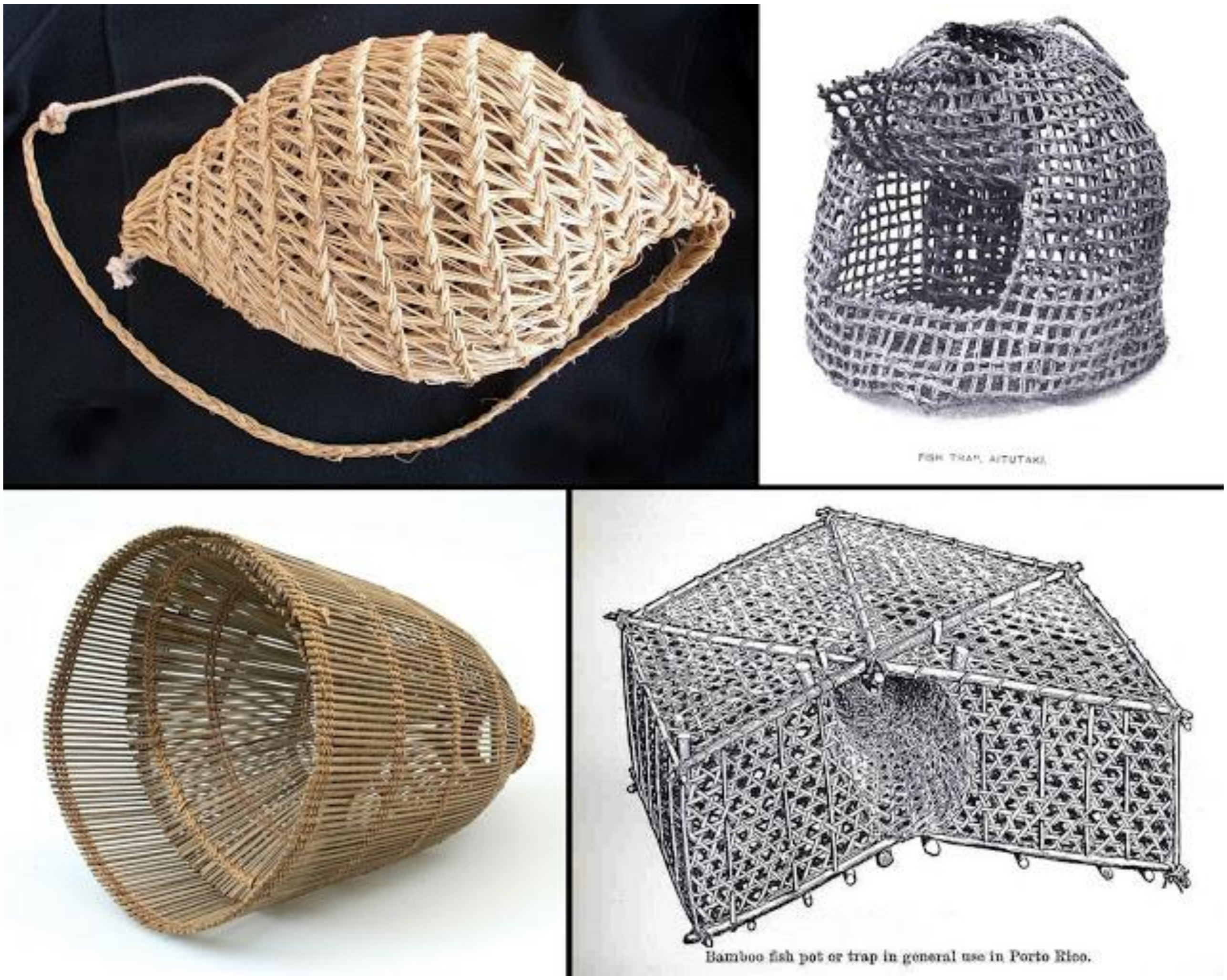
(Left) A wicker sewing basket.
(Middle) A rattan chair.
(Right) Walls in Swaziland, Africa.



VOLUME: Items can be produced in large quantities.

(Top) Sandal Maker, Tomb of Rekhmire, Egypt, about 3500 years ago, This is a facsimile from a wall painting.

(Bottom) A pair of ancient sandals made from the papyrus reed and from about the same time period as the painting above. These were made in quantity.



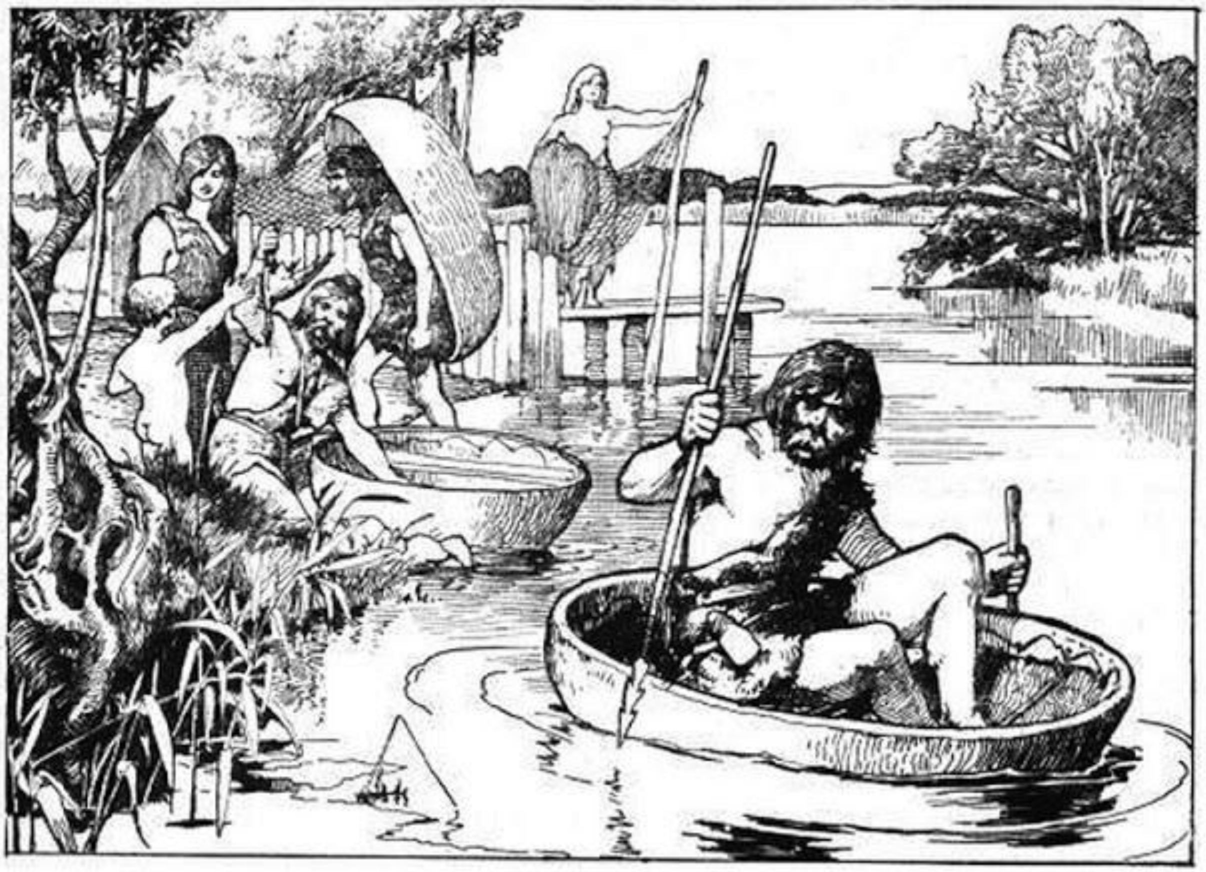
A VARIETY OF DESIGNS TO ACCOMPLISH A TASK: FISH TRAPS

(Top Left) A traditional basket for gathering snails in Southern Spain.
(Top Right) Fish Trap, Aitutaki (Cook Islands)
(Bottom Left) Braided fish trap.
(Bottom Right) "Bamboo fish pot or trap in general use in Porto Rico."

WATERCRAFT

---- Basket Boats (Coracles) ----

These boats are based on a basket-like structure that is then covered with animal hides and sealed with waterproofing materials such as bitumen which occurred naturally in Mesopotamia. These boats are quite seaworthy and have been used throughout the world for thousands of years. They are light and strong and can be made in a wide range of sizes from small boats for an individual sailor to ones capable of carrying five tons.



BRITONS WITH CORACLES.

Coracles have been used in England, Wales, Scotland, and Ireland for centuries and are still in use today. One person can easily carry a light coracle on his back and take the boat to a lake or river.

(Left) The basket structure of this boat is visible.
(Right) Large basket boats can carry twenty people.

---- Rafts ----

The right-angled horizontal crossbeams hold a raft together and are the basis for its integrity. As these pictures show, it does not matter if the raft is small or large.

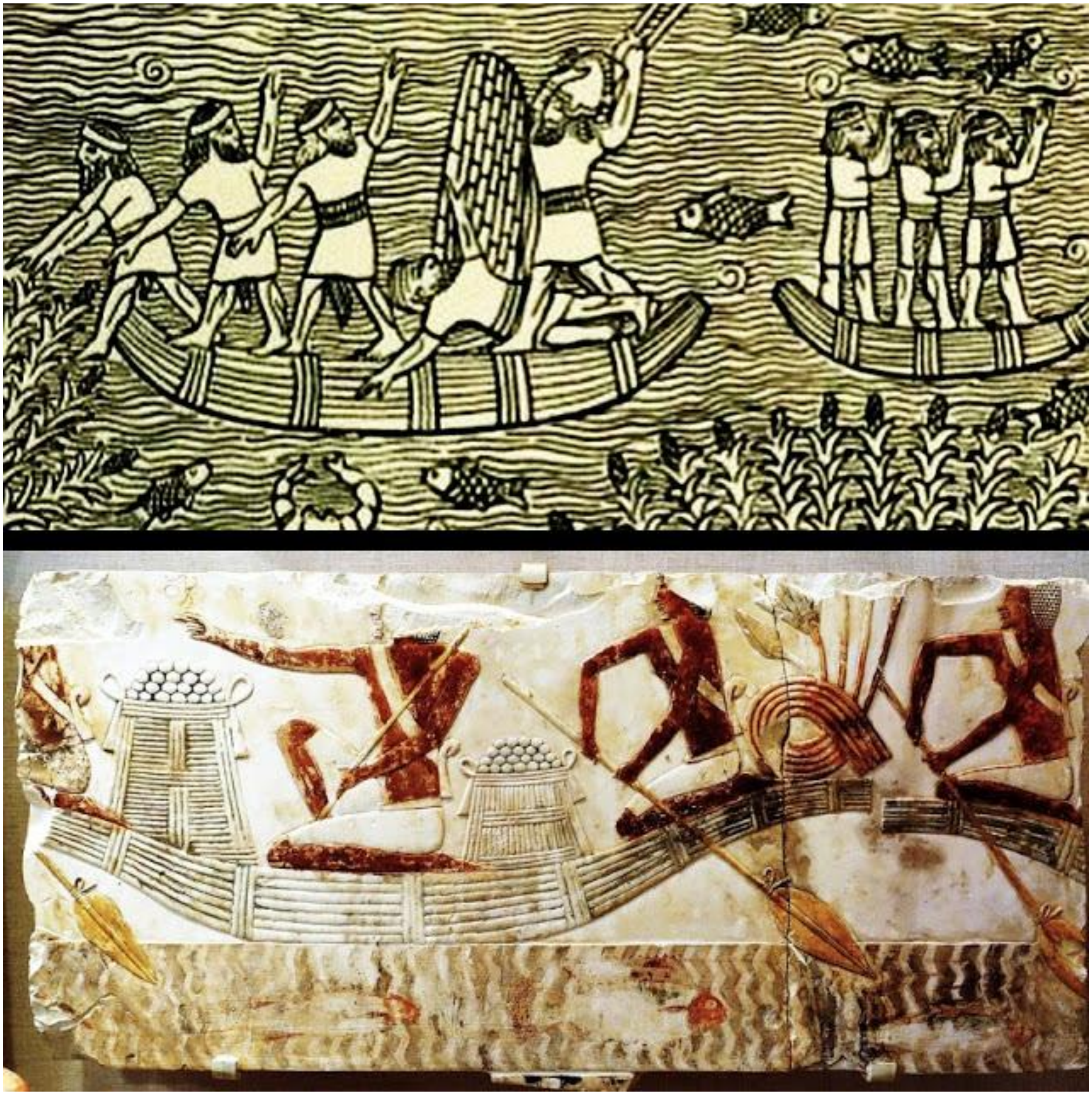
(Top) Children on a raft -- the crossbeams are clearly visible and keep the raft together.
(Bottom) A common working bamboo raft in Taiwan. The horizontal right-angled slats are visible.

This model of a balsa raft is a model of a traditional Peruvian raft, sailed by pre-Columbian people, as drawn by the Spanish around 1600. The raft is made of large balsa logs and is a "double-decker" in that there are two levels that are held together by horizontal bamboo crossbeams that are lashed to the vertical balsa logs and the deck above. This design was the inspiration for the famous South American raft, Kon-Tiki.

---- Reed Boats & Ships ----

Reed boats are made by bundling and tying reeds together in columns and then securing them with right-angle horizontal binding. Common in Egypt and Sumer/Babylon, they were made of marsh reeds in Babylon and papyrus in Egypt. As with other boats in this section, they can be quite small for an individual sailor or sixty feet long with a crew of eleven as was the case with the reproduction of an ancient Mesopotamian boat seen below.

(Top) A small reed boat.
(Bottom) Named the Tigris, this is a model of the Mesopotamian reed boat built by Thor Heyerdahl of Kon-Tiki fame. He believed that a boat similar to this had been used in the early days of the Sumerian/Babylonian civilizations. The Tigris was almost 60 feet long, had a crew of eleven, and sailed more than 4,000 miles without any serious problems.

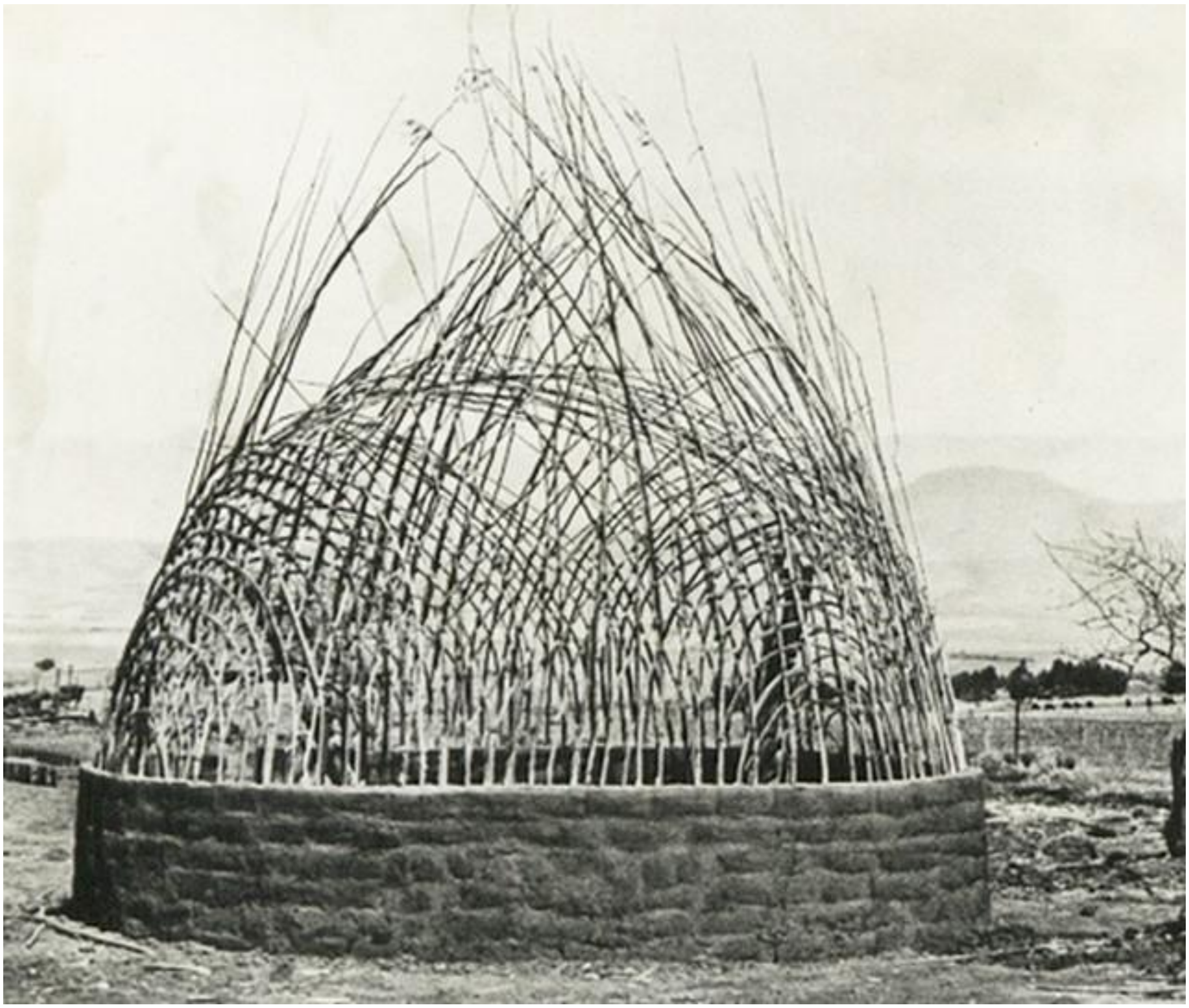


In these ancient depictions, the right-angle cross-weaving is evident for these reed boats.
(Top) This image clearly shows that the Mesopotamian boats used a right-angle cross-weaving in their boats. The drawing is after an ancient bas-relief from Nineveh Babylon dated to about 600 BCE. This was one of the pictures that inspired Thor Heyerdahl to build the Tigris.
(Bottom) The cross-weaving is also evident in this image of an Egyptian boat more than 2500 years ago.

HOUSING

---- African Huts ----

These traditional huts are based on a basket-type right-angle design. They are essentially large upside-down baskets which are then covered with a robust woven outer layer that keeps out the wind and the rain.

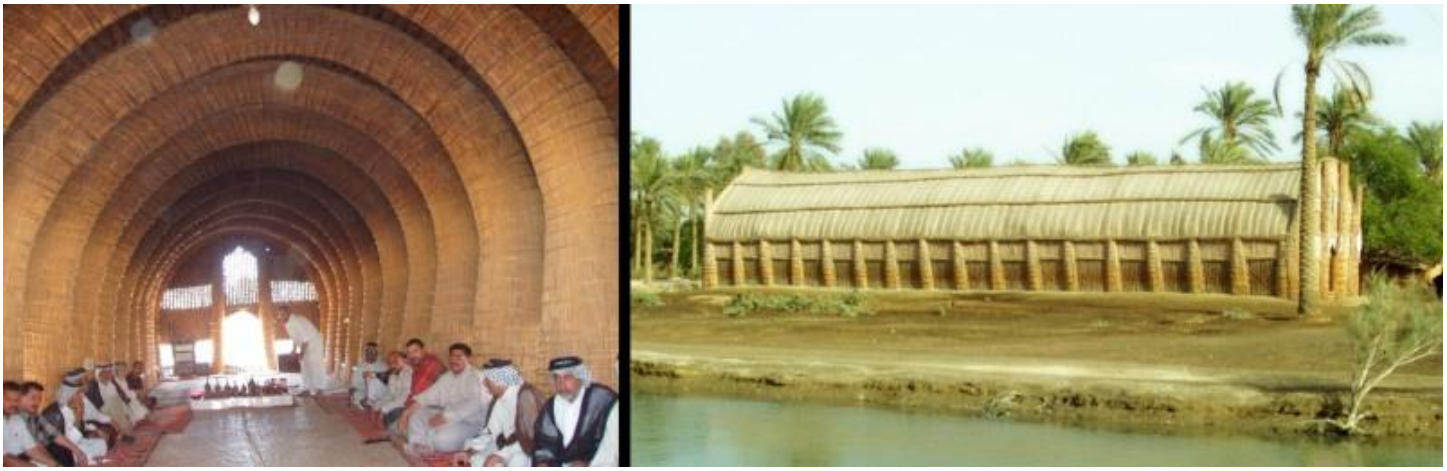


"Swazi type hut under construction."
This shows the skeleton structure over which a covering is placed.

Traditional African Huts

(Top Left) "Frame slats of a Swazi hut, at a cultural village at Jeppes Reef border post."
(Top Right) A rural hut inside the Zululand Museum, showing the basic structure, over which a covering is placed.
(Bottom Left) "The replica Zulu Hut at the Voortrekker Monument is typical of the dwellings found in Zululand, which were traditionally constructed by men."
(Bottom Right) A traditional African hut.

Detail of thatching of the replica Zulu hut (full view of Zulu hut is above bottom left).



Large mudhif buildings made entirely of reeds.
Weaving technology once mastered can be scaled up to make quite large structures such as these traditional mudhif reed houses that have been made for centuries by the Mudan people in the marshes of southern Iraq. These are used for community gatherings.
(Left) Interior of mudhif. "A mudhif, a traditional Marsh Arab guesthouse made entirely out of reeds. The Marsh Arabs live a lifestyle that dates back 5,000 years."
(Right) Very large mudhif building in Nasiriyah Iraq.

(Left) Local contractors begin the job of building a mudhif. "The reeds are gathered from marshlands near the Euphrates River."
(Middle) "Local contractors construct the main reed arches of a marsh Arab mudhif."
(Right) Almost completed, the mudhif exterior.

---- Neolithic Reconstructions ----

Early Neolithic houses in Europe.

(Top) Archeon Museum Park, Netherlands "showing a replica of a house 8000 years BC."
(Bottom) "Stone Age village of Kussow, Damshagen municipality, Germany."

LATER NEOLITHIC BUILDINGS WITH FULL RIGHT-ANGLE ENGINEERING

(Top) "Neolithic model dwelling, from an excavation in Hungary of the 5th millenium . Musée des tumulus de Bougon"
(Bottom) Model: "Wels (Upper Austria). City Museum - Minoritenkloster: Model of a neolithic village."

(Left) Building detail, interior. "Neolithical village Heldenberg."
(Right) From the Pfahlbaumuseum Unteruhldingen in Germany. The open-air museum comprises several reconstructions such as this.

(Left) Reconstruction of Lakeside Neolithic settlement in Dispilio, Greece.
(Right) Archeoparc, Germany (Schnals valley/South Tyrol). Reconstruction of a neolithic hut.

---- Neolithic Looms ----

(Left) Reconstruction. "Neolithic loom, Vinca, Serbia."
(Right) "Cucuteni Vertical Loom Reconstruction Piatra nNamt."

Textiles were invented using the same structure. The famous Anni Albers of the Bauhaus School had this to say.

> "During the 4,500 years or, in some estimates, even 8,000 years [ED: there is now concrete evidence that it is at least 27,000 years old] that we believe mankind has been weaving, the process itself has been unaffected by the various devices that contributed to greater speed of execution. We still deal in weaving, as at the time of its beginning, with a rigid set of parallel threads in tension and a mobile one that transverses it at RIGHT-ANGLES. [ED: My emphasis]"

This basic insight about right-angles has never been overshadowed. Anni Albers went on to say, "And weaving, even the most elaborate, can be done, given time, with a minimum of equipment....Fabrics of great accuracy have been executed without much mechanical aid."

WHEN DID THE DISCOVERY OF RIGHT-ANGLE CONSTRUCTION TAKE PLACE?

Right-angle design was probably discovered by basket-weaving craftsmen or was discovered in other technologies as well and then applied to basket-weaving. In any case, basket-weaving made full use of it.

Nevertheless, it may have taken thousands of years to derive a general principle that could be applied to a number of different weaves, different materials, strands of different gauges, different sizes, different uses, etc. Inventing something original from scratch would not have been easy. For example, with a basket, the forces are intertwined together, but in a building, the additional force of gravity is a key element even though the basic structure is similar.

It is also important to note that working with baskets and weaving patterns and styles would have allowed people to 'play' with these structures. Playing with inventions is important just as it is with children. Overtime a general understanding might have emerged. I assume that it was not mathematical as we would know it, but perhaps proto-mathematical in which strands of different strengths and thicknesses were put in 'opposition' to each other, for example.

Yet making baskets was one thing, and building larger items was something quite different, i.e., designing such things as walls or roofs and boats. This again would probably have taken thousands of years.

A BASKET-WEAVING TIMELINE?

I think it is very unlikely that sophisticated right-angle basket-weaving began by itself and did not evolve from something earlier. But because woven-fiber constructions decay, they have left little evidence; as one paleoanthropologist wrote, their past existence is invisible [3] -- for the most part (more about trace evidence in a future article.)

Nevertheless, another anthropologist has asserted that what we have found so far -- i.e., artifacts that have survived such as stone tools -- are only about 10% of the tools and items that were made and used in Paleolithic cultures.[4]

While microscopic trace evidence on stone tools has shown wear patterns that were caused by cutting plants and wood, this is about the only direct evidence we have. We might be forced to use other means such as computer simulations or simple logic.

SUMMARY OF A POSSIBLE TIMELINE

For example, using logic as our tool, the following timeline makes sense.

Early on -- it could be tens of thousands of years ago or a million years ago -- hominids began making the first baskets with a random weave based on models from nature such as birds' nests. Then, after thousands of years, they gradually discovered the power of right-angle design which again, after thousands of years, allowed them to make a wide variety of well-

crafted items from sandals to large boats and houses and played a major role in the emergence of civilizations such as Egypt and Sumer.

But the exact timing is not the most important thing, the progression is the most important thing.

CONCLUSION

It is quite clear that the first civilizations of Sumer, Babylon, and Egypt could not have functioned without a sophisticated woven-fiber technology which included an understanding of right-angle construction. This crucial technology included baskets and sacks for a wide variety of agricultural tasks, along with mats, shoes, containers, cordage, houses, boats, clothing, and much more. This means that woven-fiber constructions were critical to the emergence of civilization. Therefore, it is important to understand the origins and development of this technology as it played a major role in the ascendence of humanity.

Egyptian agriculture used woven-fiber sacks and baskets for planting, harvesting, transporting, storing, and processing. Without woven-fiber technology, Egyptian civilization could not have functioned.
(Left) Ancient Egyptian model of a granary with scribes. This model was found in a tomb and shows men delivering grain in woven sacks which is being recorded by scribes.
(Right) Ancient Egyptian painting of men carrying and delivering sacks, from the Tomb of Oumsou.

Right now there is almost no information about the origins of basket-weaving and the discovery of right-angle construction. If we are to understand the development of human culture and the accompanying technologies, woven-fiber technology needs to be at the top of the list. Clearly, it warrants more consideration than it has been given in the past.

(Left) Typical Egyptian work basket.
(Right) The Egyptian God Heh kneeling on a basket. He is often shown with a basket emphasizing its importance. Medium: "Egyptian faience with pale green glaze" dated "between 1070 and 332 BC (Third Intermediate-Late Period)."

SPECIAL NOTE: An important new article has just been published about similar subject matter. Entitled "Mobile containers in human cognitive evolution studies: Understudied and underrepresented" by Michelle C. Langley and Thomas Suddendorf, it was published in Evolutionary Anthropology, 2020.

ENDNOTES

#1. Please see my article:
Homo Habilis Learned Basket Making from Weaverbirds|
https://deconstructingtime.blogspot.com/2020/04/oldowan-Weaverbirds-homo-habilis-basket-making.html

#2. See the above article for information about Weaverbirds.

#3. “Thus far, the use-wear on the quartz and quartzite subsample of Kanjera artifacts confirms that animal butchery was conducted on-site, but also demonstrates the processing of a variety of plant tissues, including wood (for making wooden tools?) and tubers. This is significant, because the processing of plant materials appears to have been quite important, but would otherwise have been archaeologically invisible”.
Popular Archaeology, June 12, 2012, quoting Dr. Thomas Plummer of Queens College, City University of New York.

#4. Dr. Adovasio has made the point that there is "ample ethnographic evidence that perishable technologies form the bulk of hunter-gatherer material culture even in arctic and sub-arctic environments (e.g. Damas 1984; Helm 1981). Archaeologists working with materials recovered from environmental contexts with ideal preservation clearly confirm that this is also true for the past as well. Taylor (1966:73), for example, notes that in dry caves he recovered 20 times more fiber artifacts than those made of stone, Croes (1997:536) reports that wet sites yield inventories where >95% of prehistoric material culture is made of wood and fiber, and Collins (1937) confirms the same for sites in Alaskan permafrost."

Soffer O, Adovasio JM, Hyland DC, Klíma B, Svoboda J. "Perishable Industries from Dolní Vestonice I: New Insights into the Nature and Origin of the Gravettian." Paper Prepared for the 63rd Annual Meeting of the Society for American Archaeology Seattle, Washington, 25–29 March 1998. DolniVestonice.pdf.

PICTURE ESSAY LINKS
Please copy and paste these links into your browser.
Links are in the same order as the pictures in the essay.

SCALABLE

https://commons.wikimedia.org/wiki/File:Cestillos_de_esparto_(29319999262).jpg

https://commons.wikimedia.org/wiki/File:Donkey_panniers.jpg

https://commons.wikimedia.org/wiki/File:Ballast_Baskets_(1402074671).jpg

VERSATILE

https://commons.wikimedia.org/wiki/File:1950s_Wicker_Woven_Musical_Sewing_Basket_-_ivorybird_(12398155865).jpg

https://commons.wikimedia.org/wiki/File:Sillón_-_Madrid_(España).jpg

https://commons.wikimedia.org/wiki/File:Swaziland_-_Traditional_homes.jpg

VOLUME

https://commons.wikimedia.org/wiki/File:Sandal_Maker,_Tomb_of_Rekhmire_MET_DP346330.jpg

https://commons.wikimedia.org/wiki/File:Pair_of_Sandals_MET_eg28.jpg

FISHING TRAPS

https://commons.wikimedia.org/wiki/File:Snail_basket.jpg

https://commons.wikimedia.org/wiki/File:FMIB_33815_Fish_Trap,_Aitutaki.jpeg

https://commons.wikimedia.org/wiki/File:COLLECTIE_TROPENMUSEUM_Gevlochten_visfuik_TMnr_15-454.jpg

https://commons.wikimedia.org/wiki/File:FMIB_33300_Bamboo_Fish_Pot_or_Trap_in_General_Use_in_Porto_Rico.jpeg

RAFTS

https://commons.wikimedia.org/wiki/File:Children_on_a_raft_on_Lake_Washington_near_Bryn_Mawr,_Washington,_May_30,_1904_(KIEHL_23).jpeg

https://commons.wikimedia.org/wiki/File:Mid-south_western_Taiwan_bamboo_raft.jpg

https://commons.wikimedia.org/wiki/File:Balsa_Raft.jpg

CORACLES

https://commons.wikimedia.org/wiki/File:Britons_with_coracles_-_from_Cassell's_History_of_England,_Vol._I_-_anonymous_author_and_artists.jpg

https://commons.wikimedia.org/wiki/File:Hogenakkal_Coracle.jpg https://commons.wikimedia.org/wiki/File:Kuphar.jpg

REED BOATS

https://commons.wikimedia.org/wiki/File:Bolivia-130_-_Reed_Boat_(2218109064).jpg

https://commons.wikimedia.org/wiki/File:Tigris_Model_Pyramids_of_Guimar.jpg

-- for the Babylonian drawing see the note at the end of this section

https://commons.wikimedia.org/wiki/File:Boating,_Luxor,_tomb_of_Mentuemhet,_Third_Intermediate_Period_to_Late_Period,_Dynasties_25-26,_c._690-664_BC,_limestone,_pigment_-_Oriental_Institute_Museum,_University_of_Chicago_-_DSC07798.jpg

HOUSING

https://commons.wikimedia.org/wiki/File:The_National_Archives_UK_-_CO_1069-202-35.jpg

https://commons.wikimedia.org/wiki/File:ZA-MP-matsamo-huette.jpg

https://commons.wikimedia.org/wiki/File:Fort_Nonquai_-_Eshowe_-_Zululand_Museum.jpg

https://commons.wikimedia.org/wiki/File:Replica_Zulu_Hut,_Voortrekker_Monument.jpg

https://commons.wikimedia.org/wiki/File:Une_hutte_traditionnelle.jpg

DETAIL: Replica_Zulu_Hut_thatch

https://commons.wikimedia.org/wiki/File:Replica_Zulu_Hut_thatch.jpg

MUDHIF

https://commons.wikimedia.org/wiki/File:Iraqi_mudhif_interior.jpg

"A mudhif, a traditional Marsh Arab guesthouse made entirely out of reeds. The Marsh Arab live a lifestyle that dates back 5,000 years."

https://commons.wikimedia.org/wiki/File:Modhif_neserya_1.jpg

CONSTRUCTION OF MUDHIF

https://www.dvidshub.net/news/48053/mudhif-houses-capture-spirit-iraqi-culture

https://www.dvidshub.net/news/42276/marsh-arab-mudhif-rises-cob-adder

NEOLITHIC - EUROPEAN

https://commons.wikimedia.org/wiki/File:Archeon_8000_years_BC.jpg

https://commons.wikimedia.org/wiki/File:Kussow,_Steinzeitdorf.jpg

https://commons.wikimedia.org/wiki/File:Neolithic_model_dwelling.Musée_des_tumulus_de_Bougon.jpg

https://commons.wikimedia.org/wiki/File:SMWM_-_Jungsteinzeitliches_Dorf_4.jpg

https://commons.wikimedia.org/wiki/File:Heldenberg-IMG_7865-Neolithisches_Dorf.JPG

https://commons.wikimedia.org/wiki/File:Bodensee,_Unteruhldingen-Pfahlbauten_D-017.jpg

https://commons.wikimedia.org/wiki/File:Dispilio1.jpg

https://commons.wikimedia.org/wiki/File:Archeoparc_-_Hütte_3.jpg

LOOMS

https://commons.wikimedia.org/wiki/File:Neolitic_loom,_Vin%C4%8Da,_Serbia.jpg

https://commons.wikimedia.org/wiki/File:VerticalLoom.JPG

EGYPT AND BABYLON BASKET IMAGERY

https://commons.wikimedia.org/wiki/File:Model_of_a_Granary_with_Scribes_MET_DP351557.jpg

https://commons.wikimedia.org/wiki/File:Tombe_d%27Oumsou_1.jpg

https://commons.wikimedia.org/wiki/File:Egyptian_-_Kneeling_Heh_on_a_Basket_-_Walters_48425.jpg

https://commons.wikimedia.org/wiki/File:Basket_with_handles_MET_31-3-149.jpg

The drawing of boats from Babylon came from:

King, Leonard. A History of Babylon, From the Foundation of the Monarchy to the Persian Conquest, Vol. 2. London, Chatto and Windus, 1915.

https://www.gutenberg.org/ebooks/56667 -- page 322 in the ebook.

Article #5

Evidence for a Basket-weaving and Woven-Fiber Technology in the Paleolithic Era

This is a photo of an entire indigenous pre-Incan community in South America (the Uru or Uros people) made with woven-fiber technology: the boats, the houses, and the floating island.
https://commons.wikimedia.org/wiki/File:Photo_-_Floating_Islands_(Puno,_Peru).JPG

OVERVIEW OF THIS ARTICLE

Many paleoanthropologists believe that there was a rich and complex 'soft technology' of fibers and plant materials during much of the Paleolithic era, including the Lower and Middle periods, in addition to the 'stone

age' technology that this era is named for. Unfortunately, there is very little physical evidence since these materials decayed and left few traces. However, there is considerable evidence of a more general nature that points to the existence of such technology and makes it improbable that this technology did not exist. If this is true, it will be the job of future paleoanthropologists to discover ways to uncover this technology which has been buried in the decay of time.

> "In whichever way archaeological remains are interpreted, one must always be aware that the vast majority of the materials with which prehistoric people were surrounded and with which they worked is lost to us today. ...organic materials start to decay as soon as they are deposited in the ground."
> Grömer, Dr. Karina. "An Introduction to Prehistoric Textiles" Brewminate.com, Natural History Museum, Vienna, March 01, 2016, https://brewminate.com/an-introduction-to-prehistoric-textiles.

#1. It has been definitely established that during the Paleolithic era stone tools were made with processes and these processes became increasingly complex and sophisticated which produced significantly better and diverse tools and weapons. These processes are now well understood by anthropologists.

#2. If hominids could craft and improve stone tool processes over hundreds of thousands of years, then it is likely that they were able to create and then improve other processes which did not leave trace evidence, such as artifacts made with plant fibers.

#3. While most of the artifact evidence of Paleolithic hominids has been stone tools, a number of anthropologists believe that stone tools only represent a small number of the artifacts that were present in these cultures.

#4. Anthropologists have found that contemporary hunter-gatherers have a wide and deep knowledge of the plants and animals in their environment.

#5. A well-respected anthropologist has listed weaving as one of the technologies present in all cultures.

#6. World-wide in every environment, there were different plants that could be used to make baskets or other woven constructions. These plants varied depending on the location. But all cultures were able to find suitable plants where they lived.

#7. Basket-making is present in all cultures.

#8. There were a number of natural shapes such as the various nests made by birds and webs made by spiders that could have led to the creation of baskets and then other constructions. Since it is probable that Paleolithic people were well aware of the plants and animals of their environment it is also quite likely that they understood these constructions.

#9. There is now clear evidence, from impressions of baskets or fabric in clay, that sophisticated weaving had developed by the Upper Paleolithic period 27,000 years ago. Therefore Dr. Adovasio, the leading authority of Paleolithic fiber technology, now believes that this technology began much sooner than previously thought. It may have begun in the Middle Paleolithic or even the Lower Paleolithic.

#10. I believe the facts listed above mean that there is a high probability that basket-weaving and the weaving technology began much earlier in the Paleolithic era than previously thought. And further that it is highly improbable that this technology only began in the Upper Paleolithic era.

#11. In addition, if it can be established that basket-weaving and related technologies began earlier, it is also probable that Homo sapiens were able to make a wide variety of artifacts using this technology from sandals, to hammocks, to houses, and to boats much earlier than previously thought.

Please see the 50 photo 'slide show'
at the end of this article for a display of such artifacts.

INTRODUCTION

In 1995 a major discovery was announced that would completely change our understanding of how human culture evolved and how 'stone age' people lived. At the Society for American Archeology, Dr. Olga Soffer of the University of Illinois at Urbana and Dr. James M. Adovasio of Mercyhurst College in Erie, Pa. announced they had finally found what they had been looking for -- a quest that had occupied most of their professional lives.

Dr. Soffer had found pieces of clay with clear impressions of the earliest fabric artifacts -- the first to be confirmed from the Paleolithic time period. Since the impressions were so small they could not tell whether these were from textiles or from baskets. The leading world paleo-fiber expert, Dr. Adovasio, confirmed the find.

This one discovery pushed back the beginnings of these 'soft' technologies about 10,000 years well into the 'old stone age' and well beyond the Neolithic or 'new stone age' when everyone in the field had assumed that textiles and weaving had begun. These new findings have now been dated to 27,000 years ago.

When the clay impressions were examined closely, they revealed at least two different weaving techniques. Dr. Adovasio commented that the regularity of the weave and the 'narrow-gauge' indicated that the technology was quite advanced so that the origins of weaving had to be much earlier.

This discovery may have pushed back the origins of human culture hundreds of thousands of years because this find opened the door deep into the Paleolithic era which spanned two million years.

Dr. Soffer also noted that the clay fragments revealed a surprising variety of weaving techniques such as open and closed twines, nets, and plain weave. The intriguing thing about

the plain weave impression was that it required a loom. This fact alone meant that 'old stone age' nomadic people were making fiber constructions with a basic loom -- something that was thought impossible.

While to the average person this might not seem like a big deal, it is a big deal. Dr. Adovasio believes that our understanding of early humans is based on stone tools because they have been found in quantity. However, because fiber decays and does not leave a trace, there is little direct evidence for the archeologist. Yet he believes that stone tools were less than 10% of the artifacts of these cultures.

> Dr. Adovasio has made the point that there is "ample ethnographic evidence that perishable technologies form the bulk of hunter-gatherer material culture even in arctic and sub-arctic environments (e.g. Damas 1984; Helm 1981). Archaeologists working with materials recovered from environmental contexts with ideal preservation clearly confirm that this is also true for the past as well. Taylor (1966:73), for example, notes that in dry caves he recovered 20 times more fiber artifacts than those made of stone, Croes (1997:536) reports that wet sites yield inventories where >95% of prehistoric material culture is made of wood and fiber, and Collins (1937) confirms the same for sites in Alaskan permafrost."
> **Soffer O, Adovasio JM, Hyland DC, Klíma B, Svoboda J. "Perishable Industries from Dolní Vestonice I: New Insights into the Nature and Origin of the Gravettian." Paper Prepared for the 63rd Annual Meeting of the Society for American Archaeology Seattle, Washington, 25–29 March 1998. DolniVestonice.pdf.**

This means that to understand human and cultural development, an understanding of weaving, which was used to create a wide variety of artifacts, is critical. In other words, when Homo sapiens made the transition to modernity, weaving technology played a major role.

THE IMPORTANCE OF PROCESSES

In past articles I have made the additional point that a large number of probable weaving processes, along with the making of stone tools and the processes involving fire and food, meant that people had to develop memory, ways of communicating the process steps to the next generation, and a clear idea of a future final product when they began the process.

I believe that processes became a model for an understanding of linear time which was a crucial element in the development of a fully developed G1 (basic) language. And it was about 100 kya when all the elements came together so that the beginnings of modern behavior occurred. So it was around this time, 100 kya, that language, and modern human behavior began.

THERE ARE A LARGE NUMBER OF WOVEN-FIBER PROCESSES

While most people are familiar with baskets and even handmade baskets by local people, I doubt that there are many who are aware of the wide variety of baskets that are possible and then the additional number of artifacts that can be created with weaving techniques -- everything from shoes to thatched roofs to boats. All of these were possible in the Paleolithic era in every part of the world. See the 'slide show' at the end of this article for examples.

TERMINOLOGY FOR THESE KINDS OF ARTIFACTS

Paleolithic Woven-Fiber Technology

To avoid ambiguity I have settled on the term Paleolithic Woven-Fiber Technology to describe everything from baskets to hammocks to boats to textiles and cloth. I see them all as part of the same general weaving method which was part of an evolving technology.

And it is important to understand that all of these products (to use the modern word) were made with processes that involved a large number of steps.

While I have suggested Paleolithic Woven-Fiber Technology as a name for these kinds of artifacts, the terminology is still being worked out.

> In an article entitled "An Introduction to Prehistoric Textiles", Dr. Karina Grömer says that when speaking of prehistoric artifacts "The term textile encompasses not only woven fabrics but all products which consist of interconnected basic components. These include mats made in plying and basketry techniques, objects of fabrics made in coiling techniques, nets, wickerwork, and twined objects."
>
> She then goes on to say:
>
> "What actually is a textile? Conventionally, the term textile is applied to woven fabrics in particular. The British standard handbook for the textile industry: Textiles Terms and Definitions, The Textile Institute Manchester (7th edition 1975) says: 'Originally a woven fabric; the term is now applied to any manufacture from fibres, filaments or yarns, natural or man-made, obtained by interlacing'."Grömer, Dr. Karina. "An Introduction to Prehistoric Textiles." Brewminate.com, Natural History Museum, Vienna, March 01, 2016, https://brewminate.com/an-introduction-to-prehistoric-textiles.

In an article about the history weaving, this website suggests that weaving encompasses a wide range of processes.

> "Weaving: The art of weaving...involves the production of fabric or cloth by interlacing two distinct sets of yarns or threads in a right-angle...Early civilization called for temporary shelters to be built, so knowing how to twine, plait, knot and weave materials such as grass, twigs, string and twine together, in order to build walls, roofs, bedding, baskets and doors, was imperative."
> *The History of Weaving*. Wild Tussah, September 2014. https://wildtussah.com/history-weaving-2/.

Dr. Adovasio, the leading expert in the field has used the term, Prehistoric Perishable Fiber Technology. This would cover any fiber construction including woven artifacts.

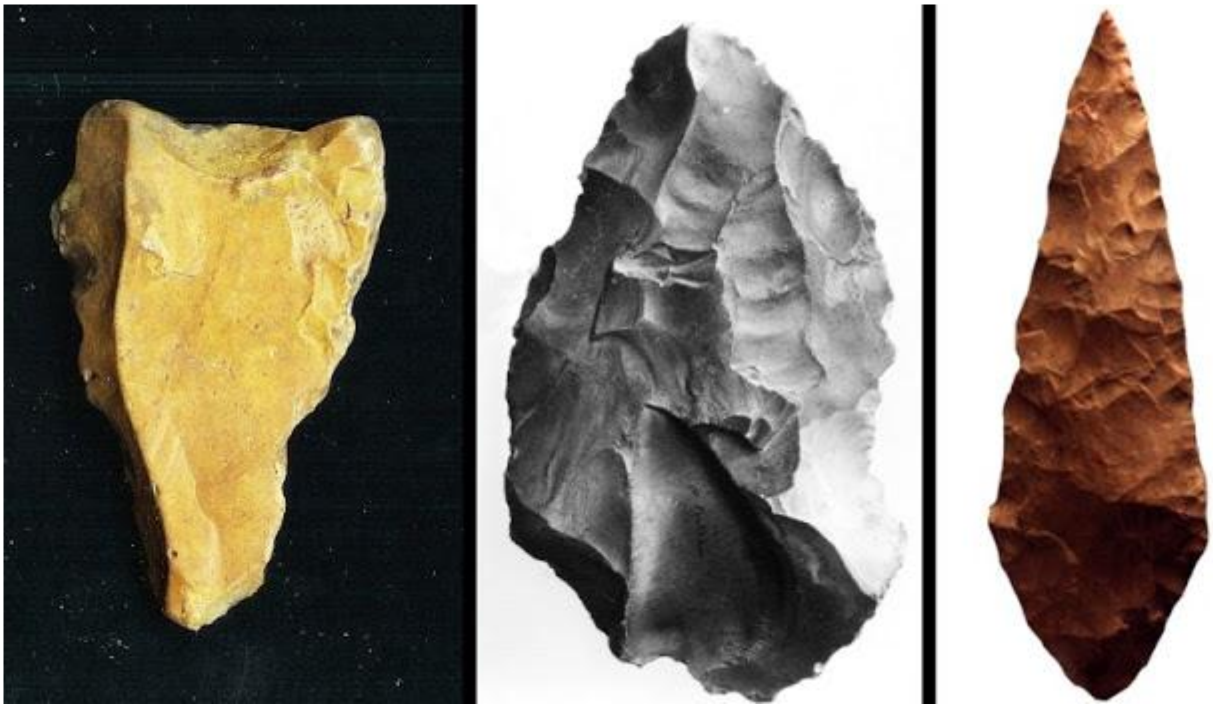
EVIDENCE FOR SOFT TECHNOLOGIES

There Is Now A Complete Knowledge
Of One Paleolithic Technology, That Of Stone Tools

The evolution of stone-tools is well documented and understood in depth; over time the technology became increasingly complex producing a variety of well-made tools.

> "In general, these [ED: stone tool] materials develop gradually from single, all-purpose tools to an assemblage of varied and highly specialized types of artifacts, each designed to serve in connection with a specific function. Indeed, it is a process of increasingly more complex technologies, each founded on a specific tradition, that characterizes the cultural development of Paleolithic times. In other words, the trend was from simple to complex, from a stage of nonspecialization to stages of relatively high degrees of specialization..."
> The Editors of Encyclopaedia Britannica. "Stone Age." Encyclopaedia Britannica, accessed September 13, 2019, https://www.britannica.com/event/Stone-Age.

> "In the late Paleolithic period, tools became even more sophisticated. As many as 80 different types of implements have been unearthed for what are called the Perigordian and Aurignacian industries in Europe. It is believed that these tools were used for hunting and butchering, clothes making, and a great variety of other tasks that moved early humankind closer to modern life. In all, hundreds of highly complex tools have been found, some of which are the prototypes for modern tools."
> The Editors of Encyclopaedia Britannica. "Stone Tool Industry." Encyclopaedia Britannica, accessed September 13, 2019, https://www.britannica.com/event/Stone-Age.



The progression of stone technology during the Paleolithic era
showing the evolution of stone tool processing.
(Left) Acheulian flint chopper, North Somerset, UK; ca. 750 kya.
https://commons.wikimedia.org/wiki/File:583_three_handaxes_ventral_(FindID_101523).jpg
(Middle) Lower Paleolithic flint stone tool, Egypt; ca.200 kya.
https://commons.wikimedia.org/wiki/File:Tool_MET_06-322-21.jpeg
(Right) Bifacial silcrete point; Blombos Cave, South Africa; 71 kya.
https://commons.wikimedia.org/wiki/File:Blombos_point_white.JPG

Since this technology was passed down from generation to generation, these skills had to be memorized and then taught to the next generation. It is clear from the tools themselves that there were 'cultures' of stone tool making, meaning that generation after generation tools continued to be made in the same characteristic way in the same culture.

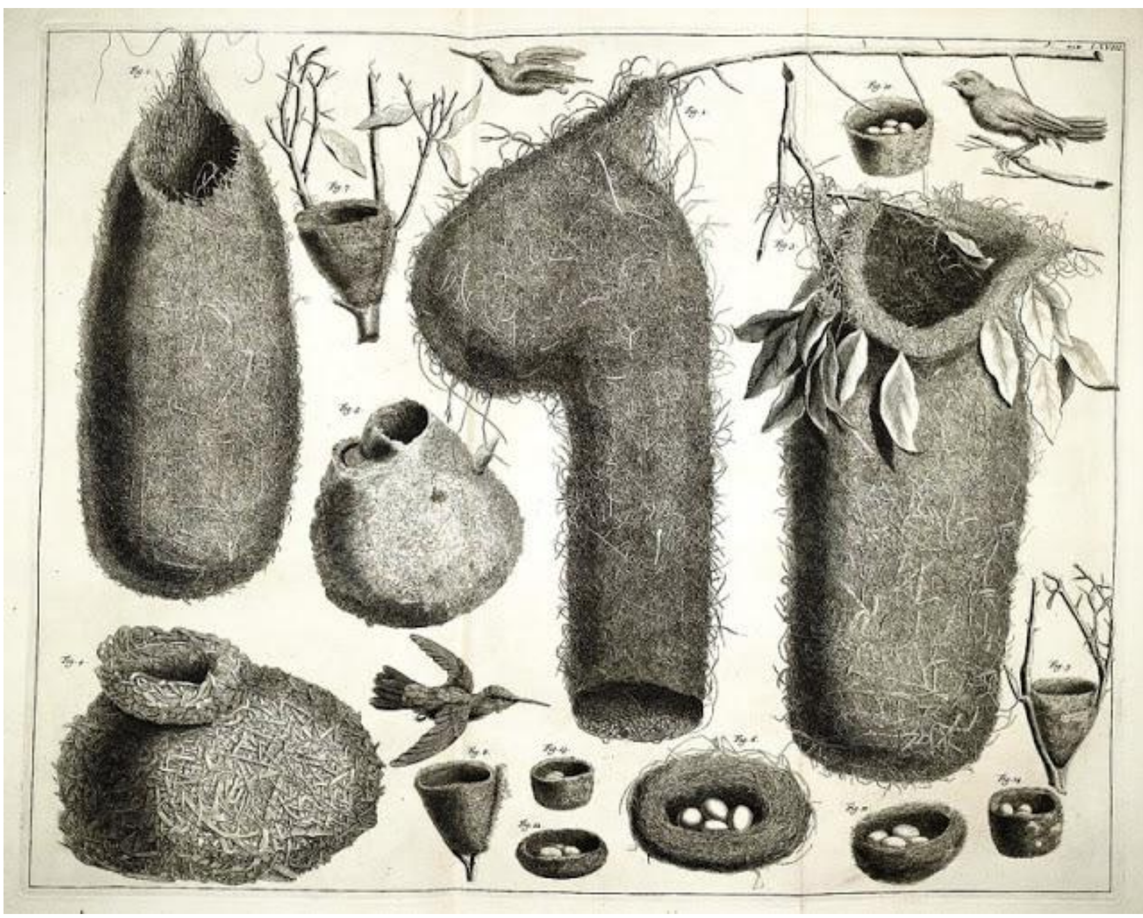
The Proven Example Of One Complex And Evolving Process Suggests Other Processes Were Also Being Used And Developing

Because one process has been well documented, it is likely that other technologies and processes of 'soft materials' existed. But due to decay, these materials have left almost no record.

There Is Extensive Knowledge
Of Plant And Wildlife By Hunter-Gatherers

"Pioneering work by Conklin (1957) and others documented that traditional peoples such as Philippines horticulturists often possessed exceptionally detailed knowledge of local plant and animals and their natural history, recognizing in one case some 1,600 plant species."
Inglis, Julian T., Editor. *Concepts and Cases: International Program on Traditional Ecological Knowledge*. International Development Research Centre (Canada), 1993, http://library.umac.mo/ebooks/b10756577a.pdf.

"...knowledge of plant uses associated with foraging and social norms is shared more widely among campmates, regardless of relatedness, and is important for camp-wide activities "
Salali GD, Chaudhary N, Thompson J, Grace OM, van der Burgt XM, Dyble M, Page AE, Smith D, Lewis J, Mace R, Vinicius L, Migliano AB. "Knowledge-Sharing Networks in Hunter-Gatherers and the Evolution of Cumulative Culture." US National Library of Medicine, National Institutes of Health, September 2016.
https://www.ncbi.nlm.nih.gov/pubmed/27618264



Various bird nests that could have been used as models for baskets
in the Lower or Middle Paleolithic eras.
A page from the 18th Century drawings in the *Thesaurus of Albertus Seba: The Albertus* Seba Thesaurus Tab. LXVIII.
https://commons.wikimedia.org/wiki/File:Albertus_Seba_Thesaurus_Tab._LXVIII.jpg

Natural Shapes Were Likely Models

Due to their awareness of and sensitivity to the environment, Paleolithic hunter-gatherers would have been well aware of a variety of bird's nests and spider webs, shapes, and structures they could use as models for useful man-made objects

> "The idea of interlacing materials together to create a weave was probably inspired by nature; by observing birds' nests, spider webs and various animal constructions..."
> *The History of Weaving*. Wild Tussah, September 2014. https://wildtussah.com/history-weaving-2/.

The design and the strength of a spider's web was a likely source for basic basket design.

(Left) Bird's nest from the 18th Century drawings of Albertus Seba.
From the *Albertus Seba Thesaurus*, Tab. LXVIII.
(Right) Neolithic woven artifact from the Cueva de los Murciélagos
in the Museo Arqueológico Nacional de España

Bird nests are a logical model for basketry.

Materials For Basket Making Were Available World-Wide

> "There is no region in the world, except in the northernmost and southernmost parts, where people do not have at their disposal materials—such as twigs, roots, canes, and grasses—that lend themselves to the construction of baskets."
> The Editors of Encyclopaedia Britannica. "Basketry." Encyclopaedia Britannica, accessed September 13, 2019, https://www.britannica.com/art/basketry.

Baskets Were Made And Were Important In Almost All Cultures Of The World

Project leader Sandy Heslop, of the School of World Art and Museology at UEA, said: "Basketry is a worldwide technology." But it must be "adapted to, local conditions in terms of resources and environment."
Heslop, Sandy. *Projects: Beyond the Basket: Construction, Order and Understanding.* Arts & Humanities Research Council, http://projects.beyondtext.ac.uk/beyondthebasket

Weaving Is A Universal Technology Of All Cultures

The well-respected Anthropologist Dr. George P. Murdock developed the Cross-Cultural Survey which listed universal technologies and behaviors in all cultures. Weaving was included in the list as one of four basic technologies.

Murdock, George P. "The Common Denominator of Cultures." The Science of Man in the World Crisis, edited by Ralph Linton, New York: Columbia University Press; 1945: pp. 123-142.

NOTE: The word 'weaving' has come to mean the making of textiles in modern-day usage. However, the term weaving could mean basket and textile weaving.

The mythology of ancient Sumer, the first civilization, is a good example. Uttu, the ancient goddess associated with weaving, was identified with the spider and even her name and the word spider were identical in Sumerian cuneiform writing [1]. But she was also known as the

"goddess of plants" [2]. In a famous myth entitled Enki and Ninhursag, she was impregnated by Enki her father, a principal god, which then led to the birth of eight plants including esparto grass [3][4] which was the most important plant for the making of baskets. Baskets were so crucial to the Sumerian culture that another principal god Enlil declared, "The pickax and the basket build cities" [5] in an early creation myth. In addition "Craft of the basket weaver" was specifically mentioned in the MES which were fundamental decrees of the gods listing the essential elements and skills of Sumerian civilization.[6]

PHYSICAL EVIDENCE OF PALEOLITHIC WOVEN-FIBER TECHNOLOGY

NEOLITHIC ARTIFACTS FOUND

> "Numerous archaeological artifacts and remains of esparto basketry have been discovered that date from the Neolithic period and onwards in southeast Spain. These pieces demonstrate high standards of quality compared with more modern pieces. In addition, there are many imprints of esparto basketry in clay or pottery (Ayala and Jiménez 2007). Among the abundant archaeological remains, some of the most outstanding are the artifacts dating back to 7,200–6,600 BP, which were found with several mummies in Cueva de los Murciélagos (Granada). these pieces represented clothes, hats, tunics, sandals, baskets, and ropes—all made with the finest techniques. In some cases, the artifacts included colored espartos (Cacho et al. 1996;Castellote 1982)."
> Fajardo, J., Verde, A., Rivera, D. et al. "Traditional Craft Techniques of Esparto Grass (Stipa tenacissima L.)" Econ Bot (2015) 69: 370. https://doi.org/10.1007/s12231-015-9323-x

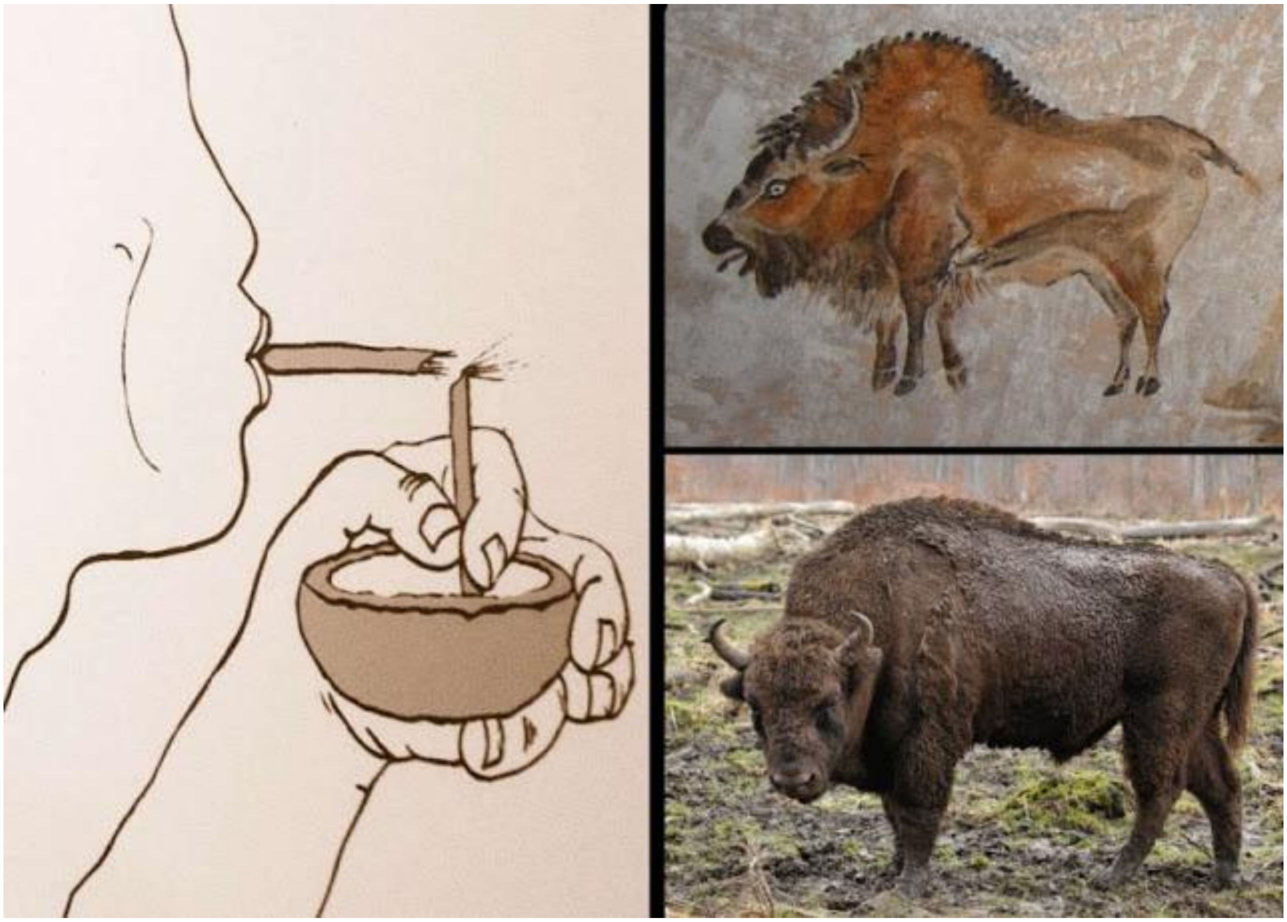
These Neolithic artifacts were found in the Cueva de los Murciélagos (Granada).
They show that the technology was already highly developed around 7,000 BP which means that the origins of this technology were much earlier.
Artifacts from the Cueva de los Murciélagos in the Museo Arqueológico Nacional de España
https://commons.wikimedia.org/wiki/Category:Artefacts_from_the_Cueva_de_los_Murci%C3%A9lagos_in_the_Museo_Arqueol%C3%B3gico_Nacional_de_Espa%C3%B1a

UPPER PALEOLITHIC WEAVING INDICATED

> "Detailed studies of a series of [Venus] figurines indicate the presence of at least three types of dressed female depictions. These include several types of headgear [ED: see Venus figurines next], various body bandeaux, and at least one type of skirt. Using data from Europe, we argue that the garments portrayed were made of plant fibers and that their exquisite detailing reflects the important role played by textiles in Upper Paleolithic cultures."
> Soffer O, Adovasio JM, Hyland DC. "The Venus Figurines."
> Current Anthropology, Volume 41, Number 4, August±October 2000.

The Venus of Willendorf & The Venus of Brassempouy, Upper Paleolithic figurines.

In addition to the clay impressions mentioned at the beginning of this article, this study indicates that textiles were well developed by the Upper Paleolithic which further indicates that the origins of weaving occurred much earlier in the Middle or Lower Paleolithic.



The Upper Paleolithic era was quite sophisticated. The multi-colored painting of a bison in the Cave of Altamira (above right) was painted with an airbrush technique (left) and the depiction of a bison (photo of a contemporary bison bottom right) was quite accurate even though it was done deep inside a dark cave from memory. Along with the newly found textile evidence, this indicates that stone-age technology must have begun much earlier than previously thought.

MIDDLE PALEOLITHIC BOAT JOURNEY

Genetic DNA evidence has shown conclusively that the Australian Aborigines crossed over from Asia to Australia about 50,000 years ago. Anthropologists agree that they probably used some kind of raft made of natural materials to make the journey.
Cooper, Alan; Williams, Alan; Spooner, Nigel. *When did Aboriginal people first arrive in Australia?* The Conversation, https://theconversation.com/when-did-aboriginal-people-first-arrive-in-australia-100830, accessed 9/22/2019.

LOWER PALEOLITHIC WOODEN OBJECTS FOUND

There have been several different significant finds of Lower Paleolithic wooden implements which were carefully shaped and treated by Paleolithic craftsmen showing that there was a soft technology and that the people using it were skilled.

THE SCHÖNINGEN SPEARS: "The Schöningen spears, discovered in Germany in 1995 and subsequent years,...were hailed as the oldest known spears and showed ‘design and construction skills previously attributed only to modern humans’ (Kouwenhoven 1997). "The Schöningen spears are now thought to be about 295 ka old..." (See reference next.)

THE CLACTON SPEAR: "At 400,000 years old, the yew-wood Clacton spear is the earliest known worked wooden implement."
Lu Allington-Jones (2015) The Clacton Spear: The Last One Hundred Years,Archaeological Journal, 172:2, 273-296, DOI: 10.1080/00665983.2015.1008839

THE BASKET AGE?

"There are two reasons, according to Jim Adovasio, we don’t think of baskets or textiles when we think of the Stone Age. One is that stones and bones, being far more durable, are far more common at archeological sites than artifacts made of fiber. But the other reason, says Adovasio, an archeologist at Mercyhurst College in Erie, Pennsylvania, is a bias on the part of archaeologists who study the era."The conventional wisdom has been that a time-consuming task like weaving would only be practiced by sedentary, agrarian cultures. [ED: Which generally means the much later Neolithic era and not the Paleolithic era.]"
Menon, Shanti. "The Basket Age." Discovery Magazine, January 1996 Issue, http://discovermagazine.com/1996/jan/thebasketage619

THE BASIC PRINCIPLE OF BASKET-WEAVING

The principle of basket-weaving is quite simple. One set of strands is at a right-angle to another set of strands. In basket-weaving the vertical stands, known as spokes, are fairly hard. Then the opposing strands, called weaver strands, are more flexible and wrap around the spokes to make the walls or the surface of the basket.

This basic structure can be applied to a wide variety of artifacts small and large such as sandals, hammocks, thatched roofs, and boats. The key was understanding the right-angle relationship between the structural elements.

While the basic idea for baskets is simple, there are hundreds of ways to make baskets and hundreds of basket shapes and sizes.

I think it is likely that the first baskets were simple ones made with vines and these baskets were fashioned after bird's nests and spider webs. Then over hundreds of thousands of years, basketry evolved along with a variety of related products. I also believe that in the beginning, the strands were often wide (a wide gauge as Dr. Adovasio referred to them) but this did not limit what could be accomplished.

It then seems likely that basket-weaving and related techniques led to the development and use of finer strands (a narrower gauge) which eventually lead to cordages such as rope and also string, twine, and thread. This allowed the creation of nets which again used the right-

angle principle. Then with the help of a loom, work with fine fibers evolved into fine weaving to make cloth. However, the basic right-angle principle was still the same.

INTRODUCTION TO POSSIBLE PALEOLITHIC WOVEN-FIBER TECHNOLOGY

To present a general idea of the wide range of objects that could have been made, even at a basic level, here is a short introduction.

In the beginning, Woven-Fiber constructions were most likely made with large reeds or stalks such as palm fronds, vines or runners, reeds, roots, rushes, bamboo, sedges, rattan, various local grasses, various straws, willow, tree bark plus splint baskets or chip baskets, made of wide wood shavings. This is a list of the most common plant materials, but in every location, there was almost always a plant of some kind that could be woven into a basket.

Traditional Ukrainian hat with a 'wide gauge' strands.

And there were/are numerous variations even for a specific design. Some could hold water without leaking and without any further treatment, for example, and some would allow a small amount of ventilation while others were almost open so that birds or live snails could be put inside them.

There are general names for this kind of construction such as wicker and wickerwork as well as caning. The general terms for basket-weaving such as basketwork and basketry are also used. And the term plaiting is often used. It means braiding, intertwining, lacing and knotting.

The types of objects that could be constructed utilizing such basic weaving technology was/are wide-ranging, including shoes, hats, bowls, raincoats, hampers, boxes, bags, satchels, backpacks, brooms, brushes, mats, steam cookers, fish and eel traps,

furniture, tables, bedding, hammocks, cribs, dolls, bird carriers, shields, coffins, walls, roofs, houses small & large, boats small & large and even bridges (see below).

Weaving techniques could also be combined with other materials such as wood to make furniture. And fiber weaving was often combined with clay or resin and other materials. Naturally, occurring bitumen was/is used to waterproof reed boats. Each product often involved a quite different, although related, process.

In addition baskets and related technologies were used with wine presses, the making of olive oil and other processes. A winnowing-basket was/is used to separate the chaff from the grain. In the first known civilization, that of Sumer and later Babylon, large rugged esparto baskets were used to transport clay to be used for building. This was so important to these early civilizations that in a Sumerian creation myth a principle god, Enlil, declared that 'the pickax and the basket build cities."

DOES THIS PROVE THAT WOVEN-FIBER TECHNOLOGY OCCURRED MUCH EARLIER IN THE PALEOLITHIC ERA? ABSOLUTELY NOT!

I have made a case for the presence of Woven-Fiber Technology early in the evolution of hominids. However, all I can say is that this evidence makes it highly probable that there was such a developing technology. I believe it also means that it was highly improbable that it did not happen.

However, until we can find definitive physical proof we are still in the world of speculation. Yet if many anthropologists accept the idea, the chances of finding solid evidence become much greater, as they will be looking for such evidence. Dr. Adovasio has written the definitive book for recognizing and documenting the remains of perishable fiber items. So with his help, hopefully, more evidence will be located and properly dated.

Adovasio, Dr. J. (2010). ***Basketry Technology:***
A Guide to Identification and Analysis, Updated Edition.
California: Left Coast Press.

SLIDE SHOW OF 50+ PHOTOS

BASIC BASKETS

A simple basic basket type design.

"Traditional water container made of palm leaves from Camenaça / East Timor"

https://commons.wikimedia.org/wiki/File:Traditional_water_container_made_of_leaf_from_Camanasa.jpg

Baskets made with wide strands (wide gauge) with different materials.

(Left) A Tamil traditional basket made from wide-gauge palm strands.

https://commons.wikimedia.org/wiki/File:Palmyra_craft_work.jpg

(Middle) A basket made from kudzu.

https://commons.wikimedia.org/wiki/File:Handmade_basket_kudzu.jpg

(Right) A basket made from wide strands of straw.

https://commons.wikimedia.org/wiki/File:Cesto_de_palha_%3D_Straw_baskets.JPG

A woodsplint basket by Nauset or Wampanoag native Americans.

https://commons.wikimedia.org/wiki/File:Basket_(splint),_Nauset_or_Wampanoag,_collected_in_Barnstable_MA_in_1892_-_Native_American_collection_-_Peabody_Museum,_Harvard_University_-_DSC05470.JPG

Basket-weaving.

(Left) 2007 Smithsonian 41st Folklife Festival - Roots of Virginia.
https://commons.wikimedia.org/wiki/File:43.SFF41.Day2.NM.WDC.28jun07_(657130602)_(2).jpg
(Middle) Bamboo basket-weaving in Hainan, China.
https://commons.wikimedia.org/wiki/File:Basket_making_in_Hainan_-_02.JPG
(Right) A Tamil bamboo basket in the making.
https://commons.wikimedia.org/wiki/File:A_bamboo_basket_making.JPG

OTHER DESIGNS

(Left) Indigenous Brazilian Xavante basket made with plaited and twined palm leaf strips.
https://commons.wikimedia.org/wiki/File:Basket,_plaited_and_twined_palm_leaf_strips,_Xavante_-_AMNH_-_DSC06163.JPG
(Middle) "Twined carrying basket of the Brazilian Sherente people."
https://commons.wikimedia.org/wiki/File:National_Museum_of_Ethnology,_Osaka_-_Twined_carrying_basket_-_Sherente_people_in_Brazil_-_Collected_in_1977.jpg
(Right) A Sami (previously known as Laplanders) basket.
https://commons.wikimedia.org/wiki/File:Sami_basket_-_Nordiska_museet_-_Stockholm,_Sweden_-_DSC09954.JPG

The more complex coiled basket technology. This is called straw binding.
https://commons.wikimedia.org/wiki/File:Halmbinding.jpg

HATS AND SANDALS

(Left) Straw hat, Vietnamese Women's Museum
https://commons.wikimedia.org/wiki/File:Straw_hat,_Vietnamese_Women%27s_Museum.jpg
(Middle)Woven palm frond hat
https://commons.wikimedia.org/wiki/File:Chapeau_congolais.jpg
(Right)Ukrainian straw hat
https://commons.wikimedia.org/wiki/File:%D0%A3%D0%BA%D1%80%D0%B0%D1%97%D0%BD%D1%81%D1%8C%D0%BA%D0%B8%D0%B9_%D0%B1%D1%80%D0%B8%D0%BB%D1%8C.JPG

(Left) Neolithic woven sandal from the Cave of the Bats in Granada, Spain (la Cueva de los Murciélagos).
https://commons.wikimedia.org/wiki/File:Cester%C3%ADa_Murci%C3%A9lagos_04.JPG
(Middle) Reconstruction of the inside of the shoes of the Neolithic frozen natural mummy known as Ötzi. The photo shows the woven structure inside the shoe.
https://commons.wikimedia.org/wiki/File:%C3%96tzi-Schuhe.jpg
(Right) "Basketry Sandal, Egypt, New Kingdom - Roman Period (1569 BCE - 337 CE)"
https://commons.wikimedia.org/wiki/File:Basketry_Sandal_LACMA_M.80.202.483.jpg

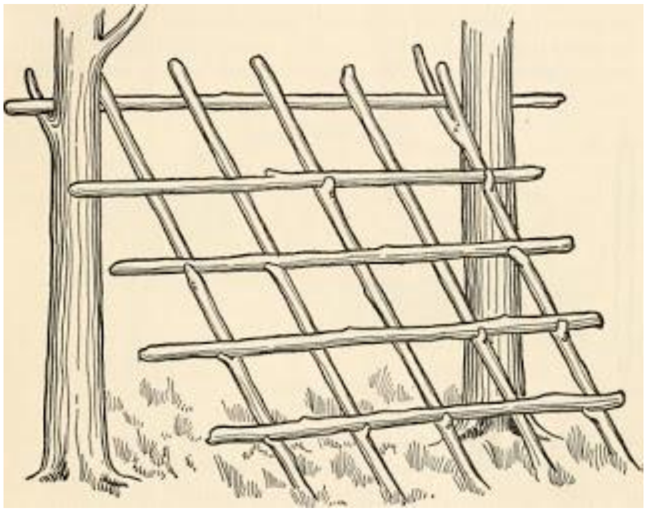
SPECIAL PURPOSE

(Left) "Traditional basket to pick snails, Southern Spain."
https://commons.wikimedia.org/wiki/File:Snail_basket.jpg
(Middle) Besakih Bali Indonesia Roasters-in-Baskets
https://commons.wikimedia.org/wiki/File:Besakih_Bali_Indonesia_Roasters-in-Baskets-02.jpg
(Right) Vincenc Pregl knits wood for fruit drying,
https://commons.wikimedia.org/wiki/File:Vincenc_Pregl_plete_leso_za_su%C5%A1enje_sadja,_Lo%C5%BEe_1958_(4).jpg

(Left) A bee skep basket (a special basket to house a beehive)
with stand and landing board, Sweden
https://commons.wikimedia.org/wiki/File:Bee_Skep,_stand_and_landing_board,_Skansen,_Stockholm.jpg
(Middle) Fish trap, Vietnam
https://commons.wikimedia.org/wiki/File:Fish_trap,_Xinh_Mun_-_Vietnam_Museum_of_Ethnology_-_Hanoi,_Vietnam_-_DSC03178.JPG
(Right) "A donkey with traditional esparto panniers"
https://commons.wikimedia.org/wiki/File:Donkey_panniers.jpg

"Satyr working a wine press consisting of a pile of round wicker-work mats. Fragmentary terracotta relief, Roman artwork, 1st century AD."
https://commons.wikimedia.org/wiki/File:Satyrs_vine_press_BM_D550.jpg

WALLS, ROOFS & HOUSES



“METHOD OF THATCHING A LEAN-TO”

"Method of thatching a lean-to wood, and these are best made by building what is known as a lean-to. Look for two trees standing from eight to ten feet apart on your camping place, with branches from six to eight feet above the ground. By placing a pole from one tree to the other in the crotches and leaning other poles against this one, brush-wood can be woven in to form a very good roof. Branches of the balsam or hemlock are best for this purpose, and the needles should point down. It is well to collect as many soft, thick tips of trees of this character as possible, both for the thatching and to make the beds."

https://commons.wikimedia.org/wiki/File:Outdoor_life_and_Indian_stories_-_making_open_air_life_attractive_to_young_Americans_by_telling_them_all_about_woodcraft,_signs_and_signaling,_the_stars,_fishing,_camping_-_also_stories_of_noted_(14750032671).jpg

Wickerwork fence, UK

https://commons.wikimedia.org/wiki/File:Wickerwork_fence_and_road_past_Old_Hall_Farm_-_geograph.org.uk_-_529110.jpg

Clay walls.
https://commons.wikimedia.org/wiki/File:Lehmausfachung.jpg

(Left) Roof weaving, Bodi Tribe, Ethiopia
https://commons.wikimedia.org/wiki/File:Roof_Weaving,_Bodi_Tribe_(11247577385).jpg
(Right) Roof in place on a house, Konso Village, Ethiopia
https://commons.wikimedia.org/wiki/File:Konso_Village,_Ethiopia_(7995031746).jpg

(Left) Monacan Indian village, Virginia -- a recreation.
https://commons.wikimedia.org/wiki/File:Monacan_village_hut-Natural_Bridge_State_Park-palisade_(30681885352).jpg
(Right) Recreated Zulu hut in South Africa
https://commons.wikimedia.org/wiki/File:Herboude_iQhugwane_naby_Dingaanstat-grootingang,_a.jpg

A home in the indigenous pre-Incan community in South America
(the Uru or Uros people) made with woven-fiber technology.
https://commons.wikimedia.org/wiki/File:Photo_-_Floating_Islands_(Puno,_Peru).JPG

BOATS & WATERCRAFT

Bamboo Raft

A bamboo raft uses the same right-angle construction used in weaving**.**

https://commons.wikimedia.org/wiki/File:Bamboo_raft.jpg

Coracle Boats also known as Basket Boats

This design is based on basket construction. These boats can be very small for just one person or huge so that they can carry tons of materials

(Left) Tungabhadra River and Coracle Boats

https://commons.wikimedia.org/wiki/File:Tungabhadra_River_and_Coracle_Boats.JPG

(Right) Round boats (Putti Teppalu) in Krishna river at Srisailam

https://commons.wikimedia.org/wiki/File:Round_boats_(Putti_Teppalu)_in_Krishna_river_at_Srisailam.jpg

Reed Boats

These boats are made of woven reeds. They can be small or relatively large.

Reed boats in the indigenous pre-Incan community in South America
(the Uru or Uros people) made with woven-fiber technology.
https://commons.wikimedia.org/wiki/Category:Uros_islands

Reed boats in the indigenous pre-Incan community in South America
(the Uru or Uros people) made with woven-fiber technology.
https://commons.wikimedia.org/wiki/Category:Uros_islands

Reed boats in the indigenous pre-Incan community in South America
(the Uru or Uros people) made with woven-fiber technology.
https://commons.wikimedia.org/wiki/Category:Uros_islands

BRIDGES

(Left) Woven-Fiber suspension bridge
https://commons.wikimedia.org/wiki/File:IRB-7-MUDDY2.jpg
Living roots bridges made by weaving living roots from trees
(Middle)Double_Decker Living Root Bridge
https://commons.wikimedia.org/wiki/File:Double_Decker_Living_Root_Bridge4.jpg
(Right) Rangthylliang 50+ meter living root bridge
https://commons.wikimedia.org/wiki/File:1_Rangthylliang_1.JPG

RITUAL

"New Orleans, Mardi Gras Day: Street costumers in straw/wicker outfits"
https://commons.wikimedia.org/wiki/File:NOMG07WikerPeople.jpg

Wicker man (ritual)
An ancient ritual of the burning man
-- made with woven fibers and then burned in a ritualistic manner.
https://commons.wikimedia.org/wiki/Category:Wicker_man_(ritual)

[1] Black, Jeremy; Green, Anthony (1992), Gods, Demons and Symbols of Ancient Mesopotamia: An Illustrated Dictionary, London, England: The British Museum Press, p. 182.

[2] Kramer, Samuel Noah (1944, 1961). Sumerian Mythology, Revised Edition. Philadelphia: University of Pennsylvania Press, p. 57.

https://www.sacred-texts.com/ane/sum/sum07.htm

[3] Kramer (1944/1961:57).

[4] 186-189. Uttu, the beautiful woman, cried out: "Woe, my thighs." She cried out: "Woe, my body. Woe, my heart." Ninhursaja removed the semen from the thighs.

190-197. She grew the 'tree' plant, she grew the 'honey' plant, she grew the 'vegetable' plant, she grew the esparto grass...

ETCSLtranslation, The ETCSL project, Faculty of Oriental Studies, University of Oxford, 2006.

http://etcsl.orinst.ox.ac.uk/cgi-bin/etcsl.cgi?text=t.1.1.1&charenc=j#
[5] Kramer (1944/1961:53).

[6] Kramer, Samuel Noah (1963). The Sumerians: Their History, Culture, and Character. Chicago: The University of Chicago Press, p. 116.

Article #6
The Importance of Processes in the Paleolithic Era

INTRODUCTION

The role of processes in the life of hominins in the Paleolithic era is one of the key factors that influenced increasingly complex cognition, planning, sharing and communication and eventually led to modern human behavior that is known as behavioral modernity.

While I have suggested in previous articles that weaving processes began early on, this is theoretical. It does not matter which processes were involved. It is the nature and the dynamics of processes that are important and not any particular one or kind.

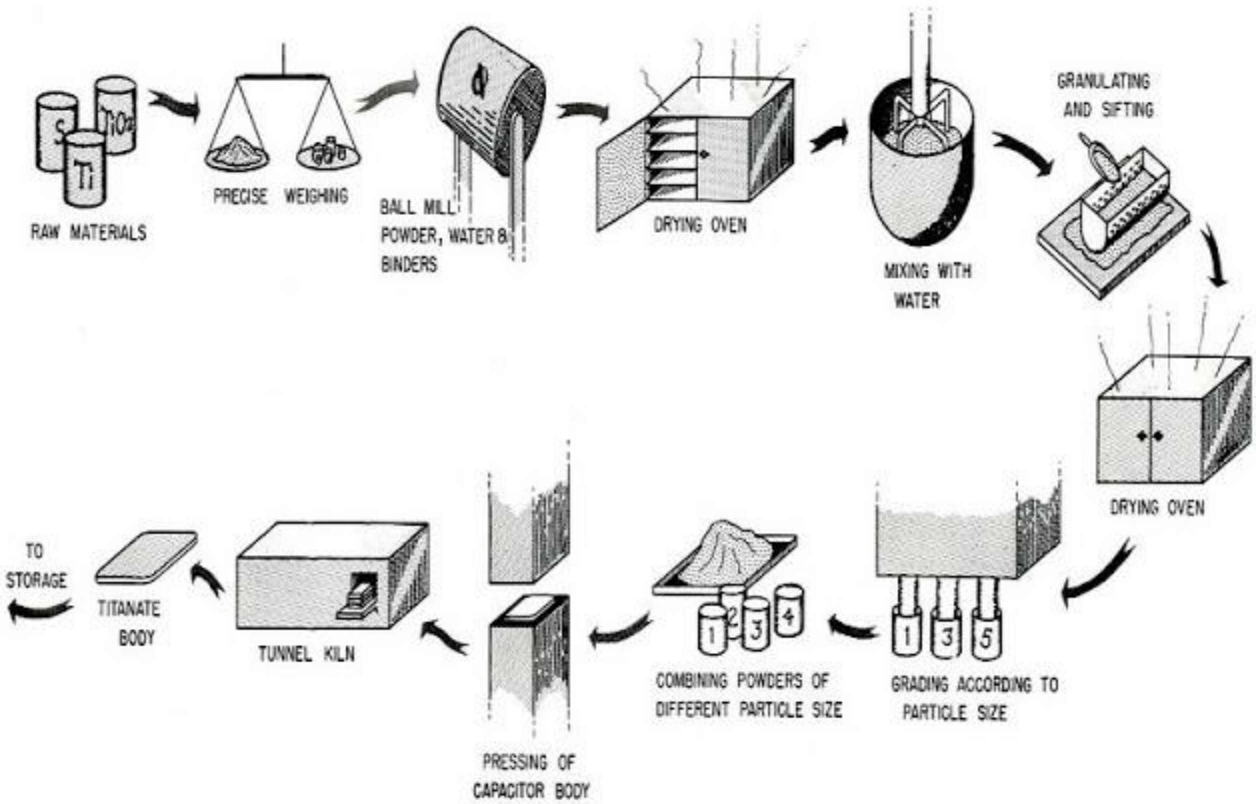
Processes have a dynamic all their own. They can start very simply with just a few steps and eventually evolve into complicated procedures with many steps and conditions. And this is exactly what happened with the one Paleolithic process we do know a lot about, that of stone-tool technology.

Google Word Definition
Process:

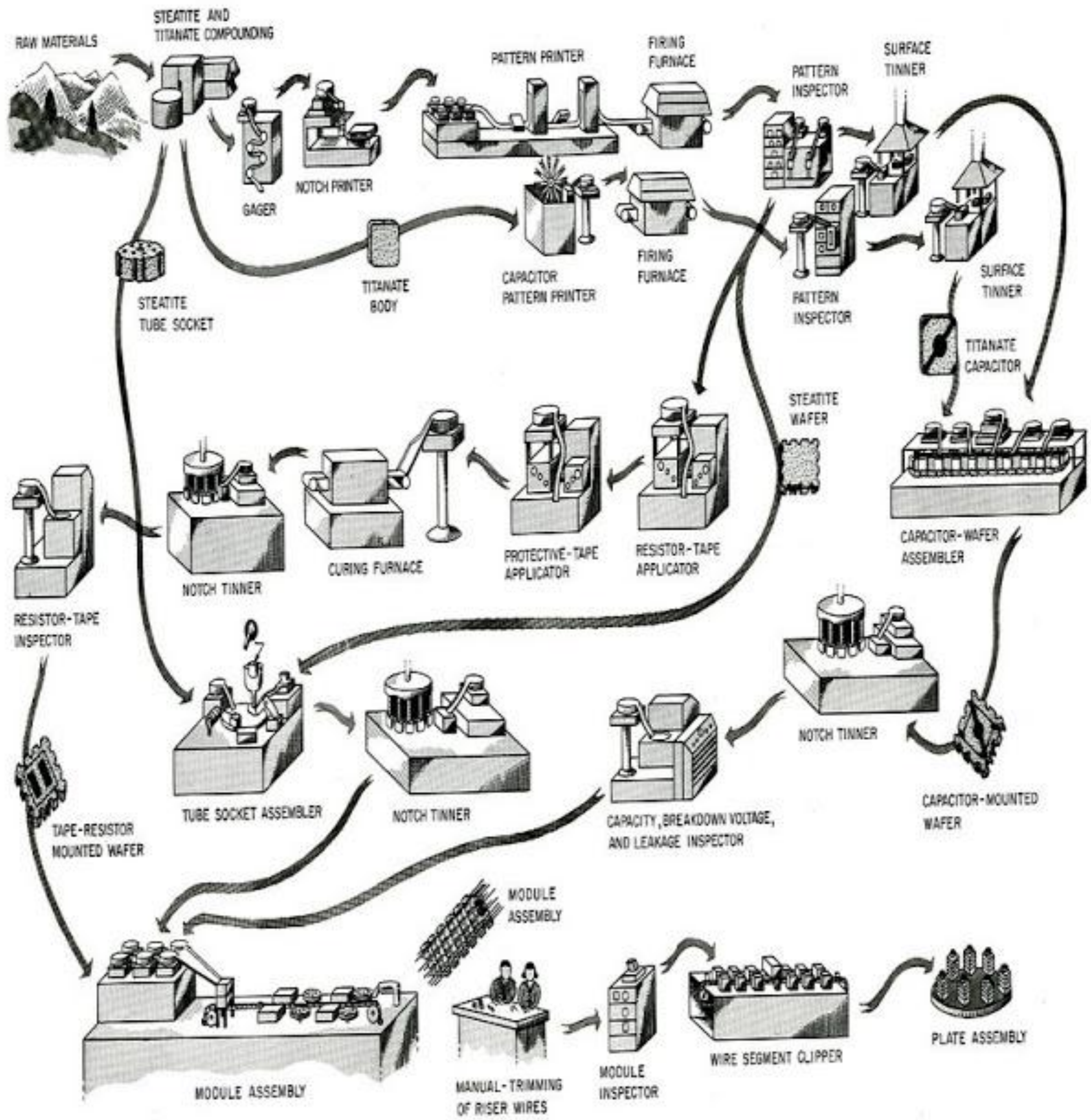
-- a series of actions or steps taken in order to achieve a particular end –

This short definition says it well. A process requires a series of actions in a sequence that must be learned and then executed. And at the same time, the practitioner must have a clear idea of the end result. This, among other things, requires a sense of time and procedure. It also requires planning. In addition, knowledge of a process must be taught to the next generation if the use of the process is to continue.

An Example Of How Processes Expand And Become More Complex With More Steps



PROCESS DIAGRAM: PROJECT TINKERTOY (Early 1950s)
https://commons.wikimedia.org/wiki/Category:Project_Tinkertoy
Project Tinkertoy facility - "Code-named Project Tinkertoy, the major objective of the program was the design and construction of a pilot plant compatible with the principles of modular design and mechanized production of electronics... NBS intended to develop a process for automated manufacture of electronic equipment and to demonstrate it on a pilot production line."
National Institute of Standards and Technology



See a full video about Project Tinkertoy
https://archive.org/details/47174USNavyProjectTinkertoy

THE EVIDENCE FOR STONE-TOOL PROCESSING IS CLEARLY ESTABLISHED

We do know for certain that Homo habilis (perhaps the earliest hominin) had mastered an initial process, what we might call an entry-level process, i.e., that of Oldowan stone-tool making. And they were able to teach and communicate this skill from generation to generation.

While the Oldowan stone-tool technology has often been characterized as crude, it nevertheless required a number of specific steps, in order, to make useful tools. And these required a good deal of skill to get the desired results.

HOW MUCH SKILL WAS INVOLVED?

> "Recent studies have shown, however, that even among the oldest sites flakes do indicate high levels of skill. For example, at Gona, Ethiopia, material dated to 2.5-2.6 myr represented skillfully flaked lava cobbles (Schick and Toth, 2006; Semaw, 2000)...Evidence suggests that skillful flaking and forethought were components of human tool production even as early as 2.5 million years ago..."
> Turcotte, Cassandra M. "Oldowan Stone Tools." The Center for the Advanced Study of Hominid Paleobiology
> (CASHP). http://www.bradshawfoundation.com/origins/oldowan_stone_tools.php

"A juvenile capuchin monkey (Sapajus libidinosus) using a stone as tool to open a seed."
https://commons.wikimedia.org/wiki/File:Stone_tool_use_by_a_capuchin_monkey.jpg

Some animals use basic tools such as a rock or a twig.
But they do not have the ability to make a complex tool when many steps are required.

ABOUT OLDOWAN STONE-TOOL TECHNOLOGY

The simple Oldowan stone-tool technology marked a major step, if not the crucial step, which eventually resulted in culture and civilization today.

If we are to understand that this technology was a *process* as I have said, we need to understand the steps that were involved. And this is especially important because this initial

process became the underlying structure that led to many more processes in the Paleolithic era.

Hammerstone (left), striking the core with the hammerstone (middle), the core and a flake (right) in a later stone-tool process.

To begin the stones that were often used were river pebbles. Choosing the right stones was crucial and it appears that Homo habilis became quite skilled at this.

Hammerstone: This was the stone that was used to strike the core and break off a flake. This stone was round, fat, hard and could be easily held in the hand. It also would not shatter.

Core: The core was the stone that was struck. The core was generally a crystalline stone such as quartz, basalt, flint or chert. Obsidian was particularly desired as it made the sharpest edge. Naturally, it depended on what was available. The abundance of these kinds of rocks that were used for these tools shows that Homo habilis knew the difference between rocks. They understood which stones were best for holding a cutting edge.

Striking the Core: The core had to be hit at just the right-angle, at a certain point and with the correct amount of force. Hitting the core could produce sharp flakes that became tools in themselves or the core could be hit in such a way that when a flake was removed, the core was left with sharp cutting points. This was then called a chopper and may have been used to cut plants or chop a tree or butcher an animal.

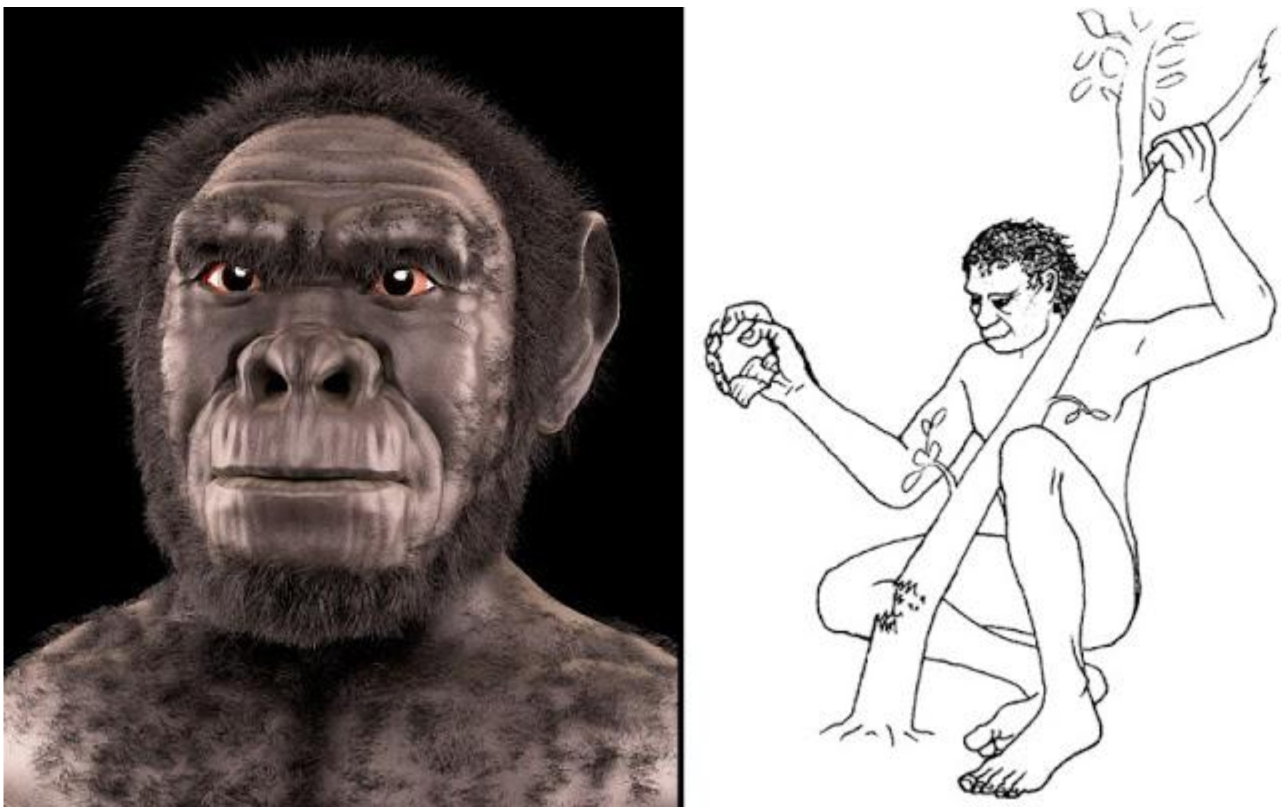
Flake: The flake was the fragment that split off from the core. Producing a flake with a sharp edge was often the reason for hitting the core. A flake was then a tool in itself which could be quite sharp, as sharp as a surgical knife today, depending on the core's material.

Handling these tools: The blunt side was called the proximal surface and the sharp surface was called the distal surface. The proximal surface was held in the hand and then the sharp distal surface was used to cut.

Conchoidal fracture: The fracture this process produced is known as a 'conchoidal fracture' which does not happen in nature and can only be produced by a deliberate sharp impact. This kind of fracture makes a solid tool that keeps its integrity and is not prone to breaking apart. And because this does not occur in nature, it is clear that these tools were man-made.

The general name for this kind of technology is **percussion technology**.

Examples of choppers made from the core.



Homo habilis - forensic facial reconstruction (left).
One of the ways that the chopper might have been used (right).

"The Oldowan represents the first instances of technological innovation in human history, wherein our ancestors first began to enhance their biological abilities with the manufacture of stone tools...Tool production and use is thought to be intimately linked to, if not the instigator of, major changes in cognitive development..."
Turcotte, Cassandra M. "Oldowan Stone Tools." The Center for the Advanced Study of Hominid Paleobiology
(CASHP). http://www.bradshawfoundation.com/origins/oldowan_stone_tools.php

EARLY STONE-TOOL PROCESS EVOLUTION

> **The initial Homo habilis stone-tool process:**
> **The Oldowan Technology**
> "These early tools were most likely used to help these humans butcher animals...cut up plants, and even do some woodworking...Stone is simply pretty good at standing the test of time, but it would not have been the only thing these people used in their daily lives. It is likely that a whole range of material spanning from skin and bark [were] used to create containers; wood used to create digging sticks, spears or clubs; and digging tools made out of horn or bone were also used."
>
> **The next and more complex Homo erectus process:**
> **The Acheulean Technology**
> "While the Oldowan was still in full swing...Africa became the initial host to a second tool industry: the Acheulean (c. 1,7 million years ago to c. 250,000 years ago)...It saw the development of tools into new shapes: large bifaces like hand axes, picks, cleavers and knives enabled the contemporary Homo erectus...to literally get a better grip on the processing of their kills and gatherings. More precisely shaped tools meant a more delicate technique was needed; and indeed, softer materials such as wood, bone, antler, ivory, or soft stones, were now used as percussors in what is known as the soft hammer technique."
>
> Groeneveld, Emma. "Stone Age Tools." Ancient History Encyclopedia Limited, 21 December 2016. https://www.ancient.eu/article/998/stone-age-tools/

It is important to note that In the Acheulean stage, stone-tool making had now developed so that hominins were making tools to make the tools, known as meta-tools -- a critical meta-step in the technology. So this process was not only more complicated but it included another level of cognition and planning.

OTHER PROCESSES

While we do not know exactly what other processes Homo habilis and the later Homo erectus used, we can be reasonably sure that these early hominins did use other processes in their daily lives. We know for certain that they mastered the process of Oldowan stone-tool making and then later the more advanced Acheulean technology, therefore it appears likely that they would have created other processes as well.

These processes would have probably involved wood and vegetation, for example. Unfortunately, we do not have direct evidence of this due to their decay -- although cut marks on stone-tools, when viewed through a microscope, indicate that stone-tools were often used to cut plants.

> "In whichever way archaeological remains are interpreted, one must always be aware that the vast majority of the materials with which prehistoric people were surrounded and with which they worked is lost to us today. ...organic materials start to decay as soon as they are deposited in the ground."
> Grömer, Dr. Karina. "An Introduction to Prehistoric Textiles" Brewminate.com, Natural History

Museum, Vienna, March 01, 2016, https://brewminate.com/an-introduction-to-prehistoric-textiles.

Dr. Adovasio has made the point that there is "ample ethnographic evidence that perishable technologies form the bulk of hunter-gatherer material culture even in arctic and sub-arctic environments (e.g. Damas 1984; Helm 1981). Archaeologists working with materials recovered from environmental contexts with ideal preservation clearly confirm that this is also true for the past as well. Taylor (1966:73), for example, notes that in dry caves he recovered 20 times more fiber artifacts than those made of stone, Croes (1997:536) reports that wet sites yield inventories where >95% of prehistoric material culture is made of wood and fiber, and Collins (1937) confirms the same for sites in Alaskan permafrost."
Soffer O, Adovasio JM, Hyland DC, Klíma B, Svoboda J. "Perishable Industries from Dolní Vestonice I: New Insights into the Nature and Origin of the Gravettian." Paper Prepared for the 63rd Annual Meeting of the Society for American Archaeology Seattle, Washington, 25–29 March 1998. DolniVestonice.pdf.

I suggest that if Homo habilis could invent the Oldowan stone-tool process, they could also have created a number of other processes using natural fibers, wood, bone, etc.

And once Homo habilis had established a life-style that relied on processes, it set hominins on a path of working with processes that would become more complicated and therefore required larger brains and the use of more areas of the brain.

In the beginning, the skill of using these processes could have been taught through imitation and learned and repeated via "muscle memory" but later, as the processes became more complex, other areas of the brain probably became involved and eventually some form of basic proto-language developed.

According to *The Evolution of Culture*, very few animals possess the ability to learn via imitation. But the genus Homo was/is one of them. (*The Evolution of Culture*, Volume 4. Linquist, Stefan, Editor. Rutledge, 2017.)"The first obvious signs of imitation are the stone tools made by Homo habilis about 2.5 million years ago, although their form did not change very much for another million years. It seems likely that less durable tools were made before then, possibly carrying baskets, slings, wooden tools and so on."
Blackmore, Susan. "Evolution and Memes: The human brain as a selective imitation device." Cybernetics and Systems, Vol 32:1, 225-255, 2001,Taylor and Francis, Philadelphia, PA.

THE INCREASING COMPLEXITY OF PALEOLITHIC PROCESSES

"Stone toolmaking action analyses...demonstrate the presence of cumulative cultural evolution in the Lower Palaeolithic and suggest that this accumulation displays an accelerating rate of change continuous with that seen in later human history. This should encourage interest in intrinsic processes of cultural evolution that might tend to produce such a uniform curve, including the potentially autocatalytic effects of increasing technological complexity...Lower Palaeolithic technologies clearly do increase in hierarchical complexity through time, raising the possibility of important interactions with the evolution of human cognitive control..."
Stout, Dietrich. "Stone toolmaking and the evolution of human culture and cognition." Philos

Trans R Soc Lond B Biol Sci. 2011 Apr 12; 366(1567): https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3049103/

PROCESSES LED TO LARGER BRAINS AND MORE COMPLEX COGNITION

In a landmark experiment, Dr. Dietrich Stout designed a study in which modern people who were skilled at making stone-tools in the manner of the Oldowan and Acheulean technology were observed via brain imaging as they made these tools.

> "Increasing levels of abstraction in action organization place demands on increasingly anterior portions of frontal cortex [22] and precisely this pattern of increased anterior activation has been observed in a brain imaging study comparing late Acheulean versus Oldowan toolmaking [29].This is consistent with the possibility that evolving neural substrates for complex action organization could have interacted with autocatalytic increases in technological complexity to produce a 'runaway' process of biocultural evolution [8,65]."
> Stout, Dietrich. "Stone toolmaking and the evolution of human culture and cognition." Philos Trans R Soc Lond B Biol Sci. 2011 Apr 12; 366(1567).https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3049103/

PROCESSES AND THE UNDERSTANDING OF LINEAR TIME

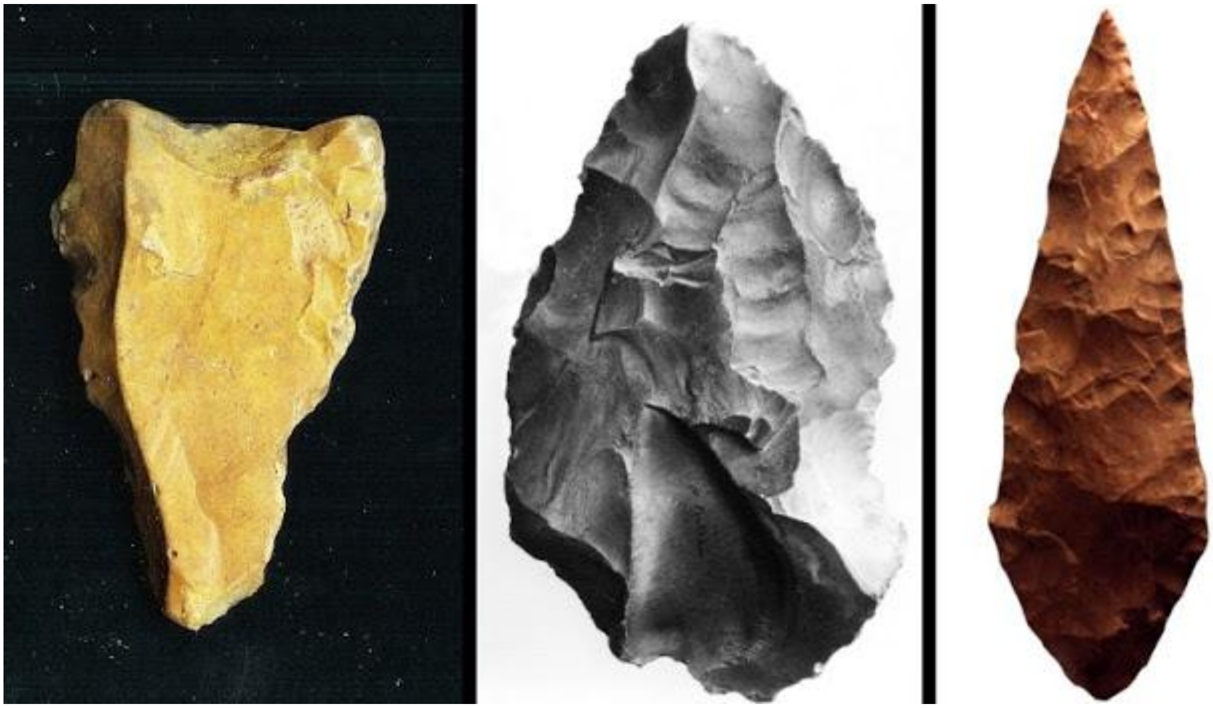
The use of processes played a critical role in the human understanding of time, an understanding that was/is unique among animals.

> "Our sense of time involves some sense of duration and also of the differences between past, present and future. There is evidence that our sense of these distinctions is one of the most important mental faculties distinguishing man from all other living creatures. For we have good reason to believe that all animals except man live in a continual present."
> "It must have required enormous effort for man to overcome his natural tendency to live like the animals in a continual present."
> Whitrow, Gerald James. *Time in History: Views of Time from Prehistory to the Present Day.* Oxford, UK, Oxford University Press. 1988, pages 7 & 22.

How and why did humans leave the immediacy and comfort of their animal existence and invent language, culture, and a sense of linear time with a past, present, and future? Did it require enormous effort? I would say no.

I would argue that this transition took place gradually over millions of years. And that rather than being difficult and painful, the break with our animal past, that led to our acquisition of behavioral modernity and the modern sense of time, occurred quite naturally.

After perhaps two million years, we know for certain that the skill and technology of stone-tool making had become quite complex. And because of this, we can perhaps assume that other processes based on natural fibers and wood, etc. had also become equally complex.



The progression of stone technology during the Paleolithic era
showing the evolution of stone tool processing.
(Left) Acheulian flint chopper, North Somerset, UK; ca. 750 kya.
https://commons.wikimedia.org/wiki/File:583_three_handaxes_ventral_(FindID_101523).jpg
(Middle) Lower Paleolithic flint stone tool, Egypt; ca.200 kya.
https://commons.wikimedia.org/wiki/File:Tool_MET_06-322-21.jpeg
(Right) Bifacial silcrete point; Blombos Cave, South Africa; 71 kya.
https://commons.wikimedia.org/wiki/File:Blombos_point_white.JPG

> “In the late Paleolithic period, tools became even more sophisticated. As many as 80 different types of implements have been unearthed for what are called the Perigordian and Aurignacian industries in Europe. It is believed that these tools were used for hunting and butchering, clothes making, and a great variety of other tasks that moved early humankind closer to modern life. In all, hundreds of highly complex tools have been found, some of which are the prototypes for modern tools.”
> STONE TOOL INDUSTRY
> https://www.britannica.com/topic/stone-tool-industry

While understanding an individual process was limited to particular materials and desired results, all processes involved a sense of time. Each step had to be done in a certain order, for example, and the eventual outcome was dependent on past steps that had been done correctly. Advanced processes often required precise conditions for specific durations of time -- such as the exacting heat treatment of silcrete (see below) to make it as workable as flint. The resulting stone was essentially an "artificial flint."

AN EXAMPLE OF A LATER COMPLEX PROCESS WHICH CONTINUED TO DEVELOP
The Heat Treatment Of Silcrete For Stone Tools, approx. 130 - 60 kya

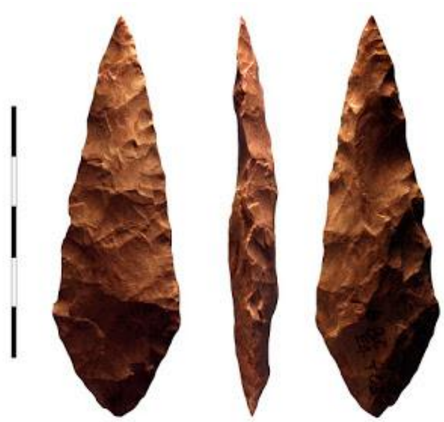
About 130 kya Paleolithic people learned to heat treat certain kinds of locally available stones. Instead of needing to use flint, for example, they, in a sense, made their own "artificial flint" by treating silcrete so that it had flint-like properties, which made it an excellent material for tools and arrows. The heat treatment made the stone harder, less prone to fracturing and easier to shape. Over perhaps 70,000 years into the Middle Paleolithic era (the time before the Upper Paleolithic cultural explosion), this technique became quite sophisticated.

Beginning with an above-ground method of placing stones in a pile of embers, it evolved into a well crafted controlled method that used "underground heating in an earth-oven like fire-pit. (sciencedaily.com -- see reference next)" This is a good example of the evolution of a Paleolithic process and the increasing complexity, precision, and sophistication that was achieved.

> The "silcrete heat treatment...may provide the first direct evidence of the intentional and extensive use of fire applied to a whole lithic chain of production."
> "This heating process marks the emergence of fire engineering as a response to a variety of needs that largely transcend hominin basic subsistence requirements,"
> "Early humans used innovative heating techniques to make stone blades." Science Daily. October 20, 2016.
> https://www.sciencedaily.com/releases/2016/10/161020092107.htm

It was familiarity with a wide variety of processes, including stone-tool making, that eventually led to an understanding of linear time. This was crucial for the transition from animal behavior to behavioral modernity and for the development of language.

Working with processes led to the development of a number of cognitive skills that were essential for behavioral modernity. Memory, a sense of time in terms of past, present and future along with a sense of time duration, goal-directed behavior, cognitive skills, and decision making came together as a result of managing a variety of complex and changing processes. In addition, there developed a way to teach and train each generation in these skills. Eventually, this culminated in modern human behavior including a full early language and a way to express linear time.



Example of heated silcrete stone that was then shaped
(the same stone seen from different angles).

THE PREFRONTAL CORTEX

The Homo sapiens brain was more than twice as large as the brain of Homo habilis and 1.5 times bigger than the brain of Homo erectus. But in addition, Homo sapiens had a distinct part of the brain that was unlike that in any other animal. This part is called the prefrontal cortex. And it is only in the last decade that we have begun to understand that this recently discovered area was critical when it came to planning, cognition and understanding the linear progression of time.

I believe an ability to work with complex processes and then to innovate came about because both the larger brain and the prefrontal cortex given to Homo sapiens allowed them to do so.

A full description of the prefrontal cortex is best left to scientific sources, so what follows are descriptions from scientific websites.

> "This part of the association cortex, which is implicated in higher cognition and affect, is thus disproportionately large in humans relative to other primates."
> Stern, Peter. The human prefrontal cortex is special. Science. Science22 Jun 2018 : 1311-1312.
> https://science.sciencemag.org/content/360/6395/1311.7

> "This brain region has been implicated in planning complex cognitive behavior, ... [and] decision making...The basic activity of this brain region is considered to be orchestration of thoughts and actions in accordance with internal goals." [ED: i.e., the future]
> Prefrontal Cortex. The Science Of Psychotherapy. 2017.
> https://www.thescienceofpsychotherapy.com/prefrontal-cortex/

I was one of the first writers in 2014 to focus on the prefrontal cortex as a critical component in our ability to understand and conceptualize linear time. We are the only animal that has this capability. See my most popular article (more than 10,000 readers since 2014) about the prefrontal cortex:

PROCESSES, TIME AND PROTO-LANGUAGE

After two million years, with their increased brain size and the added abilities of the prefrontal cortex, hominins began to develop a language and a set of conceptual tools that gave them greater control over their use of processes.

In particular, language gave humans the tools to work with time. Language could express basic linear time concepts that allowed them to imagine processes, the order of the steps involved and the duration of each step. It also allowed them to imagine different outcomes and to share and discuss processes. And, of course, language was used to instruct the next generation.

Linguists and anthropologists assume that a fully developed language, even the most basic language, would have had words that expressed concepts of time.

**Anna Wierzbicka made a list of what are known as
Semantic Primitives as listed by the Natural Semantic Metalanguage.
The following are universal words for time that occur in all languages:**

when/time, now, before, after, a long time, a short time, for some time, moment

It is important to note that language and time concepts are closely linked.

"Time reference is a universal property of language..."
Jacqueline Lecarme, Ph.D., Linguistics

And since processes proceed step-by-step, they became a model and metaphor for time, not unlike a clock which advances step-by-step as the hands of the clock move forward.

We can find examples of this today such as in this expression:

Your idea is half-baked.

This comes from the process of cooking where the bread was not given enough time to bake.

CONCLUSION

Since hominins had been working with processes for millions of years, they were familiar and comfortable with them. So the eventual awareness of linear time that processes involved and the conscious understanding of the process steps evolved naturally.

And this is why an understanding of processes is so important. Processes became the model and the metaphor for linear time along with duration. And once language and modern human behavior was achieved, humans had even greater control over their processes and their ability to control their environment. This eventually led to the Upper Paleolithic, the Neolithic and then to civilization.

AFTERWORD

ABOUT PROCESSES

I am quite familiar with processes. I processed my own black and white photographic negatives and then developed prints from those negatives for fifteen years. Negative processes involved time, temperature and proper handling, such as agitation. The initial spooling took place in the pitch dark.

I soon learned that what I did at the beginning greatly affected the end result. So as time went on, I became more precise. I learned to make accurate photographic exposures before developing so that the chemical process of developing produced a fine-grained thin negative with a full range of tones. And I added a couple of steps to standard developing that improved the results such as using distilled water as a pre-soak and diluting the developer for more control over the development time.

Then I developed my own black and white slides which was even more exacting.
And finally, I developed color slides. This process was the most involved and the most precise. Color slides, for example, required that the developing solution had to be 100 degrees F +/- 1/2 degree for a very specific duration of time.

I say all of this because I do understand how processes work and how they evolve. Whether I am talking about photographic processing or making stone-tools in the Paleolithic era or preparing esparto grass for basket-weaving or for making rope, basic step-by-step procedures are common to all.

THINKING OUTSIDE THE BOX?

I realize that my ideas may seem a bit different and unusual to Paleoanthropologists, but consider:

> "Tools are the products of our brains, and we have millions of stone tools," Wynn added. "What we need are more creative ideas on how to extract understanding from them, and what they tell us about our evolution." Quotation from paleoanthropologist Thomas Wynn of the University of Colorado at Colorado Springs.
> Choi, Charles. "Human Evolution: The Origin of Tool Use." LiveScience, November 11, 2009. https://www.livescience.com/7968-human-evolution-origin-tool.html. Accessed 10/26/2019.

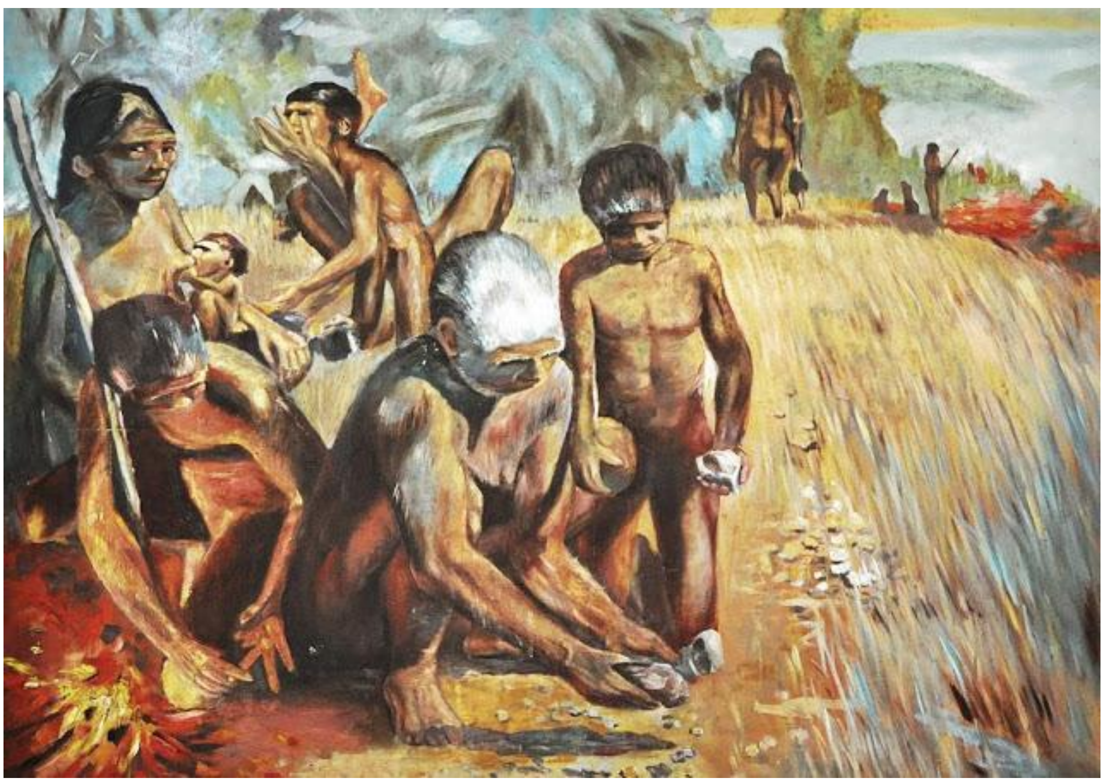
A Caveat: **While I believe that Homo sapiens became aware of linear time and were able to use it to their advantage, their sense of time was quite different from our own. I discuss this in other articles I have written.**

Article #7
The Tribal-Wide Use of Processes in the Paleolithic Era

MY PREVIOUS POINTS

I made the argument that Paleolithic *processes* were at the heart of human evolution. They began with the stone-tool technology of Homo habilis and have continued up to today.

I have further argued that these processes evolved and became more complicated as the brain of hominins grew larger. And with the help of their brain's unique large prefrontal cortex, hominins began to understand the workings of linear time -- time with a past, present, and future -- since processes proceed step-by-step in linear time.



“Primitive man making tools and teaching children”
from the Museum of Vietnamese History, Ho Chi Minh City, Vietnam.

I have also said that since we know that there was one well-developed process, that of stone-tool making, for which we have ample evidence and that has been well documented, it is also likely that there were other processes. These processes which created perishable artifacts -- made with materials such as wood, fiber, and animal skins -- have not survived because the objects would have decayed and left no trace.

MY NEW POINT

All of the above implies one major additional point. If the above statements are true, then the entire tribe of people would have probably been familiar with processes: from men (presumably) making stone tools to women (traditionally) harvesting and preparing food to children learning and helping in the making of processes.

An example of other processes:
-- While paleoanthropologists have assumed that men were making stone tools, they have also assumed that there was probably a division of labor. Women, in general, were in charge of finding food and preparing food. And this was a process all its own. Assuming that women's skills were as advanced as stone-tool making, they would have evolved their own food gathering and preparation processes.
-- In nomadic tribes women would probably have known which plants were best for eating at a certain time of year in each of the different nomadic environments. They would also have known the location, the right time to harvest, how to harvest (with special tools perhaps), how to carry the harvest and then how to prepare the plants for a meal (also with special tools perhaps). These food-related processes may have been as sophisticated as the stone tool technology at the time. In addition, children probably helped and were taught about these processes from an early age.

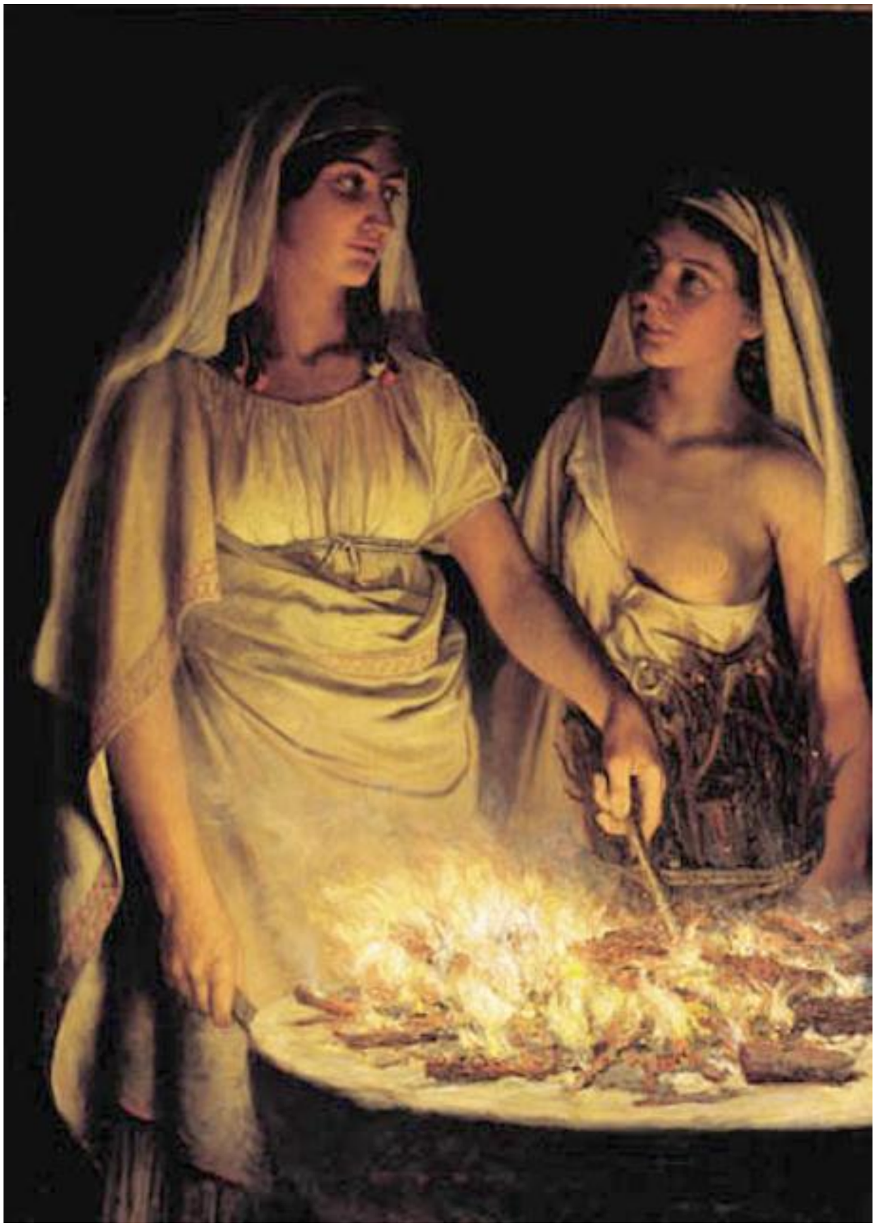
An elder shows a boy how to make stone tools.

"In a hunter-gatherer society, the hunters were usually men and the gatherers women (according to the latest research) -- although these roles were a bit flexible. This model, however, does not assume that men were dominant as a recent study has shown." **Devlin, Hannah. "Early men and women were equal, say scientists." The Guardian US, New York, NY, May 14, 2015.**https://www.theguardian.com/science/2015/may/14/early-men-women-equal-scientists

Here is a hypothetical example of two early processes during the Homo habilis time period: Just like the men knowing where to look for stones for stone tools, the women would know where to look for promising vegetation. Like the men knowing which stones to break open, the women would know which plants and parts of plants (such as seeds, nuts, and roots) to use for food along with gathering larvae, eggs, and honey. And like the men breaking the core stones apart the women would know how to harvest. And also like the men knowing which tool was best for skinning an animal or cutting down a small tree, the women would know how to prepare the food for eating.

Later when hominins began to use fire, she would also have needed to know how to find wood, work with coals, and keep a fire going even if the wood was green or wet. This was probably a shared responsibility with her mate, but it was a skill that she needed to master as well. And fire added another level to a woman's food processes -- with cooking, baking, curing, etc. In many societies, women had a special relationship with fire that was revered by the community.

A diorama of a cavewoman starting a fire:
National Museum of Mongolian History, Ulaanbaatar, Mongolia.
The expression, "Keep the home fires burning," still used today, refers to a woman maintaining a warm fire in the fireplace when her husband is away and what he will find when he returns. Also the expression 'home and hearth' implies the same relationship.



Vestal Virgins

While we cannot know what occurred in the Paleolithic era, it is clear that women had a special relationship to fire in many ancient societies. In Rome, for example, the Vestal Virgins kept an eternal flame alive. The Romans believed that keeping the fire going protected Rome. This ritual was at the center of Roman culture and it lasted for more than 1000 years until just before the fall of Rome (700 BCE - 391 CE). The ritual was in honor of the Goddess Vesta, an ancient Roman Goddess of hearth, home, and family. She was rarely depicted in human form but instead as a flame or fire itself, recalling what many anthropologists believe were the most ancient animistic beliefs of the earliest human cultures.

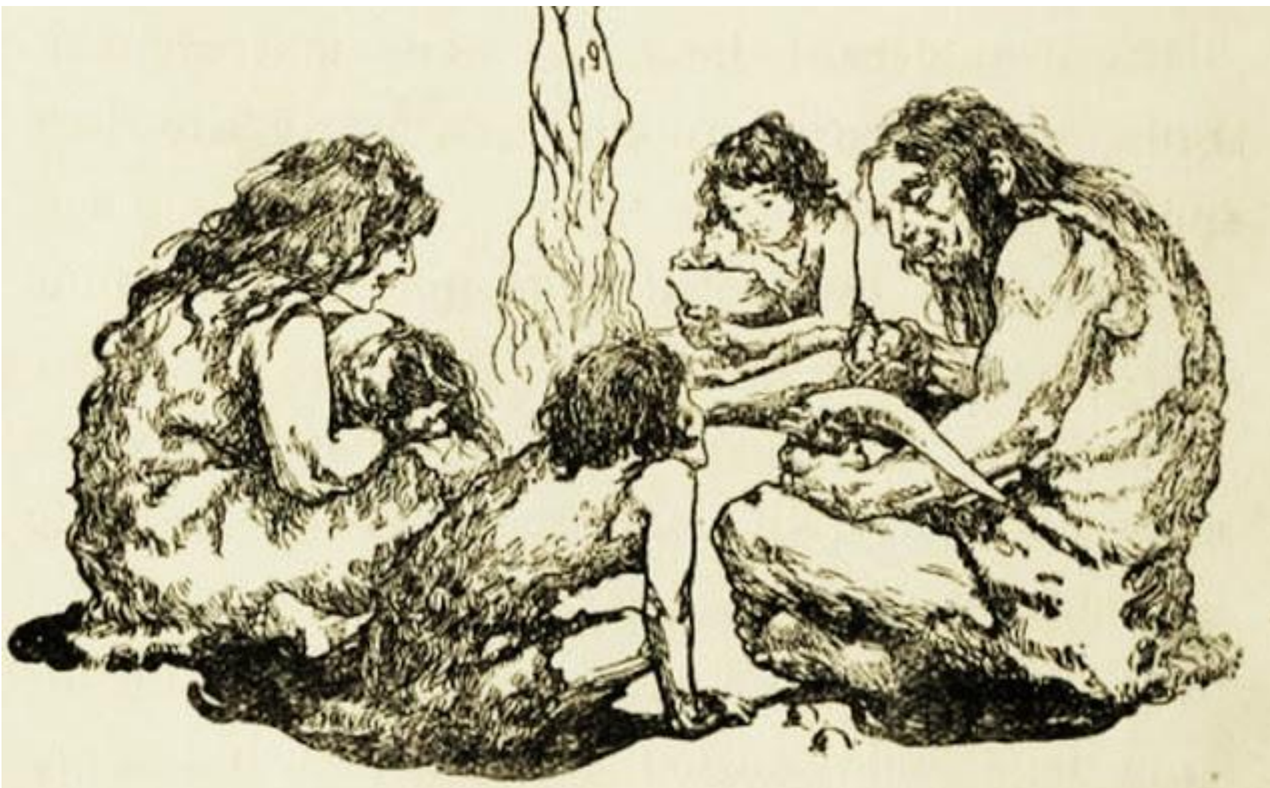
If women had their own processes in addition to the male processes of stone-tool making, this means that the idea of processes was tribal-wide. So the experience of working with processes, i.e., processes as a metaphor and processes as a model for the progressio

n of linear time was something that was understood by everyone in the tribe. There also had to be a method for teaching about processes so that this information could be passed down

from generation to generation.

And because this understanding was tribal-wide, the experience of working with processes was something that everyone could share, refer to and communicate about. So since men, women, and children all worked with processes, they could communicate with each other using various processes as a point of reference.

This is an important point because the later leap, so to speak, into behavioral modernity required that everyone in the tribe understood the developing language and the emerging culture. Working with processes would have provided that common experience and ways of communicating which then led in part to a fully developed language.



A 'cave' family sitting around a fire.

As I have written earlier, working with processes would also have led to an understanding of linear time, since all processes involve linear time (past-present-future and duration) in their step-by-step procedures. And this understanding of time was critical for the development of a full language, the development of culture and for achieving modern human behavior.

"Time reference is a universal property of language..." Jacqueline Lecarme, Ph.D., Linguistics

The death of a tribe member.

It is also possible that various rituals were based on the idea of processes. When a person died, for example, a certain ritual, which had to be performed in a specific order, was required. Such a ritual conformed in many ways to the step-by-step sequences in a process. But in this case, the desired outcome of the process was to influence spiritual or supernatural elements.

AFTERWORD

The Consequences Of Developing Processes

Working with and using processes had many ramifications besides an understanding of time and a possible language associated with it.

Working with processes meant that hominins were discovering different qualities in different materials. Some rocks broke apart to make a tool with sharp edges, for example, but most did not. As a result, hominins may have felt that each material had its own nature or as we would say its own properties.

Working with processes also meant that humankind was now beginning to make the environment adapt to its needs rather than humans adapting to the environment, like most of nature.

"The Oldowan [ED: i.e., the first stone tools] **represents the first instances of technological innovation in human history, wherein our ancestors first began to enhance their biological abilities with the manufacture of stone tools."**
Turcotte, Cassandra M. "Oldowan Stone Tools." The Center for the Advanced Study of Hominid Paleobiology (CASHP).
http://www.bradshawfoundation.com/origins/oldowan_stone_tools.php

Eventually, this may have led to a sense that people were different from the other animals and separate from nature which in turn led to a sense of separateness and superiority. This was both empowering and frightening. The basic sense of connectedness to nature had been altered and humans would have to find a way to mend that gap.

This then may have led to an animistic sensibility which the study "Hunter-Gatherers and the Origins of Religion" (reference below) said could have existed even before a fully developed language. Everything in nature had different properties and it was the task of hominins to understand or discover what those properties were.

Each person and each element in nature was seen to be alive with a unique spirit of its own. So this may have given rise to an animistic sensibility which is now seen as the most basic spiritual state (see reference next) although it is not a religion. This eventually, however, may have led to the beginnings of religion. In this view, animals, trees and rivers would have been seen as having a spirit, just like human beings but each with its own nature. And it was the job of humans to understand this nature and to work with it.

"Results [of our study] **indicate that the oldest trait of religion, present in the most recent common ancestor of present-day hunter-gatherers, was animism... [Next a] belief in an afterlife emerged..."**
Peoples HC, Marlowe FW, Duda P. "Hunter-Gatherers and the Origins of Religion." Department of Archaeology and Anthropology, University of Cambridge, Cambridge, UK. Published online: 6 May 2016 open access at Springerlink.com.
https://link.springer.com/article/10.1007/s12110-016-9260-0

Eventually, the loss of connectedness may have led to the beginnings of religion, which was, in part, an attempt to bridge that gap: to find an explanation about why humans were different from the rest of the animal kingdom and to console people about the inevitability of death.

Speaking about the much later Paleolithic temple, Gobekli Tepe, Charles Mann "suggests that the human impulse to gather for sacred rituals arose as humans shifted from seeing themselves as part of the natural world to seeking mastery over it."
Mann, Charles. "The Birth of Religion." National Geographic Magazine, June 2011, https://www.nationalgeographic.com/magazine/2011/06/gobeki-tepe/

About Animism
"Our results reflect Tylor's(1871) belief that animism was the earliest and most basic trait of religion because it enables humans to think in terms of supernatural beings or spirits. Animism is not a religion or philosophy, but a feature of human mentality, a byproduct of cognitive processes..."
Peoples HC, Marlowe FW, Duda P. "Hunter-Gatherers and the Origins of Religion." Department of Archaeology and Anthropology, University of Cambridge, Cambridge, UK. Published online: 6 May 2016 open access at Springerlink.com.
https://link.springer.com/article/10.1007/s12110-016-9260-0

About Reconstructing The Past
"Giambattista Vico [ED: a history philosopher] **believed that every theory must start from the point where the subject of which it treats began to take shape."**
Whitrow, Gerald James. *Time in History: Views of Time from Prehistory to the Present Day*. Oxford, UK, Oxford University Press. 1988, page 150.

Article #8
Overcoming Gender Bias in Paleolithic Research:
Gender Bias May Have Prevented Paleolithic Basket-Weaving Technology From Being Recognized And Accepted

My now-famous grandaunt, Mary de Garis, with other Melbourne Hospital residents.
In 1907 she was one of the first women to earn an M.D. degree in Australia.
(University of Melbourne, Mary de Garis)

ABSTRACT:
An early invention of basket-weaving technology was not considered possible until recently. There were two principal reasons. The first was that no evidence of basketry had been found that was older than about 15 kya. And the second reason, which was consistent with the first, was that baskets would only have been made in the Neolithic agricultural time

period because this time-consuming craft would not have been practical in the earlier period of the Upper Paleolithic nomadic hunter-gatherer tribes. Making baskets would have required too much time and therefore was incompatible with the constant search for food in mobile nomadic cultures.
However, both of these ideas were seriously flawed. No evidence of basket making or weaving was found because fiber materials would have decayed. And the second reason was an assumption that was not based on fact and was later proven to be wrong.
But there was a third and I believe more important reason which no one articulated and which was an unconscious bias. Around 1900, when these ideas were being formulated, basket-weaving was seen by the men, who were excavating caves, as 'women's work'. And the work of women was not considered important. In addition, few men were familiar with even the most basic basket making skills. For these reasons the importance of basket-weaving was dismissed out of hand until positive proof was found that it existed much earlier -- proof that would be almost impossible to find -- but which now has finally been found.
However, around 1900 there was ample evidence that clearly pointed to the possibility that basket making had occurred very early and needed to be considered. In this article, I discuss Native American Indian basket making skills, skills that were used extensively by pre-Neolithic nomadic and semi-nomadic hunter-gatherer tribes. And I also detail the large number of basket making tools that were found in Paleolithic caves and sites but which were not identified as such.
It might be vitally important to understand when basket-weaving began because the technology, and development of basket-weaving may have affected human evolution and human culture in much the same way as stone tool making. My contention is that gender bias prevented this important line of inquiry from going forward.

FOREWORD

"Why basket-weaving can't get no respect..."
with apologies to Rodney Dangerfield

A MAYAN MYTH

"Myth has it that Our Grandmother the Moon, the goddess Ixchel, taught the first woman how to weave at the beginning of time. Since then, Maya mothers have taught their daughters, from generation to generation uninterruptedly for thousands of years, how to wrap themselves around the loom and produce exquisite cloth." (Mayan Hands, 2020)

I use this mythological story as an example of how the skill of weaving was passed down from mother to daughter and the reverence with which it was regarded. While this particular myth deals with textiles, which is a more recent craft than basket-weaving, there are similar myths about basketry.

NOTE:

Unfortunately the term, basket-weaving, does not convey the full power, capabilities and versatility of this technology. For example, Native American Indians had over 80 uses and configurations (see the Appendix). In addition I believe that basket-weaving and textile weaving were closely related. Textile weaving probably evolved from basket-making. I have suggested the term woven-fiber technology as a better name.

INTRODUCTION

After I wrote my blog-post entitled "The History and Final Acceptance of a Rejected Idea: Basket-Weaving in the Paleolithic Era," I was still puzzled about why it took paleoarchaeologists about 100 years to accept that baskets, which were made in all cultures and which were made with a wide variety of natural materials that were available worldwide, had not been considered as possible tools during early human development in the Paleolithic era.

Read My Earlier Article
https://deconstructingtime.blogspot.com/2020/09/the-history-of-rejected-idea-basket.html

PART 1: BASIC ASSUMPTIONS AND BIASES

When I researched the topic some more, two things jumped out.

#1. The first was that paleoanthropologists and paleoarchaeologists assumed that something as intricate and time-consuming as basketry could only have been done in the sedentary environment of a farming culture, beginning in the Neolithic era. They believed basketry would have been impossible for mobile nomadic hunter-gatherers or semi-nomadic pre-Neolithic people who were on the move and who had less free time due to the constant pressures of looking for food. And since no baskets had been found that were older than the Neolithic era, this confirmed the idea.

"The conventional wisdom has been that a time-consuming task like weaving would only be practiced by sedentary, agrarian cultures." [ED: Which generally means the more recent Neolithic era and not the earlier Paleolithic era.]
From an interview with Dr. James Adovasio. (Menon, 1996)

#2. And the second thing was an unconscious bias that virtually all educated Western men in archaeology and paleoanthropology shared at the time when this field of study was taking shape around 1900. The bias was so deep and so widespread it was taken for granted. And since it was for the most part unspoken and not addressed, it was hard to identify. This bias was that baskets were 'women's work'. And while basketry might be decorative and supplemental to a culture, it was not important. So in general this work of women was seen as peripheral but not central.

NOTE:
I say all educated Western 'men' in archaeology and paleoanthropology because around 1900, when these ideas were starting to become fixed in paleolithic research, virtually all these professionals were men. It was not until 1929, for example, that Margaret Mead became one of the first women to earn a PhD in Anthropology.

LEFT: Pomo Basketmaker (Aboriginal American Basketry, 1904, Plate 12, explanation p. 222)
RIGHT: Pomo Basket In Tee Weave (Aboriginal American Basketry, 1904, Plate 173, explanation p. 454)

ABOUT THESE ASSUMPTIONS AND THEIR IMPORTANCE

Neither of these assumptions was based on science or scientific evidence. And furthermore, evidence to prove that these ideas were wrong was available in the early days of paleoarchaeology, i.e., around 1900. So in this article, I will focus further on the thinking around 1900 because that is when these attitudes became set in stone.

Surprisingly these two assumptions were intertwined and formed a barrier to scientific inquiry when the age of basketry or weaving or fiber structures was involved. The lack of evidence that basket-weaving was older than about 15 kya seemed to confirm that basket-weaving was a more recent technology and therefore not as critical to the evolution of humans as stone tool making, for example, which began perhaps 2 million years ago.

This barrier was not crossed until recently when Drs. Soffer & Adovasio were able to conclusively prove what seemed impossible, i.e., they found concrete datable evidence of weaving and basketry in the Upper Paleolithic era about 27,000 years ago.

Today the long-overdue acceptance of evidence about basket-weaving in the Paleolithic era rewrites a considerable amount of history. If basket-weaving is much older, perhaps as old as the making of stone tools, it is a game-changer. It is so important it could alter the story of human evolution, human cognition, and the development of culture along with our understanding of who we are, what we believe, and how we got to where we are today.

ABOUT GENDER BIAS

What are little boys made of?
Snips and snails, and puppy dogs' tails; That's what little boys are made of.

What are little girls made of?
Sugar and spice and all that's nice, That's what little girls are made of.

"Gender bias is an insidious problem throughout society. It arises most obviously through deliberate discrimination but also EXISTS THROUGH WIDESPREAD UNCONSCIOUS BIAS [ED: My emphasis]**. This permeates our culture, our workplaces, and even our language, often in ways we are unaware of." (arXivarchive, 2018)**

I would suggest that it goes even further. Scientific ideas or theories that involve the role of women or the products that women produce are often dismissed as unimportant. And evidence to the contrary must often meet difficult tests that include a higher standard than that required for male-oriented ideas.

This classic well-designed study at Yale University clearly shows how gender bias operates.

"Researchers at Yale published a study proving that physicists, chemists and biologists are likely to view a young male scientist more favorably than a woman with the same qualifications. Presented with identical summaries of the accomplishments of two imaginary applicants, professors at six major research institutions were significantly more willing to offer the man a job. Surprisingly, female scientists were as biased as their male counterparts." (Pollack, 2013)

In another example, women who were applying for a job in a scientific field reported that they had to go the extra mile:

"Those interviewed also recognized Prove-It-Again! bias, which requires women to provide more evidence of competence than men in order to be seen as equally competent..."You know that the rule only applies to the people it applies to," observed one woman. 'Generally speaking, women—and women of color—would be strictly held to rules and then some.' " (Williams, 2014)

THE CONSEQUENCES

An unspoken rejection of the idea that basket-weaving could have begun much earlier than previously thought, i.e., in the Middle and Lower Paleolithic eras, means that there will be fewer students who pursue this idea, there will be little research to build on and there will be little, if any funding, for such research. Furthermore, students will be reluctant to follow such a path as it will affect their careers.

THE PROBLEM OF FINDING EVIDENCE

After reading an almost forgotten book by noted French archeologist Gustave Chauvet, Dr. Paul Bahn wrote in 2001 that, "It is a long overdue development that, 90 years after Chauvet's publication, prehistory seems ready to at last accept the probably HUGE IMPORTANCE OF BASKETRY [ED: my emphasis] **and simple weaving in the Upper Palaeolithic." (Bahn, 2001, pp. 271-272)**

Speaking about the lack of archaeological interest in basketry, mats, and textiles, Grace M. Crowfoot wrote the following in *A History of Technology, Volume 1*.

"In considering gaps in the knowledge of textiles, it must be remembered that there are vast areas where little archaeological study has been undertaken...Surviving pieces of rag were often rejected as without interest...Determination of the exact botanical origin of the fibres used in basketry and weaving has only quite recently been recognized as of archaeological importance." (Crowfoot, 1954, Kindle Edition location = 8905)

When he was just learning about early fiber constructions, Dr. Adovasio wrote that he familiarized himself,

"Not only with the incredible technical diversity of prehistoric basketry, but also [developed] an ever-escalating appreciation of what one of my colleagues, Bob Bettinger, call[ed] "soft technology." Significantly, and in sharp contrast to lithic

[e.g. stone tools] or durable technology--which is usually the province of males--basketry, cordage, netting, and related plantfiber-derived products are often the work of females. Almost unconsciously, at least at first, I was developing a view of past societies and their actions that was by default far more oriented to female activities as opposed to the macho-male orientation derived from stone tools." (Adovasio, 2006, p. 37)

"The Upper Paleolithic record has largely been interpreted by males who are closet macho hunters of the steppes--if not explicit ones, he says. Their emphasis has been on stone technology, large-animal hunting, and the accoutrements of machismo. Weaving isn't as exciting as running around sticking things into mammoths."
From an interview with Dr. James Adovasio. (Menon, 1996)

PROVING THE IMPOSSIBLE

All experts and professional paleo-researchers knew that finding evidence of fiber constructions that were older than 15 kya was virtually impossible, as fiber materials decay and leave no trace. Yet Drs. Soffer and Adovasio were able to breach the barrier because they found clear fiber impressions in clay that could be dated. What follows next is an account of their find, derived from a New York Times article entitled "Find Suggests Weaving Preceded Settled Life" by Brenda Fowler in 1995.

At the Society for American Archeology, Dr. Olga Soffer of the University of Illinois at Urbana and Dr. James M. Adovasio of Mercyhurst College in Erie, Pa. announced they had finally found what they had been looking for -- a quest that had occupied most of their professional lives.

Dr. Soffer had found pieces of clay with clear impressions of the earliest fabric artifacts -- the first to be confirmed from the Paleolithic time period. Since the impressions were so small they could not tell whether these were from textiles or from baskets. The leading world paleo-fiber expert, Dr. Adovasio, confirmed the find.

This one discovery pushed back the beginnings of these 'soft' technologies about 10,000 years well into the 'old stone age' and well beyond the Neolithic or 'new stone age' when everyone in the field had assumed that textiles and weaving had begun. These new findings have now been dated to 27,000 years ago.

When the clay impressions were examined closely they revealed at least two different weaving techniques. Dr. Adovasio commented that the regularity of the

weave and the 'narrow-gauge' indicated that the technology was quite advanced so that the origins of weaving must have begun much earlier.

But this discovery may have pushed back the origins of human culture even further, perhaps hundreds of thousands of years further, because this find opened the door deep into the Paleolithic era which spanned two million years.

Dr. Soffer also noted that the clay fragments revealed a surprising variety of weaving techniques such as open and closed twines, nets, and plain weave. The intriguing thing about the plain weave impression was that it required a loom. This fact alone meant that 'old stone age' nomadic people were making fiber constructions with a basic loom -- something that again was thought impossible. (Fowler, 1995)

ASSUMPTIONS ABOUT GENDER ROLES IN 1900

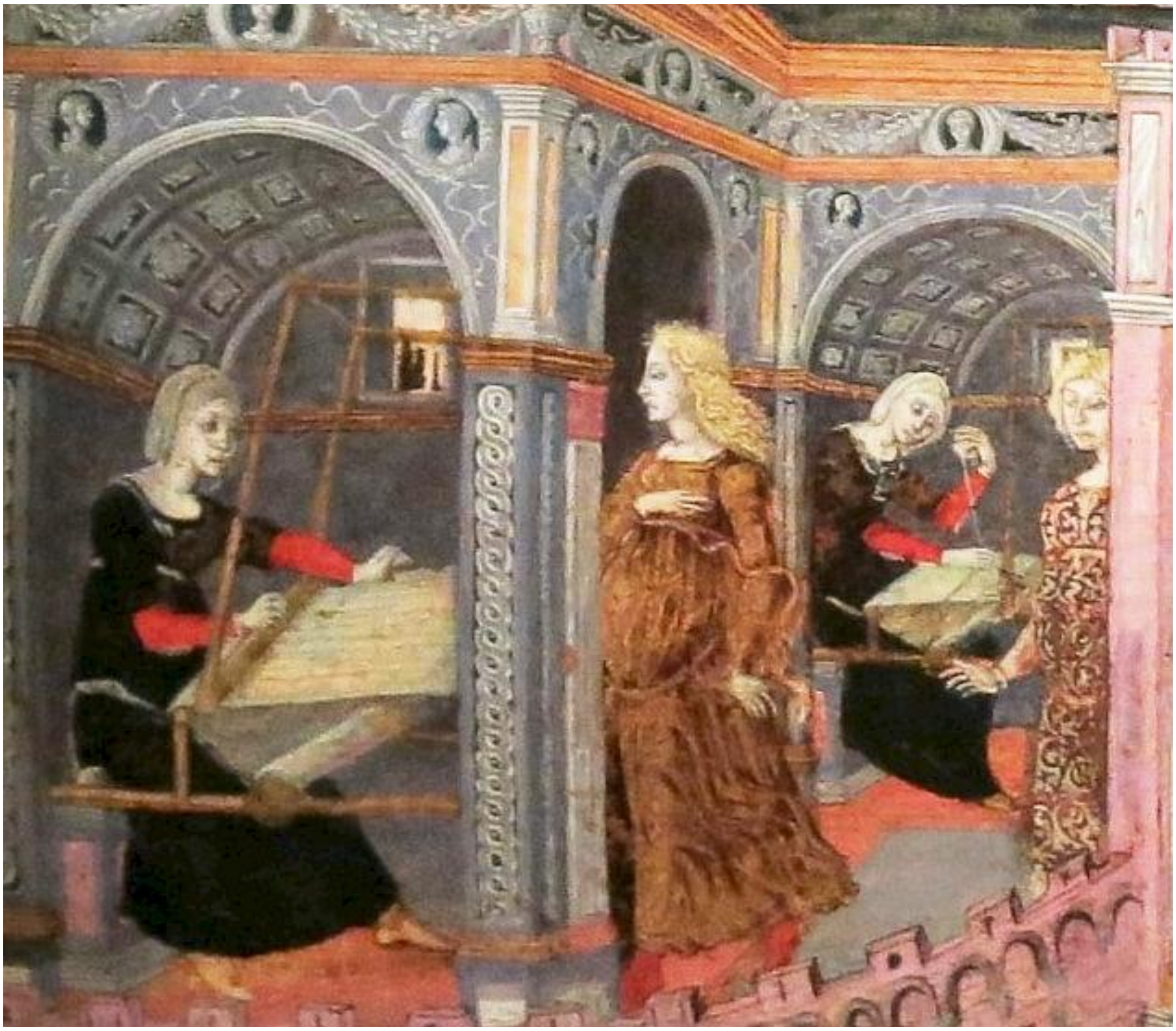
It is hard to document and pinpoint an attitude that was unspoken around 1900. People just assumed that women's roles and the value of their work were a reflection of the real world, the world the way it was, the world that no one could change.

Queen Victoria set the tone by saying, "Let women be what God intended, a helpmate for man, but with totally different duties and vocations."

Queen Victoria's mention of 'vocations', however, does get close. Some less important tasks or subjects were appropriate for women (such as being a nurse but not being a doctor), while the important male jobs were not appropriate. Women were told to "know their place" and the assumption was also that work associated with them mattered less than the work and duties of men.

(University of Melbourne, Mary de Garis)
My now-famous Australian grandaunt, Mary de Garis (above), was the second woman in Victoria, Australia to earn the Doctorate of Medicine at the University of Melbourne in 1907. When the First World War broke out in 1914, she volunteered to work in military hospitals but was famously told to “go home and sit still” which, of course, she did not do. She instead went to Scotland where women doctors were allowed and became the director of a front-line hospital. She was well known for her nerves of steel such as performing an operation during an artillery bombardment. (Moo, Women Doctors)

As historians know, women are not mentioned very often in the historical record. Women and their work were almost invisible, although they obviously lived at the same time as their men.



"Penelope in front of her loom, painting on chest panel, 15th century,
National Renaissance Museum, Ecouen."
(Commons.wikimedia.org, 15th century, Penelope)

There were, of course, a few tales of women's deeds such as the faithful Penelope who waited for Odysseus for twenty years and kept suiters at bay by making them wait for her to complete a burial shroud which she secretly unraveled each night.

I believe that in the West women's work was taken for granted. As a result, men did not know much about it or want to know or felt the need to know. And for this reason, basket-weaving -- since this is the subject of this article -- was not really dismissed as unimportant, it was never even considered.

The above outline of the attitudes toward women and women's work around 1900 may explain, but does not excuse, the reason that basket-weaving was not valued as an important technology that helped the human race survive, although stone tool

making, a male technology, did achieve such a status. Basket-weaving was also a tool-making technology, but it was not perceived as such.

MISCONCEPTIONS

Another misconception may have been due to the artwork found in many baskets, such as those by Native American Indians in North America. They often contained exquisite designs that were collected and admired for their beauty. But for the Indians, the designs were often cultural signatures derived from their tribes and they also had a spiritual meaning relating to the importance of the basket to their way of life. Western authorities probably thought of these as merely decorative and did not understand the baskets were also useful and well made.

THE CRUX OF THE PROBLEM

It was obvious to most paleoarchaeologists that finding direct evidence of weaving or basketry that was much older than the Neolithic era of sedentary farming would be almost impossible. Nevertheless, at the same time, it was clear that earlier Paleolithic humans used plant materials extensively to help them.

"In whichever way archaeological remains are interpreted, one must always be aware that the vast majority of the materials with which prehistoric people were surrounded and with which they worked is lost to us today. ...organic materials start to decay as soon as they are deposited in the ground." (Grömer, 2016)

Dr. Adovasio has made the point that there is "ample ethnographic evidence that perishable technologies form the bulk of hunter-gatherer material culture even in arctic and sub-arctic environments (e.g. Damas 1984; Helm 1981). Archaeologists working with materials recovered from environmental contexts with ideal preservation clearly confirm that this is also true for the past as well. Taylor (1966:73), for example, notes that in dry caves he recovered 20 times more fiber artifacts than those made of stone, Croes (1997:536) reports that wet sites yield inventories where >95% of prehistoric material culture is made of wood and fiber, and Collins (1937) confirms the same for sites in Alaskan permafrost." (Soffer, Adovasio et al, 1998)

Nevertheless, the idea that direct evidence, direct proof of weaving or basketry had to be found became a fixture in paleolithic research. Yet finding such evidence was virtually impossible since fiber decayed. So it was this hurdle that prevented research or hypotheses about an early development of weaving and basketry.

But I believe this was a variation on the "Prove-It-Again!" (mentioned earlier) requirement for ideas that authorities unconsciously rejected. In other words, the idea of an earlier basket-weaving technology had to meet a standard that was not required of other hypothetical ideas such as the currently popular 'savanna hypothesis' which has no direct proof but has a large following.

"The savanna hypothesis is a hypothesis that human bipedalism evolved as a direct result of human ancestors transition from an arboreal lifestyle to one on the savannas."
(Savanna hypothesis)

In a current example of gender bias, it was recently confirmed that a number of prehistoric hunter-gatherer women were buried with big game stone-age weapons which indicated that they might have been big game hunters themselves. While this data had been available for years, it had been overlooked due to the perception that women could not be these kinds of hunters.

"Marin Pilloud, an anthropologist at the University Of Nevada, Reno...tells *Live Science* that many cultures don’t share the same concept of the gender binary as modern Americans and Europeans. She adds, 'When we step back from our own gendered biases we can explore the data in nuanced ways that are likely more culturally accurate.' " (Gershon, 2020)

GENDER BIAS CONSEQUENCES

It is true that in many societies, basketry and weaving were done by women -- although there were plenty of exceptions. In some tribes, the men made nets that the women did not make, for example. So it was not a mistake to think of basket-weaving as a craft performed mostly by women.

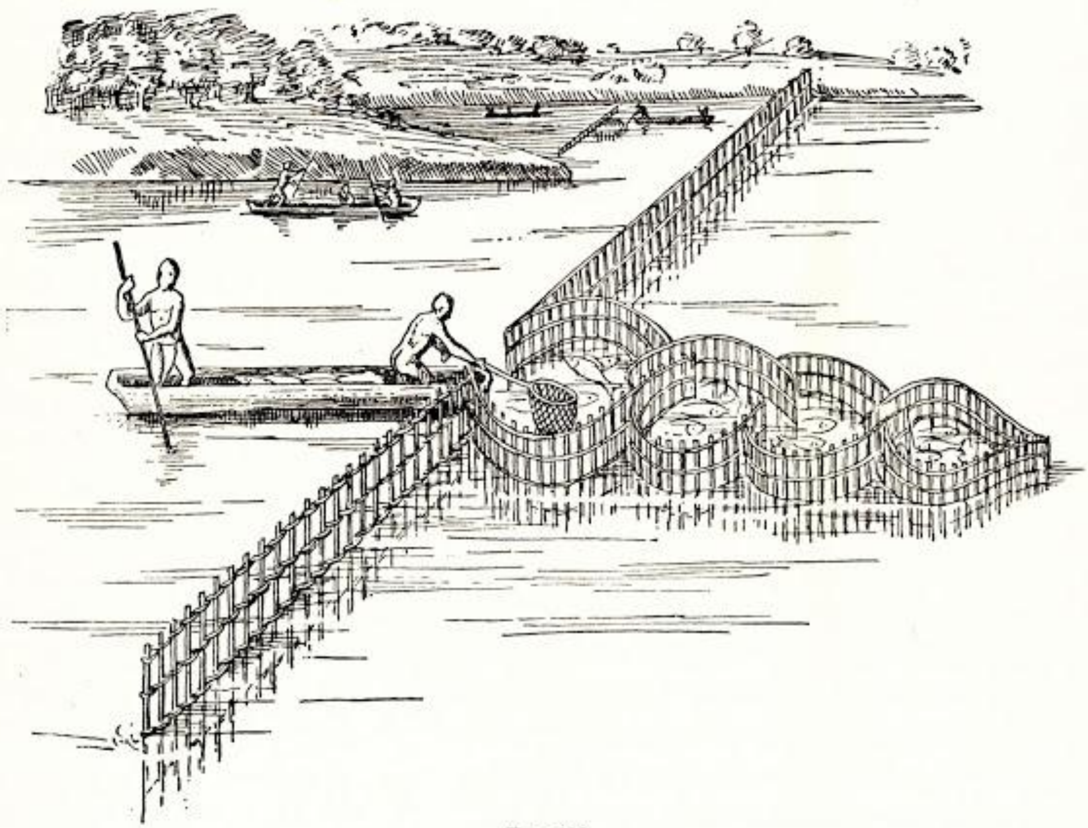


Fig. 120.
TWINED FISHTRAP.
Virginia Indians.
After Thomas Hariot.

Virginia Indians using a woven twined fishtrap, weaving that may have been done by men.
The drawing is after Thomas Hariot, ca. 1585.
(Aboriginal American Basketry, 1904, Fig. 120, p. 383)

However, whether basketry was women's work or not was irrelevant. It was a mistake to think that basketry was not important and possibly crucial to the evolution and development of the human race. And it was a mistake to think that this work was not well respected. And it was a mistake to think that women could not have developed a refined, sophisticated, 'hi-tech' kind of technology.

To have let this bias stand in the way of research and archeology did science a disservice -- and further it handicapped science. Science should be objective and gender-neutral. If we really want to understand how humans evolved and how we became what we are today, a gender bias stands in the way of truth.

"Throughout much of the history of the study of the Paleolithic and Paleoindian periods we have given ourselves over to a narrowed idea of lifeways revolving around big game, stone tools, and manly behaviour. What is becoming increasingly apparent as we restudy materials from previously excavated sites is that the diversity we take for granted in the ethnographic present and our current modern world may well have been a hallmark of previous lives as well. We must continue to

think "out of the box" and "beyond the idol" that has constrained our understanding of the ancient world." (Hyland et al, 2002, p. 8)

PART 2:
WAS THERE EARLY EVIDENCE
THAT BASKET-WEAVING
BEGAN BEFORE THE NEOLITHIC?

BASIC QUESTIONS

Based on the widely-held presumption in 1910 "that, in the view of most prehistorians, there was no Magdalenian weaving, [ED: Upper Paleolithic/Mesolithic] **and there is no question of basketry before the Neolithic.** [ED: sedentary farming and agriculture]**" (Bahn, 2001, pp. 271-272) and also the general opinion that nomadic hunter-gatherer groups would not have had the time to make baskets, several key questions needed to be answered to refute this opinion with evidence that was available at the time.**

An Explicit Question based on the above:

#1. Was there any substantial evidence that basket-weaving was compatible with pre-Neolithic, i.e., pre-sedentary agricultural farming societies?

Implicit questions that the above presumes:

#2. Was basket-weaving important or essential to the life and survival of cultures where it was found?

#3. Was the technology of basket-weaving well developed and sophisticated where it was found?

If the answers are all yes to the above, then the next follow-up questions need to be asked:

#4. How much earlier could basket-weaving have begun than was previously thought?

#5. If basket-weaving began much earlier, how could it have affected human evolution and cognition?

A LITTLE BACKGROUND

Keeping in mind that there is no clear division between different eras of human development, the following time periods are used in Paleoanthropology to roughly map out the evolution of human beings and cultures. Generally, earlier cultures had less advanced technologies and later ones more advanced -- although it has been found recently that some advanced technologies have been found, on occasion, in earlier cultures.

Upper Paleolithic = Small bands of mobile, nomadic hunter-gatherers who moved often in search of food but made advanced stone tools and some made magnificent complex paintings on cave walls.

Mesolithic = After the Upper Paleolithic era and before the Neolithic, Mesolithic (Middle Stone Age) societies were larger, semi-nomadic, hunting and gathering along with farming, but often practiced farming seasonally and moved seasonally.

Neolithic = The beginning of permanent villages and a sedentary way of life based on agriculture. The use of advanced polished stone tools also characterizes this period.

Archaic = A lifestyle by Native American Indians that existed right up to 1900 that was similar to the Mesolithic (pre-Neolithic) cultures in Europe. Indian tribes described as semi-nomadic often fall into this category.

The stone age semi-nomadic way of life of some 1900s Native American Indians was called Archaic. "Some Archaic cultures...persisted well into the 19th century. Archaic cultures in the Americas are somewhat analogous to the Old World's Mesolithic [pre-Neolithic] cultures."
https://www.britannica.com/topic/Archaic-culture

Paleoindian = Early Native American Indian cultures that were similar to the Upper Paleolithic in Europe. Prehistoric evidence was found in the Great Basin areas in the northwest United States and these cultures are considered to be very similar to those of the European Upper Paleolithic. Furthermore, evidence from excavations revealed a wide variety of basketry that had survived due to the dry climate and due to the fact that the Paleoindian cultures were dated to about 11,000 BP which meant that basketry could have survived.

EVIDENCE OF BASKETRY WITH PRE-NEOLITHIC PEOPLES

There was solid evidence around 1910 that many Native American Indians lived a pre-Neolithic lifestyle and also had a fully developed basket-weaving technology. This was clear from contemporary living tribes who lived a Mesolithic (pre-Neolithic) way of life and others who lived an Upper Paleolithic nomadic hunter-gatherer way of life.

The following book, published in 1904 by the Smithsonian Institution, contained detailed information about Native American Indian basket-weaving along with numerous photographs and illustrations. Many of the Indian tribes were semi-nomadic and others were nomadic hunter-gatherers or they had recently been nomadic hunter-gatherers until they were forced onto reservations where their mobility was limited. The information in this book contained more than enough detail to bring into question the Neolithic limit to basket-weaving.

Aboriginal American Basketry: studies in a textile art without machinery. **Contributors: Mason, Otis Tufton; Coville, Frederick Vernon. Annual Report of the Board of Regents of the Smithsonian Institution; Report of the U.S. National Museum. Washington: Government Printing Office, 1904.**
https://archive.org/details/aboriginalbasket00masorich

NOTE:
In 1904 this book, *Aboriginal American Basketry,* listed over 250 Indian tribes (pages 367-372) that had a basket-weaving culture. Most of these cultures were Archaic (see above) but some were farming and sedentary like the Neolithic and some were mobile nomadic hunter-gatherers like the Upper Paleolithic peoples in Europe. Yet all made baskets. (Aboriginal American Basketry, 1904, pp. 367-372)

In 1904 the following tribes, listed next, were documented in this book. These basket-weaving Native American Indian tribes exhibited behaviors consistent with Mesolithic or Upper Paleolithic cultures in Europe, i.e., pre-Neolithic. It would take an anthropologist who specialized in this to map out the exact spectrum but generally speaking, all of these cultures would be considered pre-Neolithic and therefore refute the claim in 1910 "that, in the view of most prehistorians, there was no Magdalenian weaving,[ED: Upper Paleolithic] **and there is no question of basketry before the Neolithic.** [ED: sedentary farming and agriculture]**." (Bahn, 2001, pp. 271-272)**

In the following list of eleven Native American Indian tribes, semi-nomadic (similar to Mesolithic cultures in Europe) make up about two-thirds of the list and nomadic hunter-gatherer (similar to Upper Paleolithic cultures in Europe) make up the other third. I have chosen these tribes because this Smithsonian book includes photos and drawings from these tribes that clearly document my thesis.

These tribes are listed in alphabetical order. Please click on the tribal name to read more about each Indian culture.

*** Apache = nomadic hunter-gatherer**

*** Chemehuevi = nomadic hunter-gatherer**

*** Chippewa = semi-nomadic**

*** Maidu = semi-nomadic**

*** Navajo (or Navaho) = semi-nomadic**

*** Paiute = considered nomadic hunter-gatherer although some tribes were semi-nomadic**

*** Pima (or Akimel O'odham) = semi-nomadic**

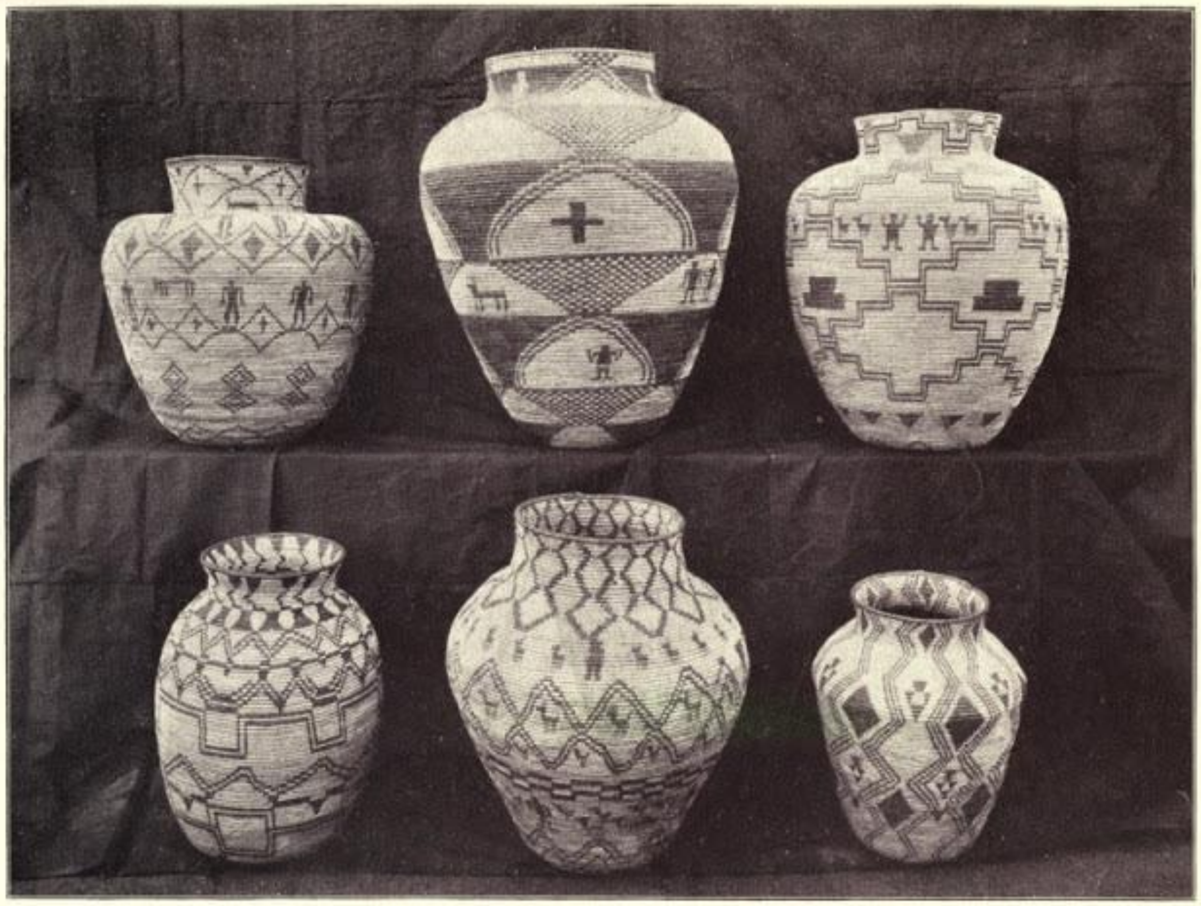
*** Pomo = semi-nomadic**

*** Tlinkit (Or Tlingit) = semi-nomadic**

*** Ute = nomadic hunter-gatherer**

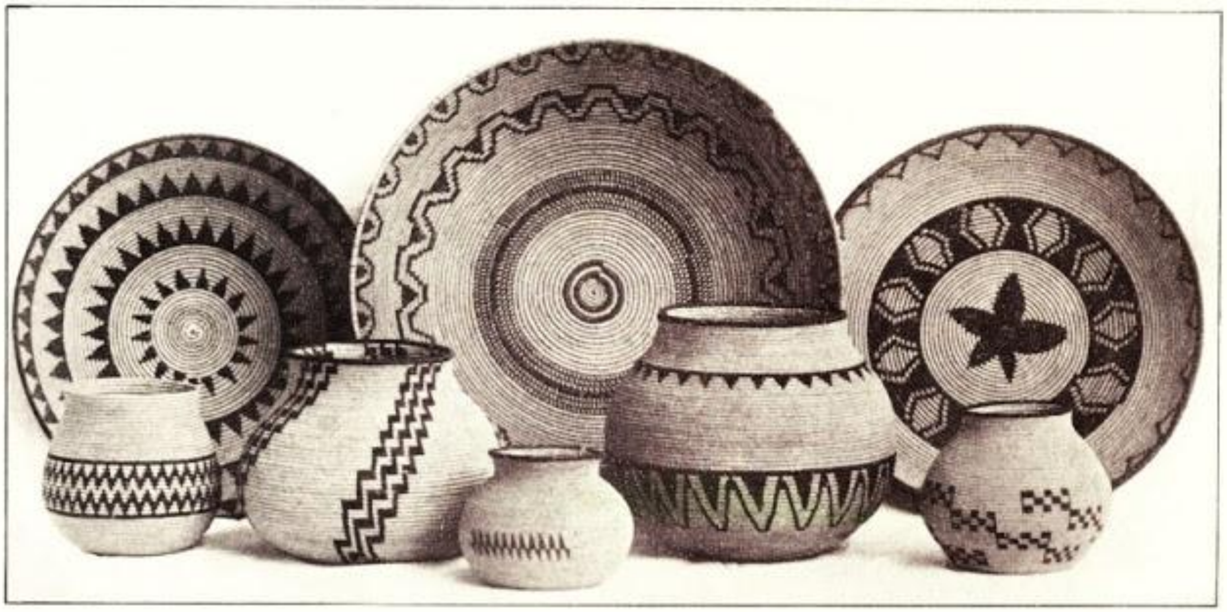
*** Yokut = nomadic hunter-gatherer**

EXAMPLES OF BASKETRY FROM THESE TRIBES



APACHE COILED OLLAS.

Apache coiled ollas (jars)
(Aboriginal American Basketry, 1904, Plate 42, explanation p. 285)

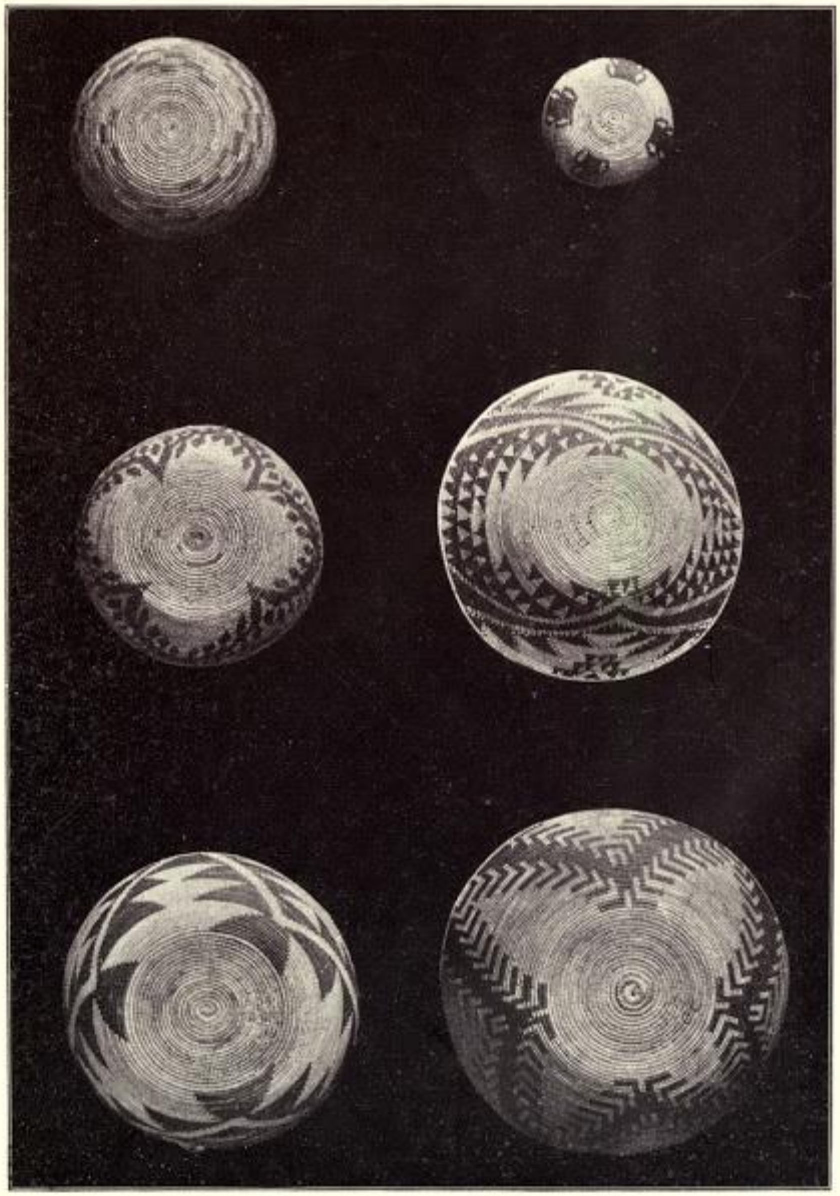


CHEMEHUEVI COILED BASKETS.

Chemehuevi coiled baskets
(Aboriginal American Basketry, 1904, Plate 232, explanation p. 519)

CHIPPEWA BARK MATTING.

Chippewa bark matting
(Aboriginal American Basketry, 1904, Plate 122, explanation p. 374)

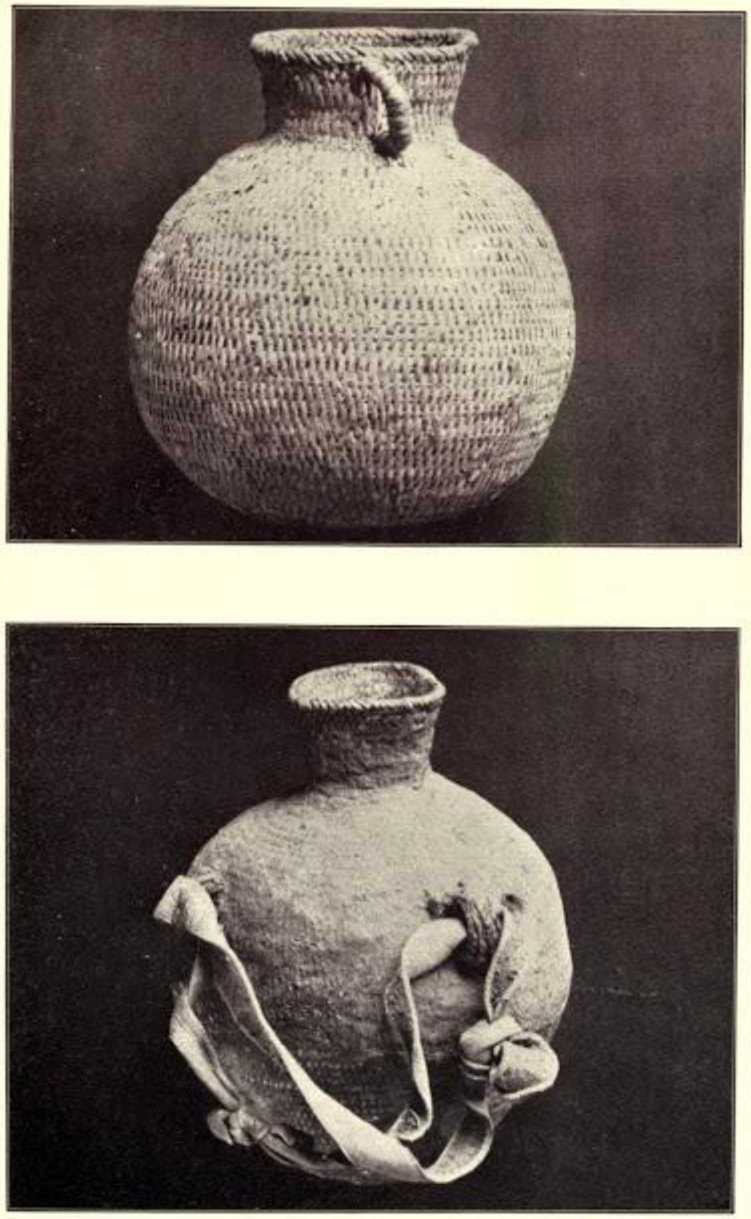


Maidu Coiled Baskets.

Maidu coiled baskets
(Aboriginal American Basketry, 1904, Plate 57, explanation p. 300)

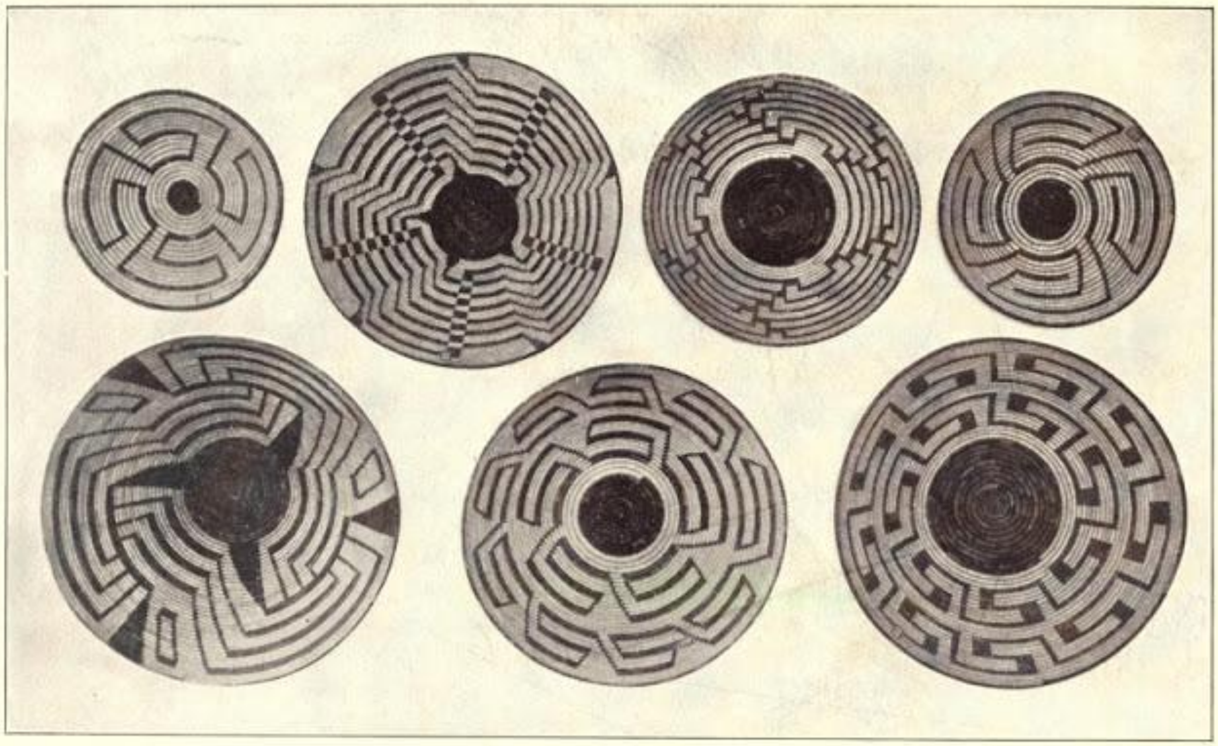
NAVAHO WATER CARRIERS.

Navaho water carriers
(Aboriginal American Basketry, 1904, Plate 118, explanation p. 361)



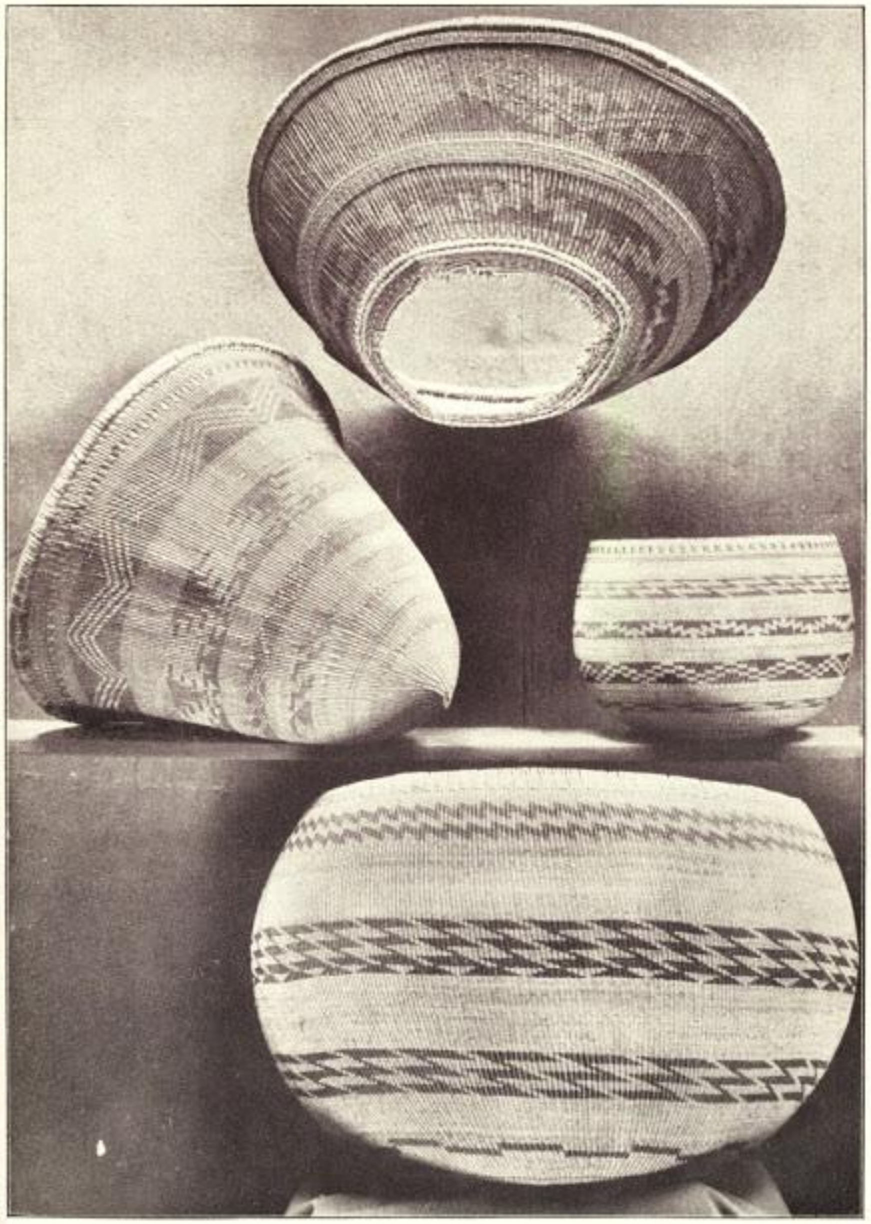
SOUTH UTAH PAIUTE BASKET BOTTLES.

Paiute basket bottles
(Aboriginal American Basketry, 1904, Plate 117, explanation p. 361)



PIMA BASKET BOWLS.

Pima basket bowls
(Aboriginal American Basketry, 1904, Plate 50, explanation p. 236)

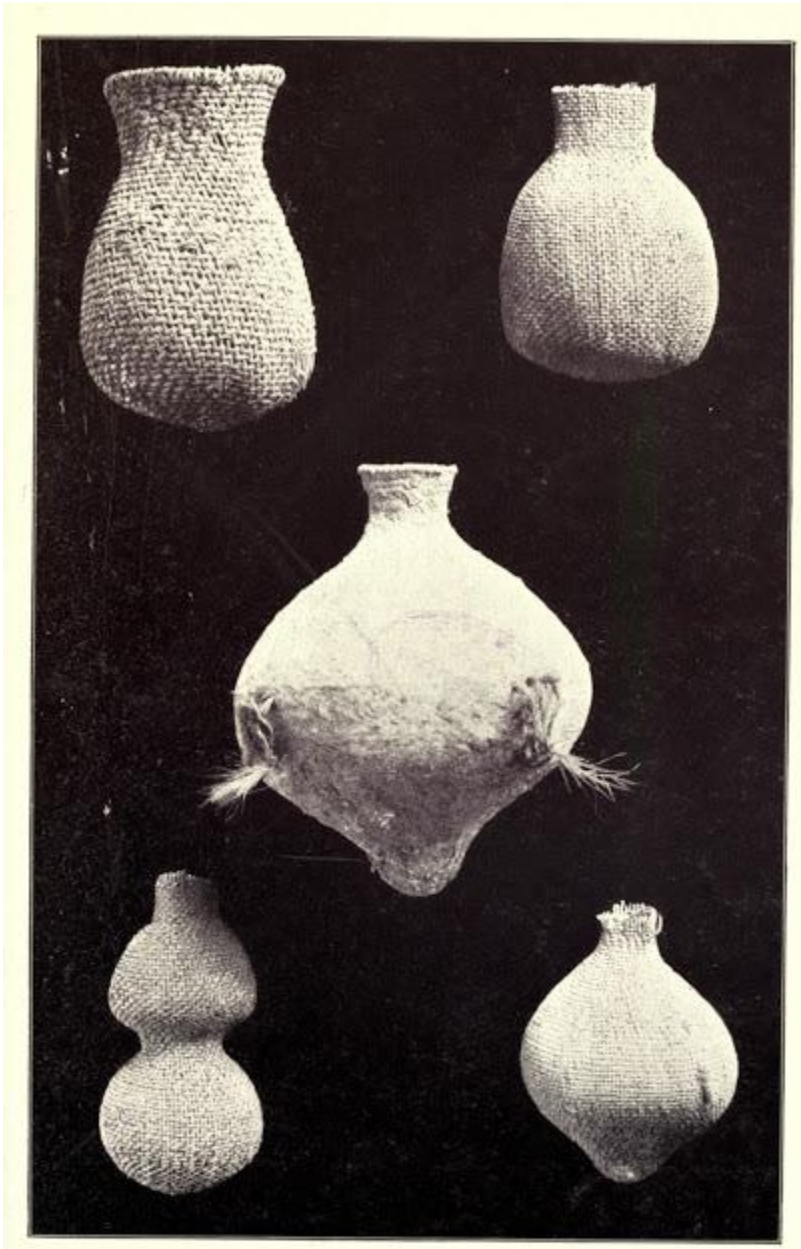


POMO MILLING BASKETS.

Pomo milling baskets
(Aboriginal American Basketry, 1904, Plate 97, explanation p. 350)

TLINKIT TWINED WALLETS.

Tlinkit (Tlingit) twined wallets (soft, folding baskets)
(Aboriginal American Basketry, 1904, Plate 146, explanation p. 409)



UTE TWINED JARS.

Ute twined jars
(Aboriginal American Basketry, 1904, Plate 21, explanation p. 236)

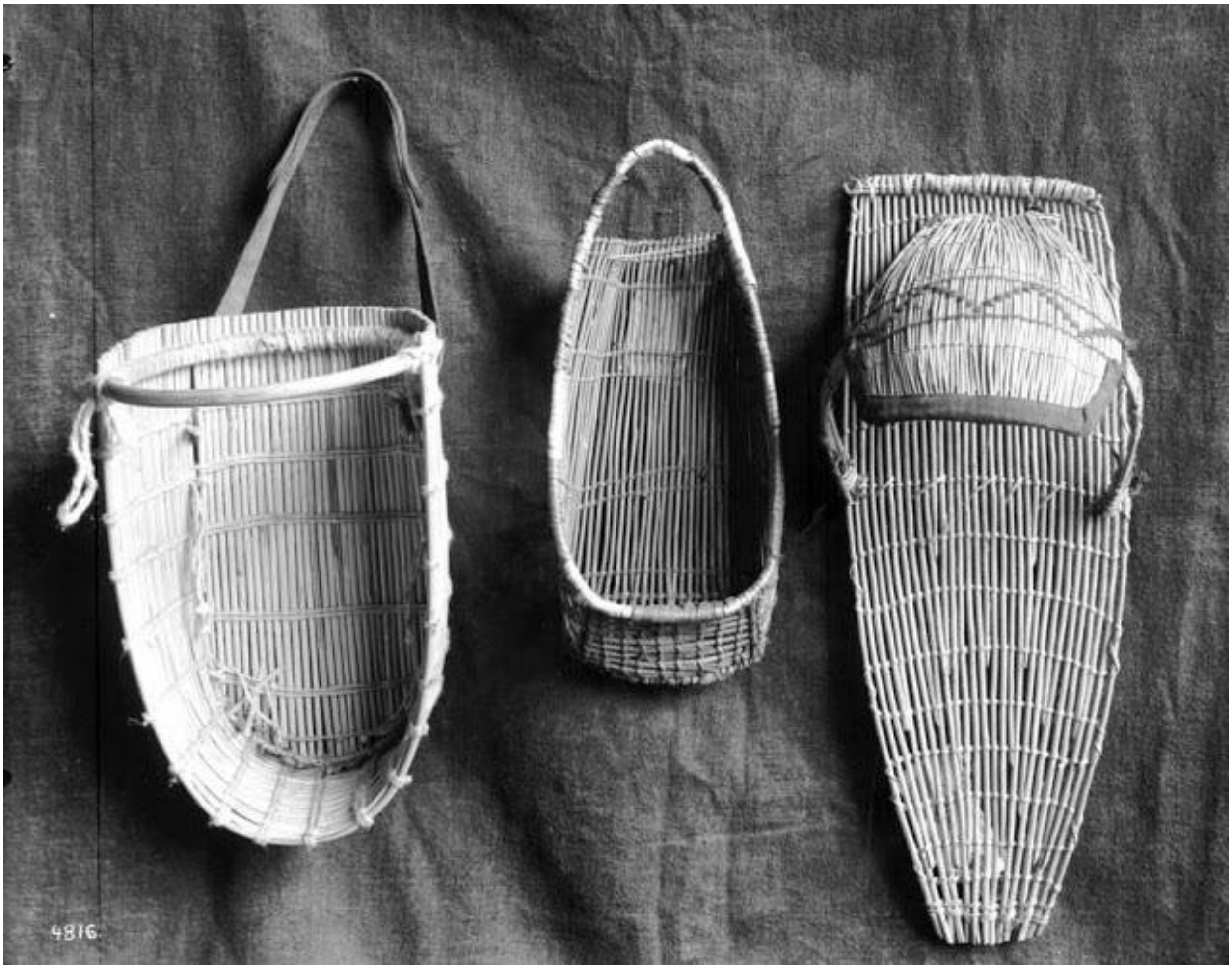
LEFT: Pomo milling baskets
(Aboriginal American Basketry, 1904, Plate 97, explanation p. 350)
RIGHT: Yokut woman sifting meal
(Aboriginal American Basketry, 1904, Plate 99, explanation p. 361)

THE IMPORTANCE OF BASKET-WEAVING TO NATIVE AMERICAN INDIAN CULTURES

So evidence was available around 1900 that clearly showed basketry was well developed and not incompatible with a semi-nomadic or nomadic pre-Neolithic lifestyle.

In fact, the reverse may have been true. Basketry was light, strong, durable, flexible, versatile, and portable which is what nomadic cultures needed. They relied on basketry to provide them with many of the essential items they required -- and so basketry may have been central to their lifestyle.

The Smithsonian *Aboriginal American Basketry* publication made this clear: "Basketry supplied nearly every domestic necessity of the Indians, from an infant's cradle to the richly decorated funerary jars burned with the dead. The wealth of a family was counted in the number and beauty of its baskets and the highest virtue of woman was her ability to produce them." (Aboriginal American Basketry, 1904, p. 335)

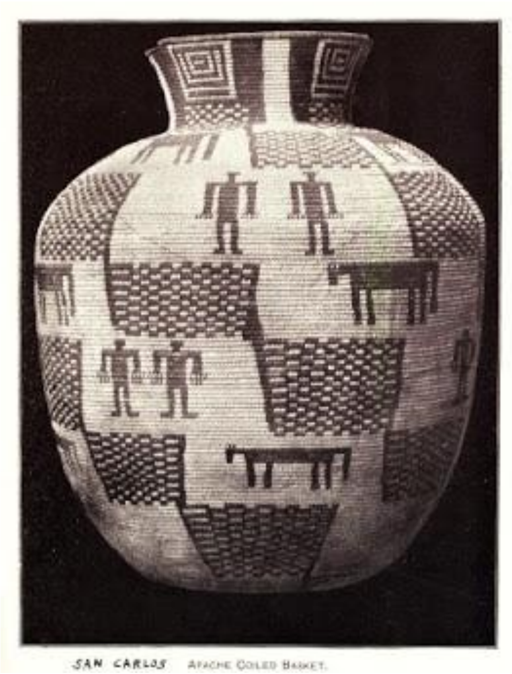


"Three Indian basket papoose carriers displayed against a cloth backdrop, ca.1900" (University of Southern California, ca.1900, Three Indian basket papoose carriers)

If researchers had asked living Native American Indians around 1900, they probably would have said something similar to the following which is from a modern Indian website (Kachina House):

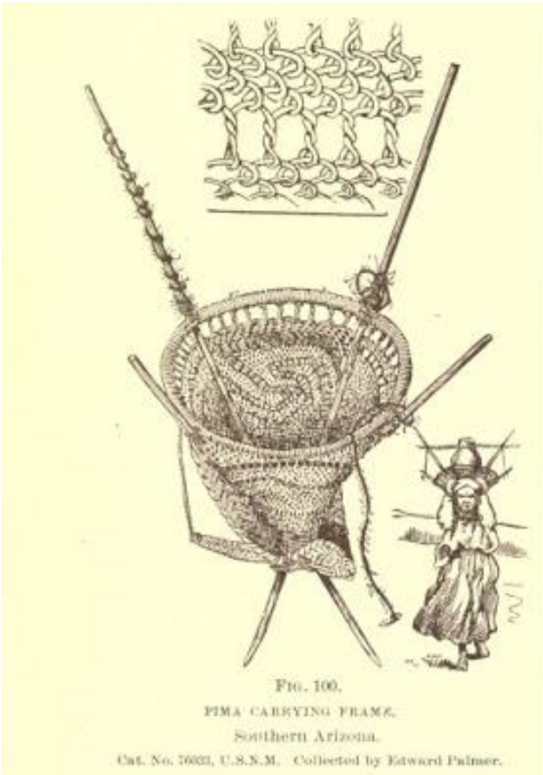
"Basket Weaving's Importance In Native American Culture:
"One of the oldest crafts in Native American cultures is basket weaving. Each tribe has its own Native American specific methods and materials to create woven baskets...In fact, basket weaving can be traced back to the beginning of mankind.
"In a world where there were no cupboards, plates, or bowls to hold your belongings, baskets served as indispensable items that had multiple purposes. They allowed people to carry water, [wear] clothing, [gather and cook] food, and much more.
"In Native American cultures, baskets took the place of every modern convenience we take for granted and also served as a representation of tribes and stories." (Kachina House)

Basket-weaving skills were central to many if not most Native American Indian cultures. "Tribal women provided almost all household tools and utensils, storage containers, cups, and cradles by using one art: basket weaving." (Boule, 1992, p. 38)



LEFT: Apache Coiled Basket
(Aboriginal American Basketry, 1904, Plate 52, explanation p. 297)
RIGHT: "Apache Indian maiden with an olla on her head, ca.1900"
(University of Southern California, ca. 1900, Apache Indian maiden)

LEFT: Carrying Basket, Paiute Indians, Utah
(Aboriginal American Basketry, 1904, Fig. 185, p. 494)
RIGHT: "Apache Indian woman carrying a "Kathak" on her back, Arizona, ca.1880"
(University of Southern California, ca.1880, Apache Indian woman carrying a "Kathak")



LEFT: Pima Carrying Frame
(Aboriginal American Basketry, 1904, Fig. 100, p. 294)
RIGHT: "Pima Indian woman...carrying firewood in her Kathak"
(University of Southern California, 1904, Pima Indian woman)

EVIDENCE THAT NATIVE AMERICAN INDIAN BASKET-WEAVING WAS ADVANCED TECHNOLOGY AND NOT PERIPHERAL OR SUPPLEMENTAL

Basket-weaving was not only part of the nomadic hunter-gatherer lifestyle and central to its culture, but also highly developed. Nevertheless, the sophistication of this craft was not recognized by most authorities in 1900. 100 years ago, I do not think the traditional educated Western male paleoanthropologists understood basket-weaving in any detail. They did not understand, for example, the full range of basket related implements that could be made (see the Appendix). Nor did they understand the various basket-weaving processes which included the critical time of when to gather plants, how to process and store them, and then how to use them when constructing an item. They did not understand that a basket maker could design exquisite baskets with local plants no matter the environment. And they also did not understand the durability of these tools and the precision with which they were made.

As an example, a tradition of very sophisticated coiled baskets was developed by Native American Indian women.

COILING:

The sophisticated technology of coiling:
"Coiling is a technique which involves sewing. A foundation material (such as split root bundles) is coiled upwards and stitched into place. A pointed tool called an awl is used to pierce a hole in each coil. The sewing element (such as the shiny outer surface of a split cedar root) is then threaded through the hole and sews that coil down to the coil below it.
"Coiled baskets can be woven so tightly that they hold water. In the past, coiled baskets were also used for cooking." (Burke Museum, Teacher's Guide)

One skill that was particularly valued, was the ability to make baskets that were waterproof containers. Depending on what resources were available, they used naturally occurring asphaltum which was common in many areas as a sealant or resin from pine or mesquite trees.

WATERPROOFING:

"The use of asphaltum by aboriginal peoples is well documented in early historic accounts and abundant archeological evidence extends its use well back into the prehistoric era. Asphaltum was the caulk, glue, and paint...: when heated, the viscosity decreases and the molten asphaltum can be applied, cooling to form a jet-black, waterproof coating, an adhesive or a decorative paint." (Calhoun, 1964)

The woman "making such baskets, [was] distributing the pitch over the inside of the receptacle by placing lumps of asphaltum in the basket with hot stones and shaking the whole with a rotary motion, causing the melting asphaltum to be distributed evenly over the surface." (Barrows, 1900, p. 41)

COOKING WITH BASKETS:

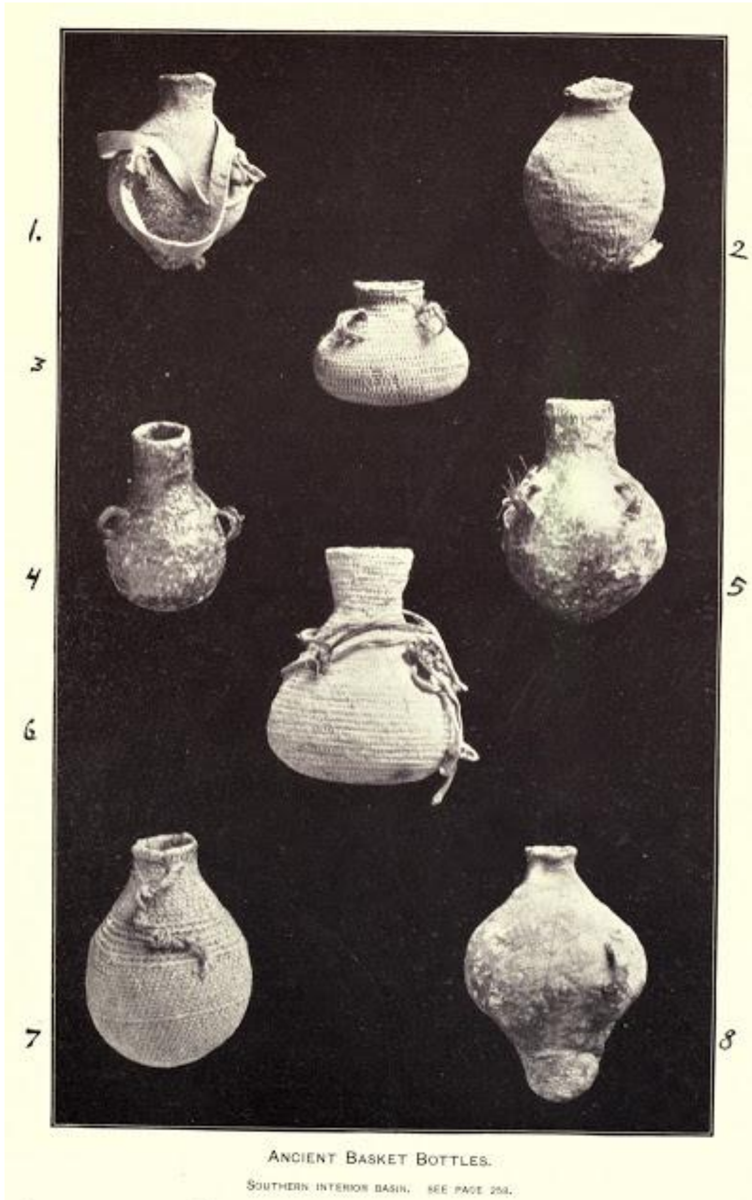
"Baskets also made fine cooking pots. Very hot rocks were taken from a fire and tossed around inside baskets with a looped tree branch until food in the basket was cooked." (Boule, 1992, p. 8)

"Closely woven, watertight containers were also used to cook foods. Red-hot rocks were placed in a water-filled basket, bringing the water to boil and cooking the contents. As the rocks cooled off, they were removed from the water with wooden tongs and replaced with newly heated rocks." (Burke Museum, Teacher's Guide)

POST-1910:
EARLY & MODERN CONFIRMATION OF BASKET-WEAVING IN UPPER PALEOLITHIC CULTURES

Since the 1900s there has been further evidence that ancient Native American Indian (Paleoindian) cultures were similar to the Upper Paleolithic way of life in Europe. But because these Indian cultures continued to exist until a more recent time in North America there were large numbers of fiber artifacts and baskets that survived -- which showed that basket-weaving and the Upper Paleolithic way of life were entirely compatible.

"In western North America, the oldest extant fiber artifacts derive from a series of sites in the northern Great Basin. The developmental basketry sequence in this area begins ca. 11,000 BP and includes such items as open and close, simple, Z twined bags, mats, burden baskets, trays, and coarse receptacles of a variety of configurations. These items are invariably twined." (Hyland et al, 2002, p. 7)



Ancient Basket Bottles, Southern Interior Basin
(Aboriginal American Basketry, 1904, Plate 32, explanation p. 258)
The existence of a well-developed basket technology in the prehistoric Great Basin region was well known by around 1900. For example, in the Smithsonian *Aboriginal American Basketry,* a variety of "Ancient Basket Bottles" using a wide variety of weaving and waterproofing techniques from the Great Basin was put together in one photograph (above) with full explanations. (Aboriginal American Basketry, 1904, p. 258-259.)

"A second concept which underlay the general model of Great Basin prehistory was the Pecos Classification, formulated in 1927 [by Kidder].
"The classification...contains...sequential stages or periods: Basket Maker I, or Early Basket Maker; Basket Maker II, or Basket Maker; Basket Maker 111, or Late (Post-) Basket Maker" Furthermore Kidder defined Basket Maker I as 'pre-agricultural' stage meaning that it was very similar to the Upper Paleolithic in Europe and mobile nomadic hunter-gatherers. (Kidder, 1924, p. 589-591)

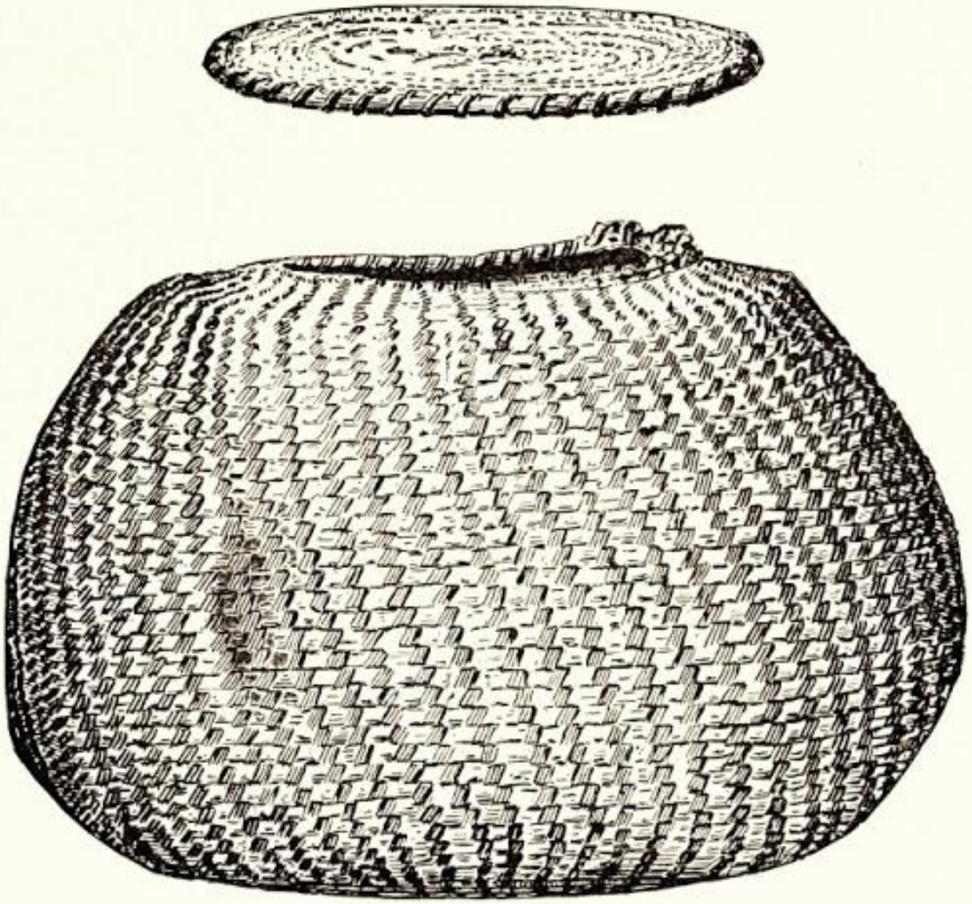


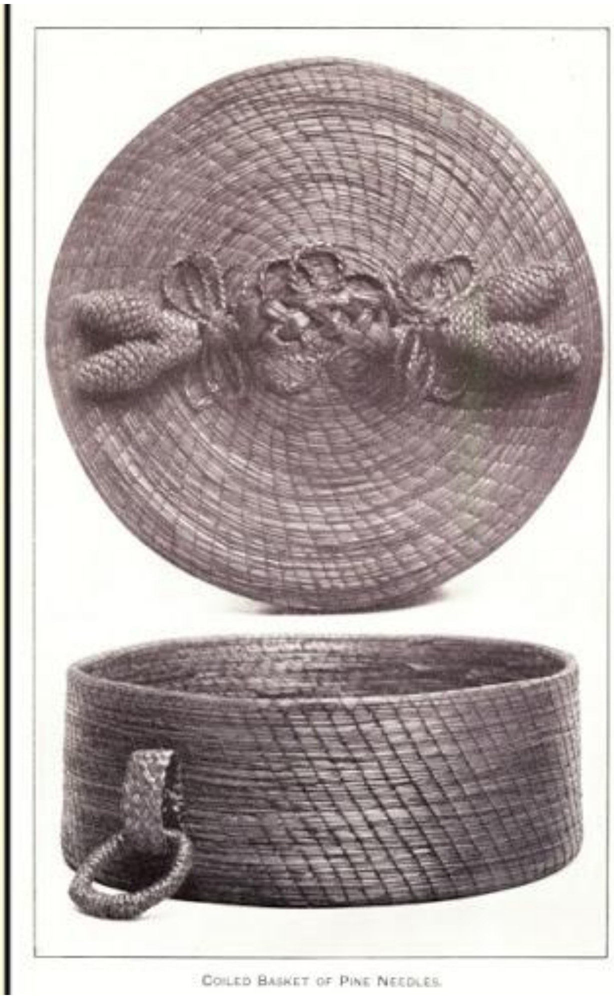
Fig. 203.

COILED GRANARY.

Pima Indians.

Collected by Edward Palmer.

Coiled Granary, Pima Indians
(Aboriginal American Basketry, 1904, Fig. 203, p. 524)
An example of a complex basket used to hold threshed grain.
A good durable design was vital for keeping food,



LEFT: Sitka Spruce
(Aboriginal American Basketry, 1904, Plate 7, explanation p. 208)
RIGHT: Coiled basket of Pine Needles
(Aboriginal American Basketry, 1904, Plate 128, explanation p. 379)
This example shows how simple pine needles could be transformed into a finely made basket.

THE SIMILARITY BETWEEN PALEOINDIAN AND UPPER PALEOLITHIC

Explaining the similarity of Upper Paleolithic cultures in Europe and North America, Hyland et al wrote:

"Systematic visual and microscopic examination of impressions on these [excavated] Far Eastern ceramics [Eastern European Upper Paleolithic impressions in clay] reveals the presence of a sophisticated plantfiber-based perishable technology. Interestingly, the technological types represented in this assemblage PRECISELY MIMIC THOSE RECOVERED FROM THE EARLIEST LEVELS OF A NUMBER OF WESTERN NORTH AMERICAN SITES [ED: my emphasis] **and may represent the prototype for this venerable industry as expressed in the New World." (Hyland et al, 2002, p. 1)**

There are "technological similarities between European Upper Paleolithic artifacts and 13,000 year old Native American artifacts." (Pennsylvania Archaeology, Paleoindian Period)

MODERN SCIENTIFIC EVIDENCE THAT HUNTER-GATHERERS HAVE MORE LEISURE TIME

Farmers have less leisure time than hunter-gatherers (ScienceDaily, 2019):
In a recent detailed study of the Agta people in the Philippines, researchers found that hunter-gatherers "who adopt farming work around ten hours a week longer than their forager neighbours."

Dr. Dyble, first author of the study, said: "For a long time, the transition from foraging to farming was assumed to represent progress, allowing people to escape an arduous and precarious way of life.
"But as soon as anthropologists started working with hunter-gatherers they began questioning this narrative, finding that foragers actually enjoy quite a lot of leisure time. Our data provides some of the clearest support for this idea yet."

PART 3: WHAT PALEOARCHAEOLOGISTS COULD HAVE/SHOULD HAVE KNOWN IN 1910

Since it has taken about 100 years for paleoarchaeologists to accept that basket-weaving had begun much earlier than the Neolithic era, I wondered if there was a way to recreate the atmosphere of thought 100 years ago to see what barriers had prevented an investigation into basket-weaving technology.

So I looked for works that were published around 1900. With the help of the Internet, I was able to find a substantial number of books and papers about paleoarchaeology, basket making instructions, and Native American Indian basket-making.

As everyone knows, it is hard to prove a negative. But in the following, I will attempt to show how the use of tools found in Paleoindian caves and various prehistoric sites was interpreted in a masculine manner and the feminine craft of basketry technology was not recognized.

NUMEROUS PREHISTORIC AWLS WERE UNEARTHED

In just about every prehistoric site or cave in Europe and North America where tools were found, bone awls were found in quantity. In North America, bone awls

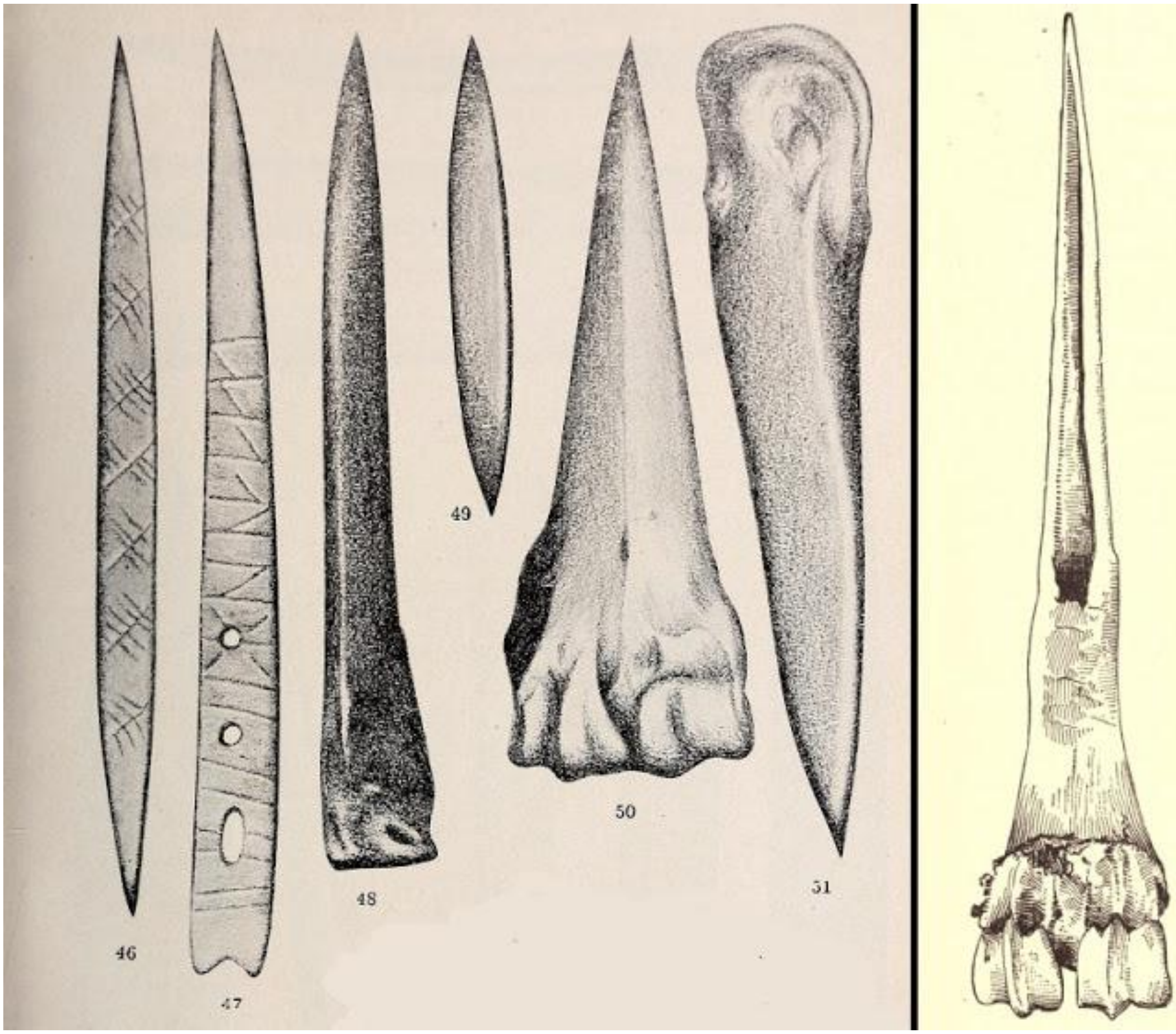
were the indispensable basket-making tool used by most Indian women. And needles were also found in large numbers which were used in basket-weaving.

But because these men, these paleoarchaeologists, were not familiar with basketry they did not make the connection. The men instead made the assumption that the pointed tools were used to punch holes in animal skins so that they could be bound together, which was not wrong as modern research has confirmed but was only part of the way these tools were used.

As a test about gender bias, I studied a book written around 1900 that described a huge number of bone awls that had been uncovered -- since bone awls, in particular, were the tools of choice for Native American Indian women when they wove baskets:

Beauchamp, William M. *Horn And Bone Implements Of The New York Indians.* University of the State of New York, New York State Museum, Bulletin 50, March 1902.

"Awls are the most common form of bone tool. They are from 2 inches to 8 or 10 inches in length. They are sometimes spoken of as needles, but it is most likely that their use was to perforate bark and skin before inserting the thong or fiber employed for sewing..." (Beauchamp, 1902, p. 330)



LEFT: 6 of the 80 awls pictured in Beauchamp's book, none of which were associated with basket-weaving or with women using them to make baskets, although there was clear evidence this was the case. (Beauchamp, 1902, Plate 5)
RIGHT: Awl from the Smithsonian book, *Aboriginal American Basketry.* The book stated this was the tool that was essential for basket making and was used by women. (Aboriginal American Basketry, 1904, Fig. 40, p. 245)

William Beauchamp wrote. "It is probable that for finer stitching the bone awl was used, as a shoemaker uses an awl in leather." (Beauchamp, 1902, p. 312) In other words, Beauchamp 'assumed' that the prehistoric awls he found were used in a way that was familiar to him and in a work that was dominated by males.

Even today this perception lingers. The following is a quote from the contemporary website of the Smithsonian Institution which does not mention basketry: "Middle Stone Age Tools: By 200,000 years ago, [ED: after Homo sapiens had emerged]**... toolkits included...stone awls, which could have been used to perforate hides..." (The Human Origins Initiative, 2020)**

My Personal Observation: It is not that unusual for an 'expert' to be quite ignorant about some aspects of her/his work. For example, when I was teaching photography to teenagers after school, I was shown a blue print by the architect of the new darkroom that was going to be part of a recreation center. What he did not tell me at the time, and what I only found out when I started teaching there, was that he had assumed a darkroom should be all black -- black counters, dark walls, floors etc. But this was completely incorrect -- and made working in the darkroom quite difficult. A darkroom needs white counters and light walls that are lit by a safe light which is just the right wavelength for the photographic material. The counters and walls need to be light so that a worker can see what she is doing under that safe light. But the architect had assumed a darkroom needed black counters and never consulted me.

A DETAILED STUDY OF HORN AND BONE IMPLEMENTS BY NEW YORK INDIANS

To test my ideas about gender bias, I did a basic content analysis of Beauchamp's book. I thought it might be a good indicator of the point-of-view of men around 1900.

The word 'women' (or woman) was mentioned only three times in Beauchamp's book. But in general, these short mentions were related to men's activities such as fishing and the making of netted snowshoes.

Quoting noted authority W. Wallace Tooker who said that "In a space 10 feet square, I found five bone needles," Beauchamp believed the needles were related to fishing and the use of thread. Then Beauchamp did say that "Indian women were expert in making fine thread" for fishing. (Beauchamp, 1902, p. 313)

Quoting from David Boyle's book *Notes on primitive man in Ontario* of 1895, Beauchamp believed that women made snowshoes but again the weaving connection to basketry was not made. "Another form also known as a needle...was almost certainly employed in the netting of snowshoes." (Beauchamp, 1902, p. 330)

Beauchamp added that women made grass mats which is a basic type of basketry but did not make the connection with basket-weaving, weaving or textiles.

With so many awls being found consistently at prehistoric sites, why did Beauchamp not ask living members of the Native American Iroquois Confederacy, for example, about these finds? The name 'Iroquois' is mentioned 21 times in the book. If he had asked, he would have discovered what was common knowledge among most American Indians, that the bone awl was the indispensable tool for the Indian woman and it was often used along with a bone needle. (See next section.)

WORD COUNTS:

Male words (men/he/him/his) = 132
[I did not include the word 'man' because 'man' back then often meant both men and women such as in the phrase 'primitive man'.]
Female words (woman/women/she/her/hers) = 5

Tools/Implements = 150
Awls Pictured = 80
Awls Mentioned = 234
Needles Pictured = 17
Needles Mentioned = 76
Fishing = 169
Arrow Words = 71
Hunt/Kill/Animal Skins = 26

Gather/gatherer (plant gathering was women's work) = 0
Basket-weaving/basketweaving/weaving/textiles = 0
[Although the making of simple mats and cordage by women is briefly described in 2 places.]
Basket = 1 [There was one passing mention of a 'basket' that was found in a burial site but nothing further was said.]

SUMMARY:

The 'invisible' female of the 1900s.
The role and work of women were barely mentioned. Although awls were the most common tools that were found, the author never realized that this tool was the essential tool for basket-weaving and never engaged in any further research beyond his assumption that they were for puncturing holes in skins and leather. Women were mentioned only a few times and when they were it was usually in association with male activities. While hunting (a male activity) was mentioned often, gathering (a traditional female activity) was not mentioned at all.

IT WAS COMMON KNOWLEDGE THAT AWLS WERE USED FOR BASKET-WEAVING

It was common knowledge that the bone awl was the primary tool for basket-making as is shown by the references in the following books that were published around the same time.

A basket-making book published n 1903 by Navajos referred to "the ever present bone awl of the Indian Woman" and goes on to say. "The squaw uses a bone awl

made usually from the thigh bone of some fowl or animal." (Navajo School of Indian Basketry, 1903, p. 10)

In his book about making baskets, Luther Turner wrote, "But the expression of thought through basketry, requires almost no tools (a knife and scratch-awl), has variety as to form and color and almost unlimited possibilities in design." (Turner, 1909, p. 5)

The in-depth Smithsonian *Aboriginal American Basketry* book stated, "The tool almost universally employed in the manufacture of coiled ware [ED: coiled baskets] **is a bone awl or pricker." (Aboriginal American Basketry, 1904, p. 191)**

Describing the Native American Indian woman's methods in his book *Practical basket making*, George James wrote, "Her tool...is a bone awl." (James, 1914, p. 82)

So the information about bone awls and basket making was available around the early part of the 1900s and not hard to find, but paleoarchaeologists did not feel the need to investigate further, even though these tools were so plentiful and obviously were widely used.

MODERN SCIENTIFIC DATA CONFIRMS THAT PALEOLITHIC AWLS WERE USED FOR BASKETRY

The latest modern information confirms what should have been known 100 years ago, i.e., that awls are often used in the making of baskets.

"Although authors have differing theories as to the uses of bone awls, the two main uses agreed upon are as manipulators in the making of basketry and as perforators in the working of hide." (Buc and Loponte, 2007, p. 145)

THE CRAFT OF WOMEN

While 'women's work' was not valued very highly in the West, this attitude stood in sharp contrast to the value Indians had for the basket-weaving skills of their women. While there were clear gender roles in Native American Indian societies, the work of women was highly regarded.

Like the Mayan weavers mentioned at the beginning of this article, these skills were passed down from mother to daughter. A well-made basket might be used by a family for generations and have a special meaning for that reason.

Here is what the Navajo people had to say about basketry and the women who performed this craft:
"Indian basketry has taught us to appreciate the beauty of primitive weaving, and furnishes the most striking illustration of the wonderful patience, fertility of resource and inventive genius of the aboriginal woman in using nature's materials, roots, grasses, twigs, vines, rushes, palm fibres, shells, and feathers, shaping them into useful and beautiful forms.
"Baskets are the Indian Woman's poems; the shaping of them her sculpture. They wove into them the story of their life and love." (Navajo School of Indian Basketry, 1903, p. 7)

The wonderful Smithsonian *Aboriginal American Basketry* book (but with horribly dated language) was published in 1904. Seven thousand copies were available for the public. If paleoarchaeologists had read this it might have radically changed their views about the complexity of basket-weaving, the skill of women, the uses of baskets by mobile hunter-gatherers, and the age of basket-weaving.

Pima Basketmaker (Aboriginal American Basketry, 1904, Plate 235, explanation p. 525)

"As you gaze on the Indian basket maker at work, herself frequently unkempt, her garments the coarsest, her house and surroundings suggestive of anything but beauty, you are amazed. You look about you, as in a cabinet shop or atelier, for models, drawings, patterns, pretty bits of color effect. There are none. Her patterns are in her soul, in her memory and imagination, in the mountains, water courses, lakes, and forests, and in those tribal tales and myths... Her tools are more disappointing still, for of these there are few: a rude knife, a pointed bone [ED: the awl], that is all. Her modeling block is herself. Her plastic body is the repository of forms. Over her knee she molds depressions in her ware, and her lap is equal to all emergencies for convex effects. She herself is the Vishnu of her art, the creator of forms." (Aboriginal American Basketry, 1904, p. 221)

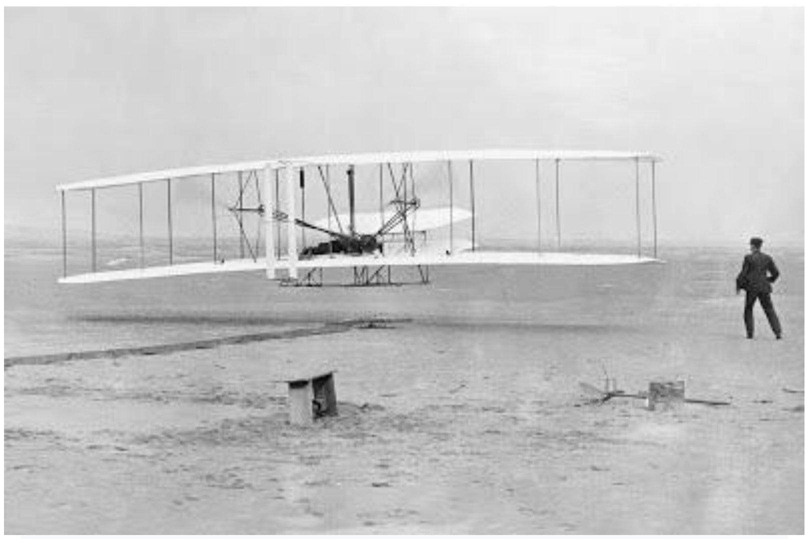
"Wherever Western researchers have come in contact with native people, whether in Britain, Africa, Polynesia, or America, it has found the woman enjoying the most friendly acquaintance with textile plants and skillful in weaving their roots, stems, and leaves into basketry, matting, and other similar products without machinery. Basketry was well-nigh universal throughout the western hemisphere." (Aboriginal American Basketry, 1904, p. 187)

As the Smithsonian book shows, the work of women was fundamental and well respected by their tribe. Women engineered, designed, and created basket-type tools made with their weaving skills. This technology developed into a diverse tool-making industry that was crucial for the survival of nomadic hunter-gatherers and probably even earlier hominins.

GETTING INFORMATION IN 1900

Some might argue that this kind of detailed information was not available or easily located 100 years ago. But this is not true as it was standard procedure, then as now, to do a review of the literature.

While paleoanthropologists did not have the luxury of the Internet as we do today, there were other ways to do a review of the literature. For example, in an entirely different field, the field of aeronautics, the Wright Brothers wrote: "the Smithsonian Institution on May 30, 1899, asking for Smithsonian publications on aeronautics and suggestions for other readings." This review had a major impact on their experiments. (Wright Brothers, Smithsonian Institution Archives)



"The Wright Flyer airborne during the first powered flight
at Kitty Hawk, North Carolina, United States of America, 17 December 1903."
Due to their thorough research and experimental testing of commonly accepted tables of lift and drag which were incorrect, these two poorly funded bicycle makers were able to scientifically leapfrog over other well-funded airplane builders.
(Commons.wikimedia.org, 1903, The Wright Flyer)

So the professional educated male authorities of the time could have researched the importance and viability of basket making in hunter-gatherer societies by simply contacting the Smithsonian which specialized in Native American Indian information. And the Smithsonian also would have been aware of other studies including those funded by various government agencies. At the time there were quite a few of these as there was an intense interest in the Native American Indian way of life.

NOTE: To see what was available go to Archive.org and search for "American Indian" or "Native American" while limiting your search to those publications before 1910 (or another date). And of course, these are only the publications that have survived as many have probably been lost.

CONCLUSION

With just the Smithsonian book *Aboriginal American Basketry* as evidence, it is clear that basketry was an integral part of a number of nomadic and semi-nomadic hunter-gatherer Native American Indian tribes. This contradicts the long-held assumption that basketry could only have begun with sedentary agricultural societies of the Neolithic. And this should have been recognized around 1900.

But having made that point, there is much more to say. It appears from the sophistication of this hunter-gatherer basketry that basket making was crucial to the life and the survival of the tribes. Women not only made superb baskets for dozens of purposes but did so with local plants which varied greatly from region to region. They also knew how to use different parts of the plants as well as when to harvest them and how to process them. Moreover, they often used a variety of plant materials in the same basket for different parts of the basket and a variety of techniques to weave the basket. As several anthropological observers noted, they probably knew more about these plants, local botany, and how the plants could be used than western-educated scientists. (Aboriginal American Basketry, 1904, p. 198)

Instead of thinking that basketry was incompatible with a nomadic hunter-gatherer lifestyle, the truth may be the opposite. These societies needed well-designed light, strong, durable, flexible, versatile, and portable basket items, and implements that they could carry with them as they traveled. And they needed to be able to make baskets from whatever plants they found as they moved around -- which women were expert at harvesting. So baskets fit well with their mobile way of life.

However, the perception of these societies has been very different. They have been characterized as 'primitive' 'illiterate' 'savages' who lived in the 'stone age'. This opinion came about because they were judged by sedentary farmers and city dwellers who lived in industrial societies but who did not understand the Native American Indian way of life and, as a result, saw it as inferior. And this may be part of the reason it was assumed that something as complex as basketry and textiles could only have been created by more 'advanced' cultures such as those of the Neolithic, cultures that were much more similar to our own.

Yet, these nomadic and semi-nomadic hunter-gatherers did the best they could with the technology they had available to them. However, unlike cities and large civilizations, they did not need a written language -- a small tribe was able to function with a spoken language which often had complex ways of conveying information.

Yet many western authorities did not recognize their expertise in basketry and instead focused on their lack of a written language which to these men meant that they were primitive savages.

"Aboriginal languages include extensive botanical vocabularies, such as plant names, terms for stages of plant growth, and terms for parts of plants. For some plant species there are specialised verbs for describing the method of collecting fruits and seeds, and of processing and eating them (Laramba Women & Green 2003)."

"Pioneering work by Conklin (1957) and others documented that traditional peoples...often possessed exceptionally detailed knowledge of local plant and animals and their natural history, recognizing in one case some 1,600 plant species." (Inglis, 1993)

I think it is now clear that 100 years ago paleoanthropologists could have been reasonably sure that basket-weaving occurred in the Upper Paleolithic and Mesolithic eras with prehistoric nomadic and semi-nomadic hunter-gatherer tribes, based on the ethnocultural examples of the nomadic hunter-gatherer Native American Indians at the time and the findings from Paleoindian sites. And this belief might have helped paleoarchaeologists when they were excavating tools and artifacts. Awls, for example, might have been found in the same area as other related basket-making evidence.

In any case, today the recognition of the importance of basketry has begun. And the point is to look at Paleolithic and Mesolithic remains with a new perspective -- and not just those in the Upper Paleolithic, but also the Middle and Lower Paleolithic.

It is possible that evidence of ancient basketry might be hiding in plain sight but only now are we able to see it.

AFTERWORD

DISCARDING OTHER RELATED ASSUMPTIONS

The Assumption That Certain Technologies Or Advances Only Occurred In Certain Time Periods

In addition to discarding a gender bias, some other long-held assumptions should be questioned. Paleoanthropologists need to rethink the sharp delineation between different prehistoric eras. The assumption has been that each era, (i.e., Lower, Middle, Upper Paleolithic, Mesolithic, and Neolithic) had technologies that were particular to each era and which progressed as time went on. However, discoveries have shown that this is not necessarily true. As Dr. Adovasio et al. describes next some 'Neolithic technologies' have been found 15,000 years earlier in Upper Paleolithic sites.

"Finally, the identification of textiles and basketry ca. 25,000 B.P., together with extensive evidence of Upper Paleolithic ceramic technologies (Vandiver et al. 1990), raise serious questions about the technological “signatures” or artifactual associations used to define particular epochs in prehistory. The Moravian sites are by chronological assignation clearly Paleolithic and not Neolithic in age, preceding the “Neolithic Revolution” (Childe l936) by some 15,000 years. They were occupied by people who subsisted by foraging, not by horticulture and whose settlement systems, as a result, featured residential mobility rather than year round sedentism. Yet, these populations produced geometric microliths, made ceramics, manufactured ground stone tools, and wove textiles and basketry, all supposed “hallmarks” of the Neolithic." (Soffer, Adovasio et al, 1998)

So while many of the Native American Indian tribes were nomadic hunter-gatherers who made old stone age tools and seemed to live a life similar to Upper Paleolithic cultures in Europe, they also may have developed what we might call a 'hi-tech' basket technology. The sophistication of this technology is clear as the waterproofing of basket canteens has shown along with the durability and wide variety of baskets.

"Many times our preconceived notions as to what ought or ought not to be present at a given site of a given age clouds and limits our ability to admit new possibilities. Ideological and theoretical biases can be quite powerful and often subtly alter our ability to see new and wonderful things." (Hyland et al, 2002, p. 8)

The Assumption That Basket-Weaving Could Have Developed In A Relatively Short Time Period

As mentioned earlier, authorities in 1910 assumed that basket-weaving could not have begun earlier than the Neolithic era or about 10 - 15 kya. Today that date has been pushed back to about 25 kya. Nevertheless, both dates contain the assumption that the fully developed technology, from start to finish, could have evolved in only 5,000 - 20,000 years since it was fully developed in Egypt and Sumer by 5 kya. This in itself seems unlikely. If stone tools took 2 million years or so to develop, why would basketry be any different?

By about 5 kya the civilizations of Sumer and Egypt depended on a complete range of woven items that were widely available and that were crucial for the development of these civilizations. This short time span for basketry assumes that basic simple basket-making such as random weave baskets could have developed into 60 ft water-sealed ocean-going boats capable of carrying 50 tons of cargo in a relatively short period of time -- which was unlikely. (National Geographic, 1979, Video: The Tigris expedition)

This is a model of Thor Heyerdahl's 60-foot reed boat. It was a recreation of a vessel that was possible 5 kya in the early civilization of Sumer. It was essentially a large coiled basket that had been sealed with bitumen, a type of asphalt, like the American Indian waterproof canteens. (Commons.wikimedia.org, Tigris Model)

Once the possibility of early basket-weaving is considered, there is evidence pointing toward older origins but which has been overlooked in the past. For example, in the following quote, a number of bone awls were found from the Middle Paleolithic (70 kya) which might have been tools for weaving with fibers since it is

now generally agreed that awls were used for basket-weaving along with other uses.

"Twenty-eight bone tools were recovered in situ from ca. 70 ka year old Middle Stone Age levels at Blombos Cave between 1992 and 2000...Detailed analyses show that tool production methods follow a sequence of deliberate technical choices starting with blank production, the use of various shaping methods and the final finishing of the artefact to produce 'awls' and 'projectile points'. " (Henshilwood et al, 2001, p. 631)

But of course, the length of time basket-weaving took to evolve is an open question -- but the assumption that basketry could have been developed in a short time needs to be looked at.

APPENDIX:

- **MATERIALS USED FOR BASKET-WEAVING**
- **LIST OF DIFFERENT KINDS OF BASKETS AND DIFFERENT WAYS BASKETS WERE USED IN NATIVE AMERICAN INDIAN CULTURES**

MATERIALS FOR BASKETRY

From the Smithsonian's *Aboriginal American Basketry* of 1904, pp. 197-198.

NOTE: This language in the Smithsonian's *Aboriginal American Basketry* of 1904 is outdated, but the observations are quite useful.

"The chief dependence, however, of the basket maker is upon the vegetal kingdom. Nearly all parts of plants have been used by one tribe or another for this purpose roots, stems, bark, leaves, fruits, seeds, and gums. It would seem as though in each area for purposes intended the vegetal kingdom had been thoroughly explored and exhausted above ground and underground.

"Is it not marvelous to think that unlettered savages should know so much botany? Mr. Chesnut, in his Plants used by Indians of Mendocino County, California, calls attention to the fact that in our advanced state we are yet behind these savages, not having caught up with them in the discovery and uses of some of their best textile materials.

"How did the savages find out that the roots of certain plants hid away under the earth were the best possible material for this function* And for another use the stem of a plant had to be found, perhaps miles away, so that in the makeup of a single example leagues would have to be traveled and much discrimination used. Unless the utmost care is exercised the fact will be overlooked that often three or four kinds of wood will be used in the monotonous work of the weft. One is best for the bottom, another is light and tough for the body, a third is best for the flexible top. This in addition to the employment of half a dozen others for designs, for warp or foundation, or for decorative purposes." (Aboriginal American Basketry, 1904, pp. 197-198)

MATERIAL SOURCES

From the Burke Museum, (UW College of Arts & Sciences), Teacher's Guide For Basketry, Northwest Coast Basketry.

"Materials used in basketry vary, depending upon the type of basket being made, its intended function, the tastes of the maker and the materials available. A basket used for heavy loads would use stiff, sturdy material such as cedar withe or cedar root. A container made to fold flat requires flexible material such as spruce root.

"Some of the more common materials used in basketry include cedar bark, cedar root, spruce root, cattail leaves and tule.

GATHERING AND PROCESSING THE MATERIALS

"Most raw materials used in weaving are harvested or gathered at specific times of the year. This ensures that the materials are collected when they are best suited for weaving. Weavers understand the growing cycles of the natural materials they use and recognize when a tree or plant is ready for harvesting. Often, special prayers are said or songs are sung by the weaver while she gathers and processes her materials.

"Most materials are collected in the spring or early summer. This includes grasses, which must be picked at just the right time. If it is too early in the season, certain grasses are too soft or narrow for weaving. Other kinds, such as reed canary grass, need to be harvested before the plant blooms.

"The bark of both red and yellow cedar is gathered when the tree sap is running, normally between April and July. The sap allows the bark to be pulled off easily from the tree.

"Once removed, the outer cedar bark is removed from the inner bark by folding and peeling the bark by hand. It is the inner bark which is used for basketry. The inner bark is washed, dried and gathered into bundles. It can now be stored for later weaving projects.

"Spruce or cedar root can be gathered at any time of the year. After they are gathered, the roots are bundled and heated over a fire. After heating, the roots are unbundled and pulled through a split wooden stick which removes the outer bark. The roots are then split one or more times, rebundled and stored until needed.

"If properly prepared and stored, materials can be kept for years before use. Although stored dry, materials are soaked in water before they are used in weaving. This makes them pliable and easier to use. While the basket maker is working, the

weaving materials and the object being made are constantly moistened to keep them flexible." (Burke Museum, Teacher's Guide: Northwest Coast Basketry)

ALPHABETICAL LIST OF USES & TYPES OF BASKETS

From the Smithsonian's *Aboriginal American Basketry* of 1904, pp. 361-363.

1. **Armor made of slats and rods woven together.**
2. **Awning mats in front of cabins.**
3. **Bags for everything; for gathering, carrying, and storing, made in every quality.**
4. **Bait holding.**
5. **Bases for pottery-making (primitive wheel); also forms for portion of vessels.**
6. **Beds of matting in basketry.**
7. **Boiling baskets, for cooking flesh or mush.**
8. **Bread, for mixing or serving.**
9. **Burden baskets in endless varieties.**
10. **Burial caskets and deposits.**
11. **Cage for insects, birds etc.; also for children on Sioux travois.**
12. **Canoe covers, for cargoes (Swan).**
13. **Canteen, for personal water supply.**
14. **Cape, poncho, or other garment to cover the shoulders, both in animal and vegetable fiber.**
15. **Carrying basket, an immense class, with infinite variety of form and universal distribution.**
16. **Carrying chair, Guatemala and Peru.**
17. **Ceremonial objects; trays in rites and before altar, carried in dances, struggled for, etc.**
18. **Chef d'oeuvres, to show the best one could do.**
19. **Chests for treasures, regalia, and fine costume.**
20. **Children s toys; imitations of more serious objects.**
21. **Clothing; robes of twine, with or without feathers; hats, jewelry, capes, fringes, petticoats, leggings, moccasins, and receptacles for these.**
22. **Coffins of canes and reeds wattled together.**
23. **Cooking baskets, used with hot stones.**
24. **Cradles or pappoose frames, quite widely distributed.**
25. **Creels, all varieties of fishermen s baskets.**
26. **Cremation baskets, burned at the woman's grave.**
27. **Cult baskets, Hupa basket wand (Ray), Ilopi plaque (Fewkes).**
28. **Curtain mats for partitions.**
29. **Cushions in boats and kaiaks.**
30. **Dance baskets, used in ceremonies.**
31. **Ditty baskets for small articles of hunters.**
32. **Dress. (Ree Clothing.)**
33. **Drinking baskets or cups.**
34. **Drum, in Navaho ceremony.**
35. **Drying tray for fruit.**
36. **Eagle traps and cages.**
37. **Etiquette baskets, for giving away on the proper occasion.**
38. **Fences of coarse basket technic; hunting fences.**
39. **Fine art in basketry.**
40. **Fish, holding, transporting, creels, bait baskets.**
41. **Fish trap, fish weirs, fykes, etc.**

42. **Food-serving baskets.**

43. **Foundations for pottery.**

44. **Fringes on garments, in refined basket technic.**

45. **Furniture in basketry. Gambling baskets. Gathering or harvesting. Gift baskets. Granary or storage. Grasshopper baskets, so called. Hammocks in basket work. Harvesting, fan or wand for beating seeds. Hats for men or for women. Head rings, olla rings for carrying. Hedges, employed chiefly in game drives. Hoppers, for acorn and other mortars. Houses, walls, roofs, floors, doors, and other parts.**

46. **Inclosures for the beginning of domestication.**

47. **Insect cage, for lighting and other purposes.**

48. **Jewel baskets, chef d oeuvres of woman's art,**

49. **Jewelry, woven in finest material for adornment.**

50. **Leggings in twined weave. Lined with clay for cooking. Love baskets. Marks on pottery. Meal trays, useful and sacred. Medicine, associated with sorcery. Milling outfit, grinding, hoppers, brushes, sieves, etc.**

51. **Moccasins or sandals. Molds for pottery. Money, mechanism of exchange. Mortuary baskets of many kinds and functions. Mud sandals, Klarnath, for going in marshes.**

52. **Mush bowls for mixing or serving. Musical instruments, rattles and drums. Offerings of food to dead, and mortuary objects. Paho, or prayer-stick wrappings (ancient graves).**

53. **Panniers, with saddles. Papoose baskets. Partitions for dwellings. Patterns for pottery.**

54. **Picking baskets, for gathering nuts and fruits.**

55. **Pitcher basket, with wide mouth.**

56. **Plaques, for meal.**

57. **Plates or platters.**

58. **Ponchos. (See Capes.)**

59. **Pottery. (See " Marks on Pottery;" also used to line roasting trays (Gushing).)**

60. **Prayer basket, Pahos.**

61. **Preparing food, mixing mush, bread, etc.**

62. **Quivers.**

63. **Receptacles of all sorts, for cooked food, dried fish, and all kinds of preserved meats and fruits. The basket maker herself keeps her splints and stems in a basket.**

64. **Religion, used in services of.**

65. **Roasting trays, for poaching seeds.**

66. **Robes of shredded bark.**

67. **Roof of basketry.**

68. **Sacred meal trays.**

69. **Saddlebags, of late application.**

70. **Sails, in both continents.**

71. **Seats, at home, in boats, etc.**

72. **Seed baskets, harvesting, carrying, and storage.**

73. **Seed beater, for harvesting.**

74. **Serving food, for single persons or a company.**

75. **Sieves, for screening or for shaking.**

76. **Skirts, both of common and ceremonial dress.**

77. **Sleeping mats.**

78. **Storage, fish, berries, pemmican, acorns. All tribes stored some kind of food.**

79. **Trade, medium of.**

80. **Treasure baskets, those considered treasures.**

81. **Trinket and feather storage, also herbs, gum, paint, etc.**

82. **Vizors of Katchina masks, made from segments of coiled basketry (Utetype), Hopi.**

83. **Washbowl, in ceremonies.**

84. **Water bottles, drinking cups, etc., of basketry dipped in pitch. Also what were called water baskets, i.e., large baskets for carrying water.**

85. **Winnowing baskets for seeds.**

86. **Zootechny, or the arts associated with animal life.**

(Aboriginal American Basketry, 1904, pp. 361-363)

"Indian male carrying a basket on his back, ca.1900"
(University of Southern California, CA. 1900, Indian male carrying)

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Apache Indian maiden with an olla on her head, ca.1900.
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Apache Indian woman carrying a "Kathak" on her back, Arizona, ca.1880.
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Indian male carrying a basket on his back, ca.1900.
<http://digitallibrary.usc.edu/cdm/singleitem/collection/p15799coll65/id/9235/rec/227>.

Pima Indian woman...carrying firewood in her "Kathak", or basket, in Pima, Arizona, 1904.
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Three Indian basket papoose carriers displayed against a cloth backdrop, ca.1900.
<http://digitallibrary.usc.edu/cdm/singleitem/collection/p15799coll65/id/17178/rec/244>

Article #9
New Evidence Suggests That Basket Making May Have Begun 2 Million Years Ago

See the explanation below for more about this traditional water carrier.

ABSTRACT: Recent excavations at the Olduvai Gorge in Tanzania, Africa have revealed new information about some of the earliest hominins, probably Homo habilis, from 2 million years ago. For the purposes of this article, the main point is that these early humans walked 12 km or 7.5 miles to gather specific stones that they used for making Oldowan stone tools and for putting together a toolkit. And these specific stones made up the majority of stones found. They did this for several hundred thousand years. I argue that to do this, they probably had containers or early baskets to help them carry a large collection of stones back to their settlements, since walking that far would have been counterproductive if they only gathered a few stones. Next in this article, I show how very simple carriers could have been from natural plant materials, carriers that might have been like some of the earliest baskets.

INTRODUCTION

An important archeological find has added hard evidence to the possibility that the origins of basketry may have begun 2 million years ago.

Recently archaeologists determined that some early hominins (probably Homo habilis), about 2 million years ago in the now famous Olduvai Gorge in Tanzania, made the same type of Oldowan stone tools for hundreds of thousands of years, even though the environment changed radically during that time. And the archaeologists were able to determine that the stones that were used to make the tools were found far from the hominins' settlement.

A close examination of the tools revealed that these hominins chose their rocks carefully for different purposes and in doing so created a toolkit of various implements. And even more

surprising, they walked 12 km (7.5 miles) from their camp to find specific kinds of quartzite. Moreover, they found the majority of these stones by traveling this far. All of this implies planning and it also implies a fairly sophisticated knowledge that was passed down from generation to generation.

So my observation is that if they were this smart, they probably made other things as well. And this is why early basketry or containers might be a part of the story. If they walked a distance to find certain stones, wouldn't they also have made some containers to carry the stones back?

LINKS AND QUOTATIONS
ABOUT THE ARCHEOLOGICAL FIND

The findings were summed up in this way:
"Early hominins succeeded by being generalists with basic, versatile tools."
(Arstechnica.com, 2 Million Years Ago)

Read the summaries of this study

2-Million-Year-Old Stone Tools Unearthed in Tanzania
http://www.sci-news.com/archaeology/ewass-oldupa-stone-tools-09236.html

This Is How Hominins Adapted To A Changing World 2 Million Years Ago
https://arstechnica.com/science/2021/01/this-is-how-hominins-adapted-to-a-changing-world-2-million-years-ago/

Read the entire original article
(a PDF download is also available at this site).

Earliest Olduvai Hominins Exploited Unstable Environments ~ 2 Million Years Ago
https://www.nature.com/articles/s41467-020-20176-2

"The scientists also compared the chemical composition of the Ewass Oldupa tools [ED: the tools found in the excavation] and determined the MAJORITY [ED: my emphasis] of rocks used to make them had been obtained 12 km (7.5 miles) away from the site.
“This indicates planned behavior at an early stage in human evolution,” said co-author Julien Favreau, a Ph.D. Candidate in the Department of Anthropology at Mcmaster University."
(Sci-news.com, 2 Million Years Ago)

"The oldest evidence we have for early human relatives at Olduvai Gorge is a handful of stone tools, made and used around 2.03 million years ago.
"They seemed to choose different materials—in some cases as specific as choosing slightly different types of quartzite from different outcrops—for particular tools. (A study last year also suggested that the earliest toolmakers in our family tree knew enough to choose their materials wisely.)"
(Arstechnica.com, 2 Million Years Ago)

THE ORIGINS OF BASKETRY

If these early hominins were this smart, they could have woven containers out of leaves, vines, grasses, and branches since these were the most available materials. Or they could have made pouches out of animal skins or made a carrying device with gourd-like plants. Or they might have made these carriers with a combination of techniques.

Plus these containers or proto-baskets would have been part of the basic toolkit. They would have been one of the tools that worked alongside and complimented the other tools in the toolkit.
I believe that prehistoric containers or baskets were tools, yet when I read about basketry, in particular, it is not usually characterized as a technology and individual baskets are not often thought of as tools. But they were just that. A basket was a tool just as an Oldowan stone chopper or scrapper was a tool. Containers are essential and common to all cultures according to Dr. Donald Brown in his book *Human Universals* (1991).

In any case, these hominins needed a way to put together the many stones they had collected after walking 12 km and to carry them back when they made the return journey.

It is also important to note that the plants for making baskets would have changed as the environment changed. While the types of stones hominins looked for would have remained the same, the plant life varied. But, as is well known, baskets can be made from a wide variety of local plants, so continuing to make baskets with different plants would not have been out of the question for this young technology.

EARLY BASKET DESIGNS AND TECHNOLOGY

There are many things in nature that could have sparked the imagination of early hominins to make or weave baskets such as various bird nests, spider webs, or a tangle of plant growth which demonstrates how interwoven branches and vines can be quite strong and resilient.

As I wrote in an earlier article, there is fossil evidence of Oldowan stone tools and weaverbirds remains, birds that made elaborate woven basket-like nests, that were found together in the Bed I layer at Olduvai Gorge. These bird nests could have provided a model for early baskets.

Paleolithic Evidence Shows That Homo Habilis
Could Have Learned Weaving From Weaverbirds (Ploceidae)
https://deconstructingtime.blogspot.com/2019/10/paleolithic-evidence-for-early-weaving_27.html

A weaverbird nest (left) and a random weave basket (right).

NOTE: While the earlier find is consistent with the same general time frame as that of this recent archeological find, i.e., 2 mya, it is in a different area of the Gorge. Bird fossils were found at the Ewass Oldupa site where this study was done but unfortunately I cannot determine if they included weaverbirds.

"The concentration of stone tools and animal fossils (wild cattle, pigs, hippos, panthers, lions, hyena, primates, reptiles, and birds) at the Ewass Oldupa site are evidence that both human and animal life centered around water sources."
(Sci-news.com, 2 Million Years Ago)

THE FIRST CONTAINERS/BASKETS?

While I believe that basic early basketry could have been learned based on observations by hominins of weaverbird nests, I also think that prior to that, simple proto-baskets could have been made. These baskets might have required only minutes to create and could probably have been made as needed while hunting or gathering. It may have only taken a few folds of large leaves, for example, or the intertwining of smaller leaves and branches to make a container.

"Traditional water container made from palm leaves from Camenaça / East Timor" (Commons.wikimedia.org)

This very simple water container (above) shows how easily a container or proto-basket could have been made.

View the next video that shows how to make a cup that holds water that is made from a flat sheet of printing paper. Making such a cup takes about a minute. Something like this could easily have been made by Homo habilis from a large leaf or several leaves or other plant materials. These could have been modified to work as carrying baskets with a handle or straps to carry on the back or to hang from the shoulder.

How To Make A Paper Cup That Holds Water (HD) **(1.5-minute video)**

https://www.youtube.com/watch?v=q6u_Ag6UTqs

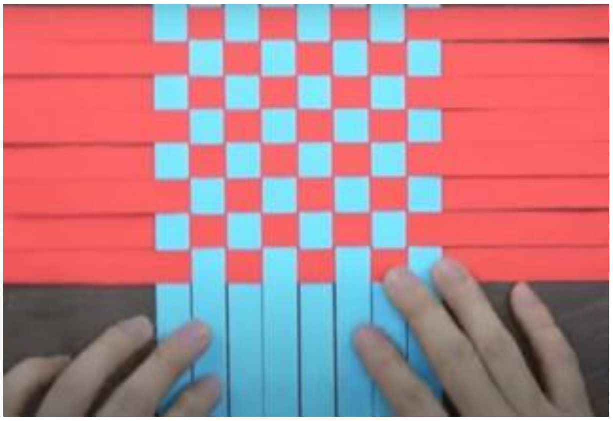
Photos from another how-to video on YouTube
How to Make a Paper Cup - Easy Tutorials
https://www.youtube.com/watch?v=GFo2uANiVLs&feature=emb_rel_pause

This recent archeological excavation found that palm trees were part of the changing environment at one time. Palm leaves are especially useful for making simple fast woven-fiber items.

> "Our research reveals that the geological, sedimentary and plant landscapes around Ewass Oldupa changed a lot, and quickly," the researchers said.
> "Yet humans kept coming back here to use local resources for over 200,000 years.
> "They used a great diversity of habitats: fern meadows, woodland mosaics, naturally burned landscapes, lakeside PALM GROVES,[ED: my emphasis] steppes."
> **(Sci-news.com, 2 Million Years Ago)**

The next video shows how to make a very simple but more advanced basket and uses standard basket weaving techniques. It uses paper strips and takes about five minutes to create. This use of strips is similar to basket-weaving with palm leaves detailed next.

Paper Weaving Basket **(4-minute video)**
This basket is created like the palm leaf basket next.
https://www.youtube.com/watch?v=zBCWVNDliQo



This next how-to video shows how to make a 'primitive' traditional basket. It is based on the same principles as the paper basket in the video above. It is strong and durable but not complicated and only takes minutes to make.

How To Make A Primitive Basket **(5-minute video)**
A simple quick basket made from palm leaves.
https://www.youtube.com/watch?v=5J_AMS8vbgs

Carrying basket of the Sherente people in Brazil.
National Museum of Ethnology, Osaka, Japan. Collected in 1977.
(Commons.wikimedia.org)
A basket that uses the basic simple weaving method shown above.

So as basket-weaving developed, Hominins might have used strips of palm leaves or other such plant material to make similar items, since one of their changing environments included palm trees.

See the next set of pictures about karagumoy leaves in the Philippines that can be used to create strong but basic baskets. (Click on any picture to see the images as a 'slide show'.)



"Pandanus simplex is an economically important species of Pandanus (screwpine) (They are palm-like, dioecious trees) endemic to the Philippines. It is commonly known as karagumoy (also spelled karagomoy or karagomoi) or kalagimay. Its leaves and fibers are used widely in the Philippines for thatching, ropes, and weaving various traditional handicrafts like baskets and mats." (Wikipedia.com) (Commons.wikimedia.org)

CONCLUSION

But again, the key point is quite simple. Would these intelligent hominins spend a full day (round trip plus gathering) walking to a place 12 km away without having a container to help them carry back the stones that they had found? This does not seem likely.

So I believe this study now adds one more bit of evidence, to the many others I have written about in previous articles, that suggests that basketry may have begun quite early in the evolution of hominins.

AFTERWORD

Instead of the "Stone Age," it might be more appropriate to describe earlier eras of human existence as also being in the "Basket Age." When basketry started is, of course, up for debate. It might have been in the Upper Paleolithic or the Lower Paleolithic, for example.

In earlier articles, I have made the point that for about 100 years archeological authorities held that basket-weaving was not possible before 10 - 15 kya, i.e., it was a technology of Neolithic agricultural societies. These authorities felt that basket-making would have been too demanding and time consuming for earlier hunter-gatherer societies. So this idea effectively prevented any explorations into the possibility of basketry in the Paleolithic era, the era of hunter-gatherers. Now, finally, that barrier has been disproved and it is clear that basket making did happen in at least the Upper Paleolithic and possibly earlier. I have written about this in detail in my series of articles about basket-weaving.

See a full list of these articles:
https://deconstructingtime.blogspot.com/p/blog-page.html

However, the question still remains, how long ago did basketry begin? The current thinking is that it probably began in the earliest part of the Upper Paleolithic or perhaps 40 - 50 kya. Yet I believe it could have happened much earlier, i.e., 2-3 mya or millions of years ago. The key point is this: Now that we know that basket-weaving was not incompatible with a hunter-gatherer lifestyle and would have made a major survival difference, it could have begun with our earliest hunter-gatherer ancestors, Homo erectus or even Homo habilis.

We humans have been hunter-gatherers for millions of years while agriculture has been around for only 10-20 thousand years and civilization for a mere 5 thousand years. When human-like creatures were just getting a foothold on survival millions of years ago, basket technology would have proven invaluable. It would have enhanced the ability to gather plants, collect fish, and carry various materials, for example. Plus these people lived in the natural world of plants and fibers -- the materials needed to make baskets, so it seems logical that they would have made carrying devices.

The problem, of course, is that fibers decay and do not leave much evidence behind. But with modern forensics, we may be able to overcome this barrier such as looking at the microwear cutting patterns on Oldowan and Acheulean stone tools.

It is important to note that two well-respected anthropologists came up with a list of cultural universals, i.e., attributes common to all cultures, which included several things that were consistent with the idea that early cultures could have made baskets. George Murdock in the book, *The Common Denominator of Cultures in The Science of Man in the World Crisis* (Edited by Ralph Linton, New York: Columbia University Press; 1945: 123-142) listed weaving, tool-making, and ethno-botany as common to all cultures. Donald Brown in his book *Human Universals* (1991), listed tool and tool making, cordage, and containers.

In my past articles, I have listed over 20 facts that suggest basketry could have begun much earlier than previously thought.

And if it turns out that basketry was practiced millions or hundreds of thousands of years ago, we might need to revise our ideas about early human technology. As an article in Discovery Magazine suggested, we may want to rethink our categories. Instead of characterizing these early hominin time-periods as only belonging to the "Stone Age" it might make sense to think of them also as belonging to a "Basket Age."
(Menon, 1996, *The Basket Age*)

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Article #10
Basket-Weaving Education and Its Cognitive Aspects

"Baby in the basket by Jeg & Sally Sørøver."
https://commons.wikimedia.org/wiki/File:Jeg_er_Sally_Sørøver.._(161970299).jpg

ABSTRACT: Basket-weaving classes, programs, and instruction books for ages 3 to 18 years old may provide insights into the cognitive demands of basket-weaving and the development of those skills. An understanding of the cognitive skills as related to basketry may apply to the possible early use of basket technology by Lower, Middle or Upper Paleolithic hominins such as Homo habilis 2 million years ago.

NOTE: This is the 10th article I have written about the possibility of basket-weaving in the Lower Paleolithic era. Please see the Afterword for more about this cycle of articles.

INTRODUCTION

I have written the following in several of my articles about basket-weaving in the Paleolithic era.

After reading an almost forgotten book by noted French archeologist Gustave Chauvet, Dr. Paul Bahn wrote in 2001 that, "It is a long-overdue development that, 90 years after Chauvet's publication, prehistory seems ready to at last accept the probably HUGE IMPORTANCE OF BASKETRY [ED: my emphasis] **and simple weaving in the Upper Palaeolithic." [1]**

In this article I want to focus on the phrase 'the probably huge importance of basketry' in not just the Upper Paleolithic, but, perhaps, the Middle and Lower Paleolithic as well.

And saying 'huge importance' is not an exaggeration. As I wrote in my article on *Overcoming Gender Bias In Paleolithic Research*:
Today the long-overdue acceptance of evidence about basket-weaving in the Paleolithic era rewrites a considerable amount of history. Furthermore, if basket-weaving is much older, perhaps as old as the making of stone tools, it is a game-changer. It is so important it could alter the story of human evolution, human cognition, and the development of culture along with our understanding of who we are, what we believe, and how we got to where we are today.

I think there are three main areas that the early development of basket-weaving could have affected.

#1. Survival
The use of baskets could have allowed hominins to generally gather more food and materials in their immediate area plus gather more food and materials that were distant from their camp. Basket technology would also have allowed them to process the food such as baskets for winnowing, and then to store the food. This may have given hominins the 'edge' which allowed them to survive.

#2. Cognition
The creation of basic woven baskets (I have suggested that some of the first baskets were made with a random weave technique) was a cognitive leap. As basketry developed the process became increasingly complex, as all processes do, which added to the growth of cognitive skills. Some of the cognitive aspects included the conception of a design before construction, an understanding of shape and volume, an understanding of structure and engineering in terms of strength and flexibility, and an understanding of plant materials that had the necessary properties. Basic math and geometry concepts could have developed from both the creation of baskets and the use of baskets.

About Random Weave
Making a basket led to more than its tangible benefits of gathering more food and carrying tools.
It was engineering a space, a portable space -- a space which was designed by a human for a specific purpose and a specific use. And a basket was designed to be durable.
The first baskets, based on a random weave, did not require tools and could have been woven with hands only.
As I have written early hominins would have known about containers and basic weaving from their familiarity with weaverbirds and their complex nests, birds who often lived in close proximity to these early humans in baobab trees on the African savanna.
Basket-weaving also provided a link between body movement and hands-on construction with more abstract thinking. The mind could see a direct result that was put together by a coordinated design concept made by hand and by the rhythms of weaving a basket.

Random Basket by photographer and creator Nan Bowles.

#3. Culture

As I have written in another article, basketry could have provided a set of metaphors and a common language that influenced how a tribe functioned in their daily lives. Although basketry was primarily practiced by women (judging from the Archaic Native American Indian examples) men, probably at times, used weaving techniques such as with fish traps and also used the products that women created. So men were familiar with the functionality of baskets as they employed them in their work. Children would have been familiar with the use of baskets from an early age. This means that basketry provided a shared understanding of things like structure, purpose, volume, and strength that all could refer to.

COGNITION AND BASKET-WEAVING

The point of this article is to focus on cognition, even though these other aspects of basket-weaving were just as important. My task in this article was to find hard evidence that indicated increasing cognitive skills as basketry and a woven-fiber technology developed.

Recently science has devised methods for studying cognitive skills in early hominins. A number of studies have been done in which the making of stone tools from different eras was compared in terms of their cognitive demands on the human brain. For example, the brain activity of people who were skilled in making stone tools that mimicked Oldowan and Acheulean tools were compared. In general, as each tool technology became more complex and advanced, the cognitive demands and cognitive complexity increased as well.

Read the following study:
Cognitive Demands of Lower Paleolithic Toolmaking
https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4398452/

Today there is a very specific way to understand the cognitive aspects of basket-weaving, one which describes in detail what is grasped as the process becomes more advanced. Basketry has been used for over 100 years to teach very young students along with much older students basic skills that cover many of the cognitive and mathematical skills that were described earlier.

I believe the best way to explain and describe the cognitive aspects of basket-weaving is to list the various educational programs and projects that are available today for all ages from kindergarten to high school. This listing and the descriptions of the courses show exactly how basket-weaving has the power to increase cognitive skills.

What follows is a brief listing of only some of the 'basket based learning' that is available today. This list goes from age 3 to grade 12 (or age 18). At each stage, students learn additional mathematical, spatial, geometric, conceptual, and problem-solving skills.

It stands to reason that if a 5-year-old or an 8-year-old can learn basic cognitive skills with basketry, then early hominins, such as Homo habilis, could have done the same. Furthermore, if there was no language among early hominins such as Homo habilis, this did not have to be a barrier to teaching the next generation about basket-weaving skills. See the "Learning Without A Language" section at the end of this article.

As the skills and craft evolved, it would have increased the cognitive development of early humans. So, Homo erectus with a larger brain might have been operating at the 12-year-old, or 6th-grade level.

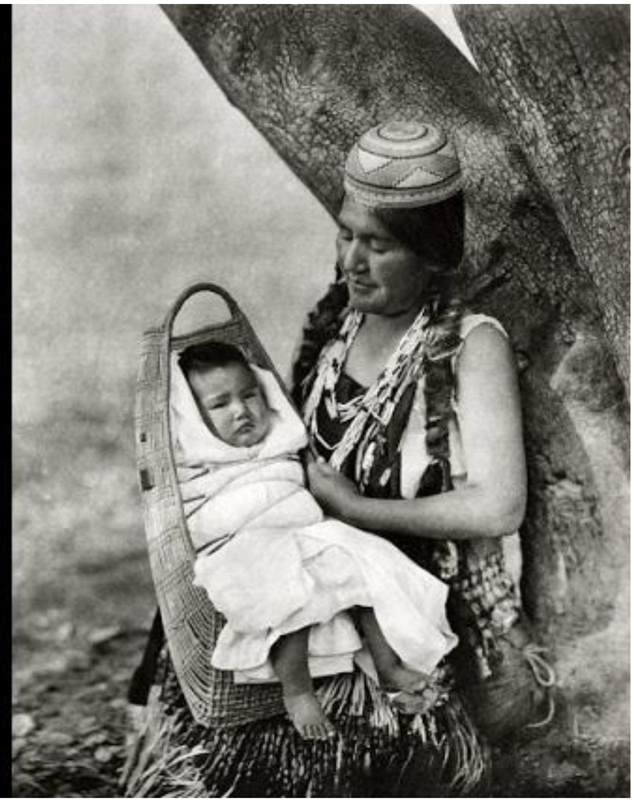
Naturally, this is all conjecture, but, nevertheless, it is a real-world example of how basket-weaving skills could have developed at different and advancing stages of brain development.

But don't take my word for it. In the next section read the program descriptions quoted from educators, teachers, and even government programs that explain and attest to the value of using basket-weaving to teach conceptual and mathematical ideas to students of all ages.

YOUNG CHILDREN & BASKETS

Until less than one hundred years ago, most children were in contact with or surrounded by basketry almost from the moment of birth. This meant that the basic structure and purpose of basketry was familiar to them even before they could talk. And with this kind of familiarity, it was easy to use baskets to teach basic concepts of shape and volume and then move on to more complicated ideas about math and geometry. It is probably safe to assume that this was true for prehistoric peoples as well.

"Maricopa child in a basket, circa 1907".
https://commons.wikimedia.org/wiki/File:Maricopa_child.jpg



(LEFT) "Yurok or Hupa, Late 19th century, Cradle Basket, California, 1917."
https://commons.wikimedia.org/wiki/File:lossy-page1-727px-California,_Yurok_or_Hupa,_Late_19th_century_-_Cradle_Basket_-_1917.426_-_Cleveland_Museum_of_Art.tif.jpg
(RIGHT) "Edward S. Curtis Collection of Indian People."
https://commons.wikimedia.org/wiki/File:Edward_S._Curtis_Collection_People_004.jpg

(LEFT) Rembrandt, Harmensz van Rijn: Detail from *The Holy Family with Angels*, 1645.
https://commons.wikimedia.org/wiki/File:Rembrandt_Harmensz._van_Rijn_058.jpg
(RIGHT) Samuel van Hoogstraten: "Mother with a Child in a Wicker Cradle."

https://commons.wikimedia.org/wiki/File:Samuel_van_Hoogstraten_-_Mother_with_a_Child_in_a_Wicker_Cradle_-_WGA11723.jpg

(LEFT) "Studio portrait of a young girl with basket."
https://commons.wikimedia.org/wiki/File:COLLECTIE_TROPENMUSEUM_Portret_van_een_Europees_kind_in_sarong_en_kabaja_bij_een_koffiestruik_TMnr_10023886.jpg
(RIGHT) "Studio portrait of a young girl in the Dutch East Indies."
https://commons.wikimedia.org/wiki/File:COLLECTIE_TROPENMUSEUM_Studioportret_van_een_jong_meisje_Nederlands-Indië_TMnr_60013198.jpg

(LEFT) "Silva, 3 years old, Planina, goes to the field with her mother in 1954," Slovenia.

https://commons.wikimedia.org/wiki/File:Silva,_3_leta,_Planina,_gre_s_koškom_z_materjo_na_njivo_1954.jpg

(RIGHT) "Young Havasupai Indian girl carrying a Kathak [burden basket] on her back, ca.1900."
https://commons.wikimedia.org/wiki/File:Young_Havasupai_Indian_girl_carrying_a__Kathak__on_her_back,_ca.1900_(CHS-3394).jpg

**CONTEMPORARY EDUCATIONAL PROGRAMS
THAT USE BASKETRY AND BASKET-WEAVING TODAY**

The following school programs are quoted from the cited website.

"Girl basketweaving, Fort Ross State Historic Park. Jenner, California. 2015."
https://commons.wikimedia.org/wiki/File:Girl_basketweaving_-_Fort_Ross_State_Historic_Park_-_Jenner,_California_-_Stierch_-_A.jpg
https://commons.wikimedia.org/wiki/File:Girl_basketweaving_-_Fort_Ross_State_Historic_Park_-_Jenner,_California_-_Stierch_-_B.jpg

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PRESCHOOL, AGE 3 TO 5

**Early Years Foundation Stage
The University of Cambridge**

http://nrich.maths.org/early-years

The 'Early Years Foundation Stage', for children age 3 to 5, is a project that is "an innovative collaboration between the Faculties of Mathematics and Education at the University of Cambridge which focuses on problem-solving and on creating opportunities for students to learn mathematics through exploration and discussion."

Baskets

https://nrich.maths.org/content/id/9716/Baskets%202020.pdf

OR https://nrich.maths.org/9716

Counting reliably. Solving problems, including doubling, halving and sharing. Using everyday language to talk about size, capacity, position and distance.

The Activity

Place some baskets (probably 3 to 8) in the middle of a suitable space along with the objects which should be near to, but not in, the baskets.

The Mathematical Journey

Properties of shapes:

• choosing particular baskets for particular objects having analysed the properties of the shapes involved

Position and spatial properties:

• using positional language, for example: on top of, next to, underneath, in front of, behind, between, left, right, etc., to describe the items in the baskets and the positions of the baskets themselves

Number:

• counting and cardinality – progressing from knowing some number words, to saying one number for each object, then knowing the number of the whole group

"Children's Basket-Making Class, Upper Arlington, Ohio, 1918."
https://commons.wikimedia.org/wiki/File:Children%27s_Basket-Making_Class,_1918_(4406415497).jpg

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3RD - 5TH GRADE

Math in Basketry: Basketry Kit
Grade Level: Upper Elementary: Third Grade through Fifth Grade
Subject: Math, Social Studies

https://www.nps.gov/teachers/classrooms/basketry-kit.htm

A kit for making and studying baskets.

This kit blends culture with math. Students learn the mathematical properties of shapes, patterns, angles, and symmetry used in Tlingit basketry *[ED: Native American Indian].* Kit includes basket, weaving books, and references for borrowing museum items for school use.

National School of Wickerwork and Basketry of Fayl-Billot, making large baskets, 1910.
https://commons.wikimedia.org/wiki/File:Fayl_billot_1910_75388.jpg

4TH GRADE

Math In A Basket
In-School 4th Grade

https://dramaticresults.org/our_program/math-in-a-basket/

Students integrate math, social studies, and the arts when learning to make reed baskets from scratch. This unique program meets Common Core Content Standards for both Visual Art and Mathematics. By finding the surface area, perimeter, and volume of their baskets students practice measurement. Furthermore, the process of planning, designing, and creating helps students become familiar with engineering concepts. Rudiments of algebra and geometry are integrated into Math in a Basket curriculum.

Student Impact:
The latest evaluation results show that over 3 years, the program:
Improved math and art skills for nearly 900 students.
Increased teachers’ abilities to integrate the arts in class.
Benefitted social-emotional learning for students and teachers.

"Basket makers, Industrial School, Baguio, Philippines, 1911."
https://commons.wikimedia.org/wiki/File:Basket_makers,_Industrial_School,_Baguio,_P.I_(NYPL_Hades-2359625-4044390).tiff

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6TH GRADE

Building Baskets, Benchmark Style

https://www.benchmarkschool.org/news/news/news-detail/~board/news/post/building-baskets-benchmark-style

Consider what you might need to survive in a hunter-gatherer society. What tools would you need, and how would you get them?

Nicole Scali asked her students to create functional hunter-gatherer baskets using only glue, 80 strips of paper, brushes, and a plan. Would their baskets hold up? The class intended to find out, holding a competition to see which baskets could carry the most weight for the longest time.

Prior to beginning construction, the class brainstormed. What obstacles might they encounter? They considered that the paper might rip, they might run out of paper, and they might be stymied by not having an example to follow.

Next came planning. Working in teams of two, students sketched their designs. When construction began...it became clear that no two basket designs were alike. Some teams made woven designs, some layered, and some used twisted paper.

When the baskets were completed and the day for testing arrived, they...ran into a problem they hadn't anticipated: what to do with baskets that broke in some way prior to testing? Falling back on hunter-gatherer methods, Nicole allowed the students whose baskets needed fixing to go out into the playground and use objects found in nature, including bark and stems from leaves, to make repairs.

Nicole... says, "I was very impressed with how creative the kids were, both in their designs and in their flexibility. They did a great job and were pleased with the outcome."

Basket weaving with the Sisters; Karlshof nursing home, Germany.

https://commons.wikimedia.org/wiki/File:Photo_-_Lauterhofen_-_Karlshof_-_Korbflechterei_-_Schwestern.jpg

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5TH - 12TH GRADE

Math for Real: Weaving Mathematical Concepts
Grades 5 - 12
Funding provided by the Canadian federal government

https://theconversation.com/indigenous-basket-weaving-makes-an-excellent-digital-math-lesson-110094

Indigenous Basket-Weaving Makes An Excellent Digital Math Lesson
By Veselin Jungic, Professor, Simon Fraser University

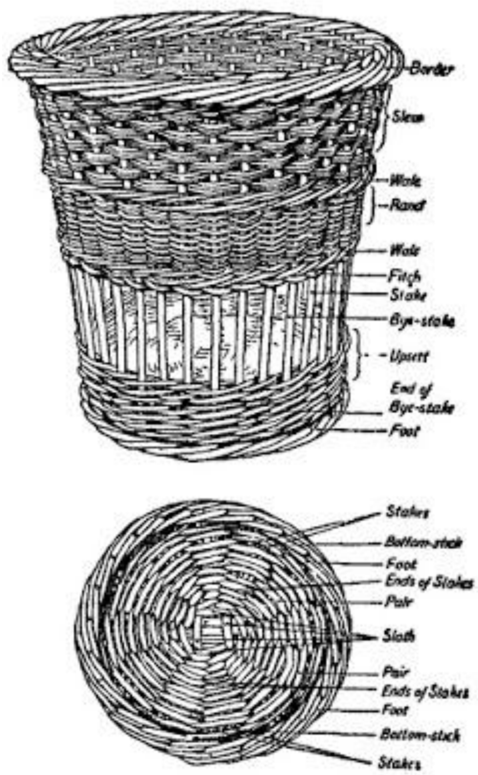
The Tla'amin baskets are examples of functional mathematics and art. Baskets of all shapes and sizes are built with the purpose of packing food, storing goods or even as baby cribs. Building a basket is a small bio-engineering project that requires mathematical thinking and math-related skills. These skills include precise measurement, the creation of appropriate shapes, and adhering to certain well-established patterns.

Digital classroom learning
Callysto is a multimodal learning platform available to grades 5-12 students across Canada at no charge. It was launched in fall 2017 by the Pacific Institute for Mathematical Sciences (PIMS) and Cybera, an Alberta-based digital infrastructure non-profit organization. The Callysto program lists as its main goal "help[ing] young learners complete high school with the fundamental skills — computational and design thinking — required to be able to tackle any challenge they might face." The funding was provided by the Canadian federal government through the CanCode program.

"Country School- Everyday Life at Baldock County Council School, Baldock, Hertfordshire, England, UK, 1944."

https://commons.wikimedia.org/wiki/File:Country_School-_Everyday_Life_at_Baldock_County_Council_School,_Baldock,_Hertfordshire,_England,_UK,_1944_D20551.jpg

"Classes, Department of the Interior, Bureau of Indian Affairs, Pierre Agency, (1954 - 1972)."
https://commons.wikimedia.org/wiki/File:Classes_-_NARA_-_285433.jpg



"Illustration from 1911 Encyclopædia Britannica, article BASKET."

https://commons.wikimedia.org/wiki/File:Basket_1.png

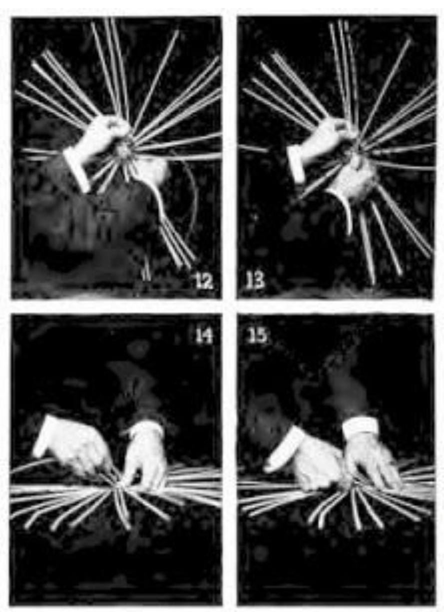
AN INSTRUCTION BOOK

The Basket Maker
Author: Turner, Luther Weston.
Worchester, Mass.: The Davis Press, 1909.

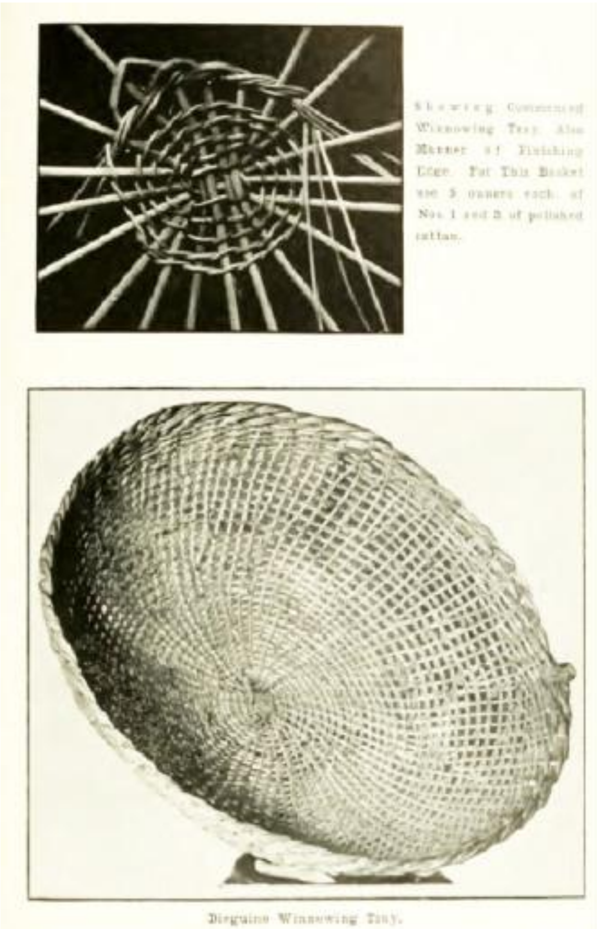
https://archive.org/details/basketmaker00turniala

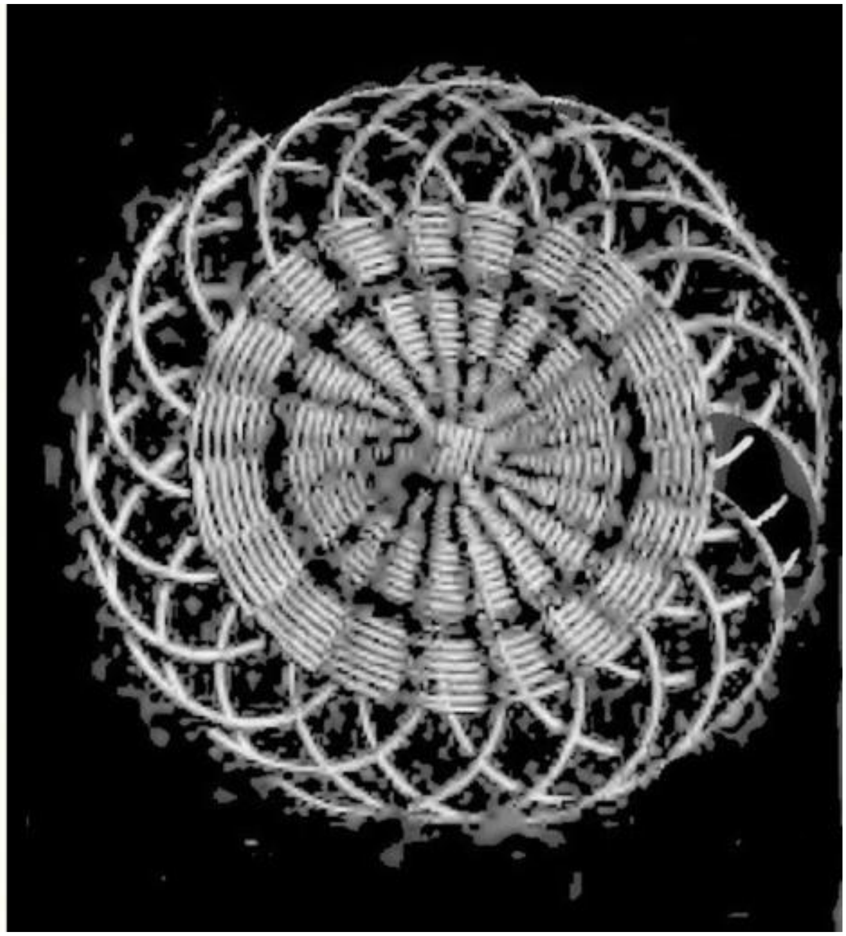
"A pupil should not be allowed to progress who cannot make the bottom of a basket and have it strong and closely woven. He must understand that no basket can be firmly made unless its foundation is right."

"But the expression of thought through basketry requires almost no tools (a knife and scratch-awl), has variety as to form and color and almost unlimited possibilities in design."



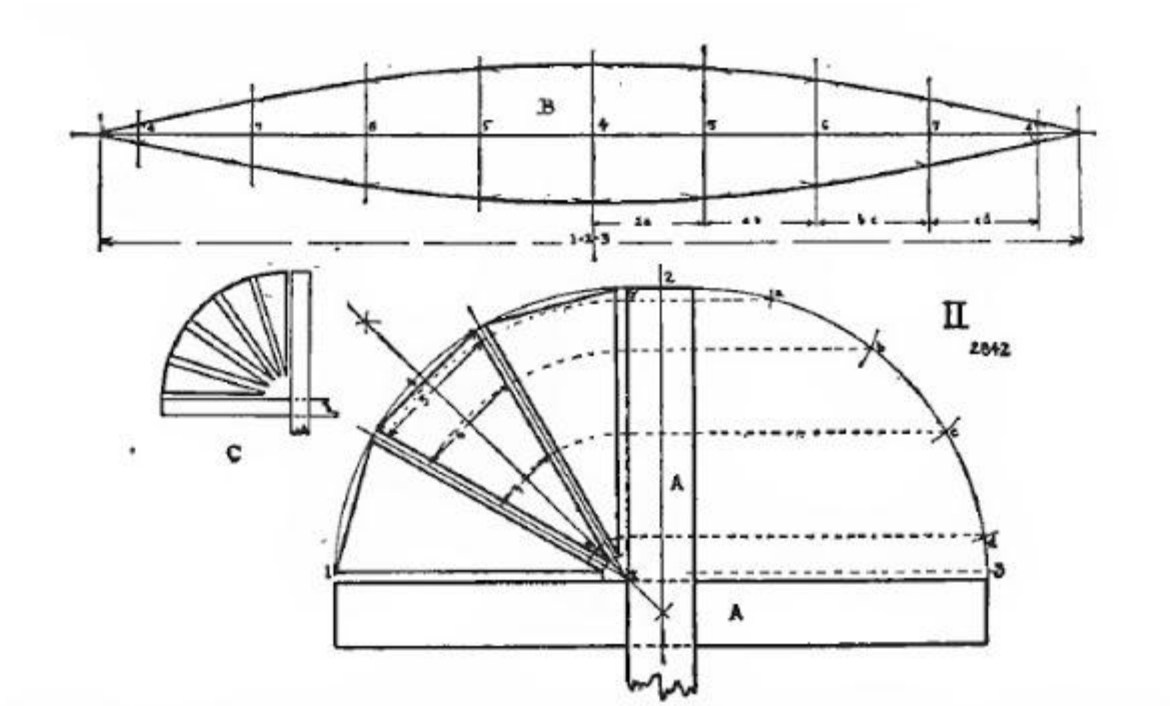
(LEFT) Page 30, Turner, Luther Weston. *The Basket Maker*.
<https://archive.org/details/basketmaker00turniala>. Accessed 28 November 2020.
(RIGHT) "Wicker basket starting."
https://commons.wikimedia.org/wiki/File:Cistell_vimet.jpg





(LEFT) Page 75, N*avajo School of Indian Basketry. Indian Basket Weaving.* Los Angeles: Wedon & Spreng Co., 1903. <https://archive.org/details/indianbasketweav00nava>. Accessed 28 November 2020.

(RIGHT) Page 12, Turner, Luther Weston. *The Basket Maker*. <https://archive.org/details/basketmaker00turniala>. Accessed 28 November 2020.



The geometry of melon-shaped baskets.
Page 53, Turner, Luther Weston. *The Basket Maker.* .
<https://archive.org/details/basketmaker00turniala>. Accessed 28 November 2020.

LEARNING WITHOUT A LANGUAGE OR WORDS

Learning And Teaching Via Imitation

According to an article in the *Evolution of Culture* [2], very few animals possess the ability to learn via imitation. But the genus Homo was/is one of them. Susan Blackmore of the Department of Psychology, University of the West of England, Bristol, United Kingdom wrote the following:
"The first obvious signs of imitation are the stone tools made by Homo habilis about 2.5 million years ago, although their form did not change very much for another million years. It seems likely that less durable tools were made before then, possibly carrying baskets, slings, wooden tools and so on." [3]

"What was it these early stone-knappers knew that chimpanzees can't get? I think one thing was that early hominids were much better at copying motor procedures — we can watch an individual perform a motor task and mimic it. Chimpanzees are terrible at that — they see a task and have to reinvent the wheel. This gets back to mirror neurons and the copying of behavior."
Quotation from paleoanthropologist Thomas Wynn of the University of Colorado at Colorado Springs in an article by Charles Choi. entitled "Human Evolution: The Origin of Tool Use." [4]

So my final example of teaching comes from a study of the lives of the African Aka hunter-gatherer women by Bonnie Hewlett [5]:

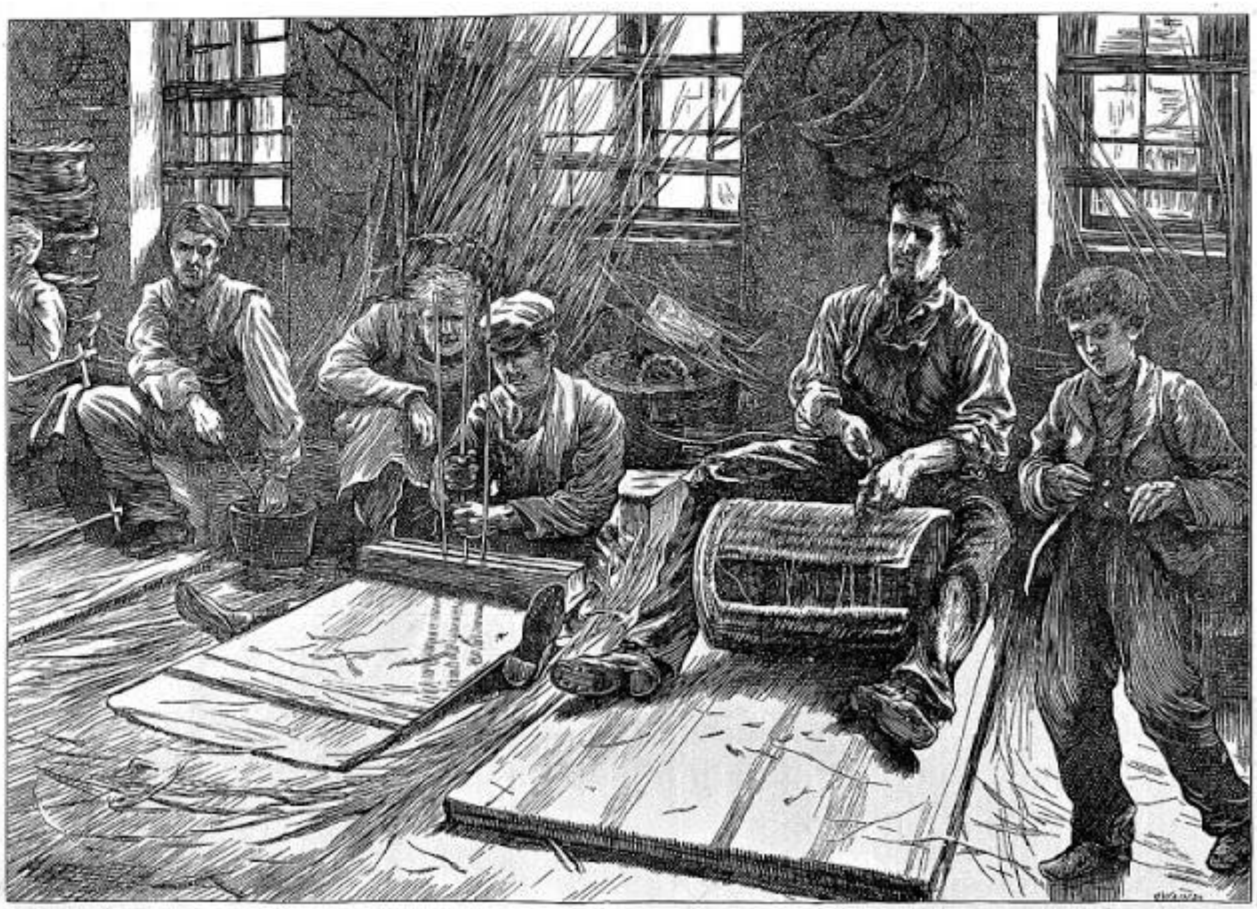
Bonnie Hewlett asked women to teach her how to be an Aka woman. In order to show her how to make a basket, a woman sat next to her, touching her and never left her side. The woman started the basket, ripped it apart, then asked her to try it on her own. As she tried to weave, some Aka laughed and commented; after a short time, a 12-year-old girl came over, sat next to her in the same way as the adult woman, demonstrated again how to do it, and then handed it back for her to try. Hewlett was not weaving correctly so the girl took her hand and helped her weave the twine. The mother and the 12-year-old spent three weeks, hours at a time, sitting right next to Hewlett until she completed the small children's basket. Both the Aka mother and young girl had pedagogic skills, knew how to use demonstration, pointing, feedback, and scaffolding.

(LEFT) Germany, 1860.
https://commons.wikimedia.org/wiki/File:Die_Gartenlaube_(1860)_b_429_3.jpg
(RIGHT) "Basketweaving at Fort Ross State Historic Park, Jenner, California."
https://commons.wikimedia.org/wiki/File:Basketweaving_at_Fort_Ross_State_Historic_Park_-_Jenner,_California_-_Stierch_1.jpg

TEACHERS, COMBAT SOLDIER REHAB & BLIND WORKERS

"Public Instruction Activities at the Teachers' Training College, Art Section, Basket Work Class, Brisbane City, Australia, April 1951."
https://commons.wikimedia.org/wiki/File:Queensland_State_Archives_1624_Public_Instruction_Activities_at_the_Teachers_Training_College_Art_Section_Basket_Work_Class_April_1951.png


(LEFT) "Reconstruction: occupational therapy, Walter Reed General Hospital, Washington, D.C., World War I."
https://commons.wikimedia.org/wiki/File:Reeve_004272.jpg
(RIGHT) "The War on War Nerves- Rehabilitation at Mill Hill Hospital, England, 1942."
https://commons.wikimedia.org/wiki/File:The_War_on_War_Nerves-_Rehabilitation_at_Mill_Hill_Hospital,_England,_1942_D11982.jpg



BLIND BASKET-MAKERS

"Blind Basket-makers," 19th century.
https://commons.wikimedia.org/wiki/File:Blind_Basket-makers_Wellcome_L0000904.jpg

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ESSAY ON ZULU BASKET MAKING:
AN EXPLANATION OF THE COGNITIVE ASPECTS OF TRADITIONAL BASKET-WEAVING

Juxtaposing Form, Function, and Social Symbolism:
An Ethnomathematical Analysis of Indigenous Technologies in the Zulu Culture
Project: Ethnomathematics and Indigenous Knowledge Systems
https://www.researchgate.net/publication/316089427_Juxtaposing_Form_Function_and_Social_Symbolism_An_Ethnomathematical_Analysis_of_Indigenous_Technologies_in_the_Zulu_Culture

"Zulu basket with cover."
https://commons.wikimedia.org/wiki/File:Brooklyn_Museum_52.80.3a-**b_Basket_with_Cover.jpg**

The following is quoted from the above website.

"For the Zulu culture, basketry technology requires thinking in terms of form, functionality, and the process of handling the vegetal materials. The materials, which are confined to the local vegetation of the Zululand, determine the kind of construction and consequently influence the shape of the baskets.

"In response to the delicate nature of the elements, the process of bending and folding gently but firmly follows a methodical configuration that adheres to certain specifications in the dimensions of the piece, to the flexibility of the design, and to the strength of the structure. The basket is composed of systematically repeated modular units or repeated sequences of units.

"The basket begins its existence as a flat surface and progressively takes a three dimensional shape, a kind of hemisphere in many variations. To get the desired dimensions, the basket maker resorts to successive subtractions, reducing the size of the materials used without interrupting the iterative patterns and the structural organization of the elements.

"Measuring, counting, timing, devising and structuring patterns, bending and folding according to afforded dimensions, and decision making are all examples of activity-situated ethnomathematical ideas.

"We contend hitherto that such technologies embody indigenous knowledges and skills that are methodically systematized yet ORALLY-BASED [*ED: my emphasis*]."

COGNITIVE DEVELOPMENT AND BASKET-WEAVING

Just how could basketry have affected thought and culture? We can point to one specific example in the early days of human civilizations.

Basket-weaving was central to the first civilization of Sumer. And without it, this first civilization could not have functioned -- as it needed baskets for agricultural work and for the transporting, distributing, and storing of crops. In addition, basket-weaving was used for a variety of items from reed mats to fences, grass houses, and large reed boats.

In the *Elementary Sumerian Glossary* [6], a basket weaver is defined as:" a reed craftsman, basket, and mat weaver." In this same glossary, there are 19 words relating to basketry and reed craftsmanship showing how important and pervasive it was within Sumerian society.

Moreover, basket-weaving was a highly revered skill. In a Sumerian creation myth the principal god, Enlil, declared that "the pickax and the basket build cities." [7] The 'craft of basket-weaving' was specifically mentioned in the about 100 MEs of Sumer, a list of the most important values, beliefs, and skills of Sumerian culture. [8]

**A number of myths in Mesopotamia and in Africa involve basketry and creation or cosmology. For example, (quoted from: https://www.britannica.com/art/basketry)
In Africa, the Dogons equated a basket with the sky.**

"The Dogon of West Africa tell how their first ancestor received a square-bottomed basket with a round mouth like those still used there in the 20th century. This basket, upended, served him as a model on which to erect a world system with a circular base representing the sun and a square terrace representing the sky."

Dogon basket.
https://commons.wikimedia.org/wiki/File:ASC_Leiden_-_W.E.A._van_Beek_Collection_-_Dogon_daily_life_03_-_Jauire_takes_the_millet_from_the_granary_for_the_daily_meal._In_principle,_only_men_can_get_millet_from_the_granary,_Tireli,_Mali_1980.jpg

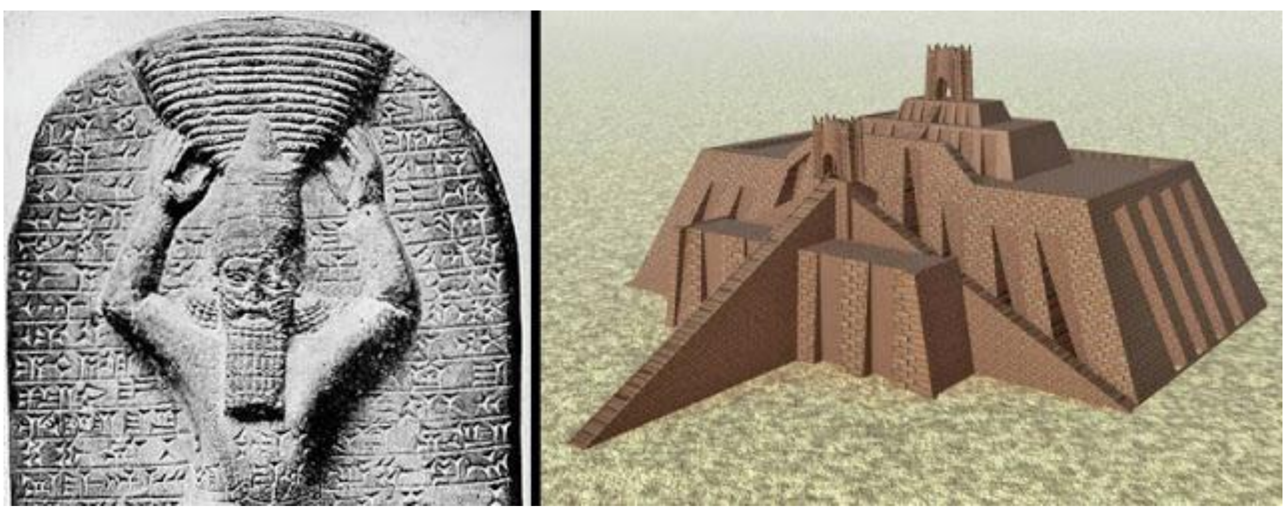
"The Babylonian god Marduk “plaited *[wove]* a wicker hurdle *[mat*] on the surface of the waters. He created dust and spread it on the hurdle.” Thus ancient Mesopotamian myth describes the creation of the Earth using a reed mat."

"Neolithic reed mat, Hemudu Culture, Zhejiang, China."
https://commons.wikimedia.org/wiki/File:Neolithic_reed_mat,_Hemudu_Culture,_Zhejiang,_1974.jpg

Furthermore, the basket was so important the king was required to perform a basket-bearing ceremony [9] when a new religious temple, called a ziggurat, was to be constructed. He carried the basket on his head during a ceremony to dedicate the start of construction and

then later metal figures of the king with a basket on his head, known as foundation pegs, were buried at key points during the construction of the building. [10] The ziggurat was a high temple made of bricks that was designed to bring religious clerics nearer to the sky so they could be closer to the gods in the heavens.

"Partially reconstructed facade and access staircase of the Ziggurat of Ur, originally built by Ur-Nammu, circa 2100 BCE."
https://commons.wikimedia.org/wiki/File:Ancient_ziggurat_at_Ali_Air_Base_Iraq_2005.jpg



(LEFT) King "Ashurbanipal as High Priest."
https://commons.wikimedia.org/wiki/File:Assurbanipal_als_hogepriester.jpg
(RIGHT) "Computer reconstruction of the Zugurat of Ur-Nammu, currently located on the outskirts of Nasiriyah and built at the beginning of the 21st century BC."
https://commons.wikimedia.org/wiki/File:Ziggurat_of_ur.jpg

"Foundation Figure in the form of a peg surmounted by the bust of King Ur-Namma, Neo-Sumerian, Ur III period, reign of Ur-Namma, c. 2112–2094 BCE."
https://commons.wikimedia.org/wiki/File:Foundation_figure_of_Ur-Namma_holding_a_basket_MET_DP375097.jpg

And because of the Sumerian familiarity with basketry, it is highly likely that it became a model for mapping out the night sky.

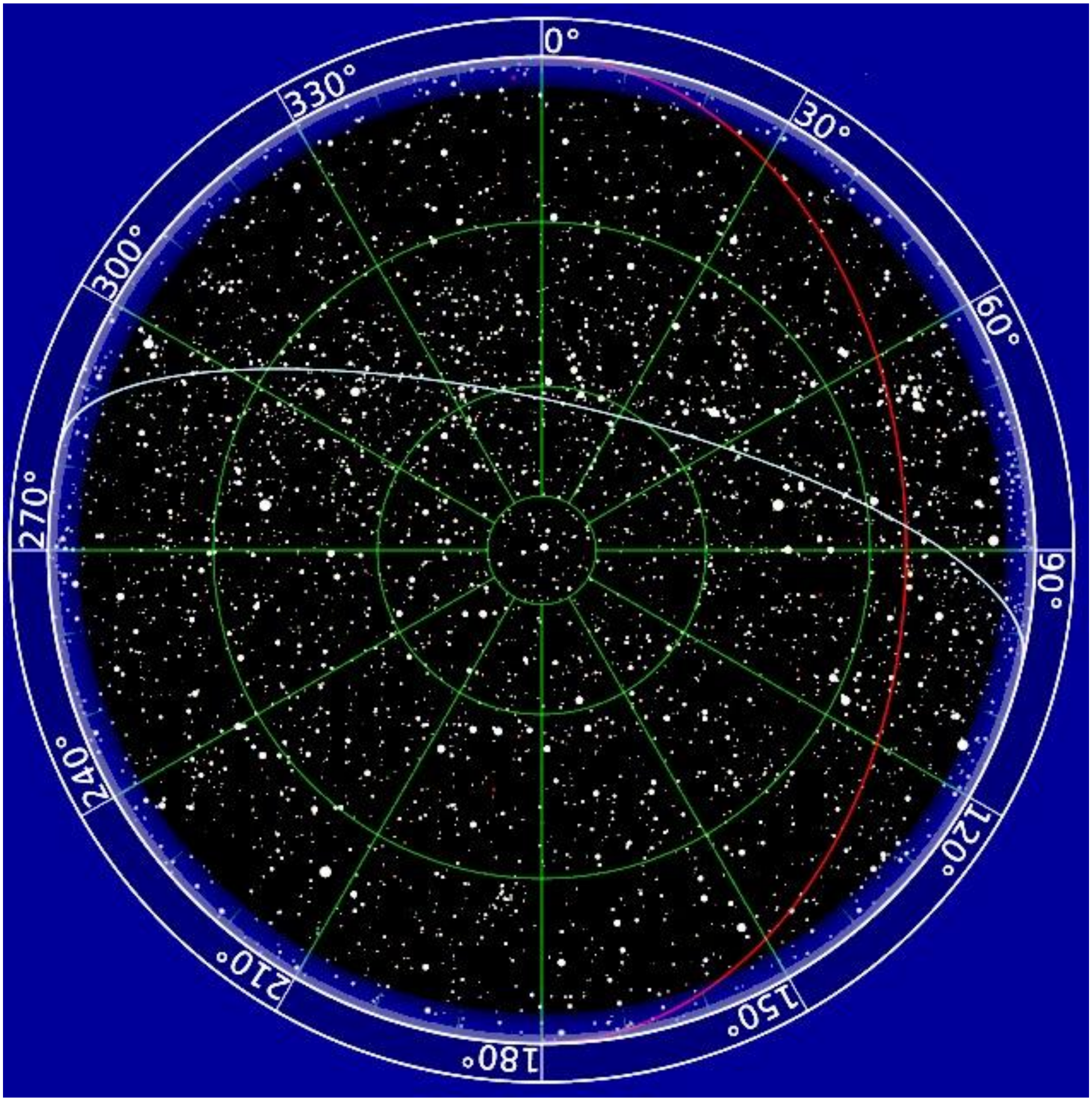
But how did this map of the stars and planets specifically relate to basket weaving?

Generally speaking, a basket is made up of two parts: vertical spokes and the horizontal weaver. This forms a regular grid that defines a space that can be expressed in mathematical terms. Basketry was so much a part of this culture it is likely that basket structure led to the Sumerian and then the later Babylonian concepts and maps of the stars and planets that were located by declination and right ascension which today can be thought of as latitude and longitude on the Earth projected into the sky.

"Markfelder Straße at the Canal Festival 2011 in Datteln" Germany.
https://commons.wikimedia.org/wiki/File:Datteln_-_KF2011_-_Markfelder_Straße_17_ies.jpg

The Babylonians developed a system to map out the stars in the sky based on a circular grid that was divided into 360 degrees. The sky was then further divided into hours, minutes, and seconds which both pinpointed the position of a star or a planet and also related to the movement and rotation of the heavens or the moving planets in the night sky. In other words, it added the element of time. In short, they had created a human model that defined space and time and that was so accurate and useful we still use it today.

"The Babylonian GU text arranges stars in 'strings' that lie along declination circles and thus measure right-ascensions or time intervals, and also employs the stars of the zenith, which are also separated by given right-ascensional differences."
Reading: Babylonia. LibreTexts [11]



This 360-degree circle of the stars is still how the night sky is understood in astronomy today. In this picture, you can also see the vertical and horizontal grid lines.
"Map of the night sky: star positions from the Bright Stars Catalog, 5th Edition. Rasterized." 2006.
https://commons.wikimedia.org/wiki/File:Sky.png

So it is possible that the basket was a model for a mathematical spatial pattern that also included time.

Commenting on a new recent understanding of the precision of this Babylonian math, Alexander Jones, a historian at New York University, said it showed:
"a more abstract and profound conception of a geometrical object in which one dimension represents time, It's much earlier than these concepts have ever been found before, he said, and "their presence … testifies to the revolutionary brilliance of the unknown Mesopotamian scholars who constructed Babylonian mathematical astronomy." [12]

As I said this system is still in use today and utilizes the same mathematical system such as 360 degrees divided into hours, minutes, and seconds. It defined a 'grid' not unlike today's Cartesian coordinate system which is essential to our modern way of life and, for example, forms the basis of computer graphs and modeling.

In fact, a recent study of the Babylonian system corresponded exactly with a calculation using modern graphing. Mathieu Ossendrijver, an astroarchaeologist at Humboldt University of Berlin who could also read ancient cuneiform Sumerian tablets, said in an interview with Space.com [12] that:

The process of measuring that geometric shape *[ED: regarding the planet Jupiter as it was indicated on the Babylonian grid]* was described on the Babylonian tablets. Although the tablets did not have any visible graphs, the calculations done matched this technique precisely.

Michael Lombardi, a metrologist in the Time and Frequency Division at the National Institute of Standards and Technology in Boulder, Colorado wrote the following for Scientific American:

Although it is no longer used for general computation, the sexagesimal system *[ED: base 60]* is still used to measure angles, geographic coordinates and time. In fact, both the circular face of a clock and the sphere of a globe owe their divisions to a 4,000-year-old numeric system of the Babylonians.[13]

CONCLUSION

I believe it is clear from this article, that basket-weaving would have been possible even with the limited brain capacity of Homo habilis or other early hominins. And it could have led to increased cognitive skills as basketry became more complex, the same dynamic that has been hypothesized for the evolution of stone tools, from Oldowan to Acheulean, for example. And these in turn may have led to an evolution that favored a larger brain which again appears to be the case with the development of stone tools.

Ancient Egyptian "Toy Basket with Contents, From Egypt, Upper Egypt, Thebes, Deir el-Bahri, Temple of Mentuhotep II, circa 712–525 B.C."

https://commons.wikimedia.org/wiki/File:Toy_Basket_with_Contents_MET_22.3.65ab_back.jpg

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AFTERWORD

This is my 10th article about the possibility that basket-weaving could have been an early technology of hominins in the Lower Paleolithic era. My first article in September 2019 listed a number of reasons that this was likely. But now a year and a half later, I have explored many different aspects of this hypothesis which has made my case much stronger. For example, I have found evidence that hominins lived in close proximity to weaverbirds who made elaborate woven nests that could have been a model for early basket weaving. And I have examined the later discovery of right-angle construction which opened the door to an almost limitless number of well-made functional designs and constructions from small to large. I have also examined a number of assumptions that have turned out to be false, but which, in the past, have prevented research into the early existence of basketry in human cultures.

But now with this 10th article, I have in a sense, come full circle. Since this is a blog about the human experience of time, I believe that baskets and the process of making baskets may have been models for time itself. The steps for making a basket could have eventually become time metaphors, for example. And so I ended this article with an example of a space-time grid, the map of the sky, designed by the avid basket makers of Sumer and Babylon, which may have been based on basket construction.

Since time is invisible, cultures have needed metaphors to describe it, such as time is like a flowing river, or the past is behind us and the future ahead of us. Some physical constructs have also been useful such as the hourglass in which the sand at the top is the future, the sand that has fallen to the bottom is the past and the sand that is flowing from top to bottom is the present. The expression "the sands of time" comes from the hourglass.


"Wooden hourglass."
https://commons.wikimedia.org/wiki/File:Wooden_hourglass_3.jpg

Basketry could also have been a visible metaphor for time. This is because making the basket involved creating a regular grid that took a specific amount of time to construct. Furthermore, the construction and the time element could be further divided as each row took a specific amount of time. Therefore a basket might have been thought of as a physical visual representation of time and, moreover, it was a representation that would have been easily understood.

"Bamboo basket making."
https://commons.wikimedia.org/wiki/File:A_bamboo_basket_making.JPG

As I said almost ten years ago in the first post on this blog, an understanding of time was/is essential for human cognition. Without it we could not plan or build or develop -- and words about time are present in all languages. How we developed that sense of time, of past, present, future, and duration -- which only we have and which the animals do not have -- is one of the great achievements of humankind, and without it, civilization could not exist. The gradual human understanding of time and how it came about is one of the great mysteries and one whose importance has been virtually ignored.

Hourglass icon on the computer.
https://commons.wikimedia.org/wiki/File:Cursor-design1-hourglass.svg

ENDNOTES

[1] Bahn, Dr. Paul. (2001). "Palaeolithic weaving – a contribution from Chauvet." Antiquity, 75:271-272.

[2] Blackmore, Susan. "The Origins of Imitation." The Evolution of Culture: Volume IV (The International Library of Essays on Evolutionary Thought), Stefan Linquist (Editor). No page numbers. Routledge, July 28, 2010.

[3] Blackmore, Susan. "Evolution and Memes: The Human Brain as a Selective Imitation Device." Cybernetics and Systems, Vol 32:1, 225-255, 2001,

[4] Quotation from paleoanthropologist Thomas Wynn of the University of Colorado at Colorado Springs in an article by Charles Choi entitled "Human Evolution: The Origin of Tool Use." LiveScience, November 11, 2009.
<https://www.livescience.com/7968-human-evolution-origin-tool.html>
Accessed 10/26/2019.

[5] Boyette, Adam; Hewlett, Barry. "Teaching in Hunter-Gatherers." Washington State University. # Springer Science+Business Media Dordrecht 2017.
DOI 10.1007/s13164-017-0347-2.
BoyetteHewlett_teaching_in_HG_tYq6NC7.pdf

[6] Foxvog, Daniel A. Elementary Sumerian Glossary. University of California at Berkeley revised 2008.
SumerianGlossaryFoxvog.pdf

[7] Kramer, Samuel Noah. Sumerian Mythology, Revised Edition. University of Pennsylvania Press, 1961, page 53.

[8] Kramer, 1961, p. 116.

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Article #11

The Need to Change the Term 'Basket Weaving' to the Term 'Woven-Fiber Technology'

The current name for this subject,
'Basket Weaving',
is hindering research
into the origins of basketry
in the Paleolithic era



By about 1900 basketry was seen as a lowly art form.
These are photos of some humble basket peddlers.
https://commons.wikimedia.org/wiki/File:FOURNEL(1887)_p079_Fig.43.jpg
https://commons.wikimedia.org/wiki/File:Swedish_basket_maker_1910.jpg
https://commons.wikimedia.org/wiki/File:Basket_Carrier_(16590874244).jpg

THE PROBLEM WITH
SERIOUS BASKET WEAVING RESEARCH

"Basket weaving can't get no respect"
With apologies to Rodney Dangerfield

One of the greatest barriers to the acceptance of basket weaving as a key technology in the development and evolution of hominins is the lack of a good general terminology for the craft.

There are a number of reasons for this, some important and some even humorous. Here is a current definition of basket weaving:
The Lexico dictionary website, powered by Oxford Languages, had this definition:
bas·ket-weav·ing
noun
1. the art or activity of creating woven baskets.
2. HUMOROUS
used as the type of college course that is thought to be without any practical or professional value.

And it also had these examples about the humorous definition:
-- 'If your transcript is filled with easy A's, such those as earned in classes like the fabled Basket-Weaving 101, you'll likely be ranked below a student who has a lower GPA comprised of courses in the hard sciences.'
-- 'When I was in school, we called this kind of course Basket-Weaving 101 (actually, we did not have any courses this absurd, but some were almost as easy as this one seems to be).'
-- 'So even though they fail a core class, they can still get an A in "basket-weaving 101" or "making balloon doggies" 102, and pass to the next grade.'
https://www.lexico.com/en/definition/basket_weaving

And let's not forget the famous fictitious college course we all laughed about: Underwater Basket Weaving. This "is an idiom referring pejoratively to supposedly useless or absurd college or university courses" (Wikipedia.org). There is even a full Wikipedia page on this:
https://en.wikipedia.org/wiki/Underwater_basket_weaving

But it gets even worse. I found the same glib references not only in the United States but also in England. In fact, you can view a complete tongue-in-cheek course outline (see next) for Underwater Basket Weaving from the University of Portsmouth, UK at this web address.
https://web.archive.org/web/20100706054529/http://techfaculty.port.ac.uk/tud/db/UnivPort/level_3/1SSHLS3UBW.htm

UNDERWATER BASKET WEAVING

Academic year: 2007-2008

Local Key	1SSHLS3UBW	**Hemis Key**	U00000	**Base Key**	3644
Credit Points	10	**Lecturer**	*To Be Advised	**Coordinator**	Dr Valda Bunker
Delivery Mode	Campus - Semesterised	**Release Status**	A	**Materials**	
Normal Level	3	**Notional Study Hours**	100	**Standard Hours**	24
Scheduled Activities		**Min Student Numbers**		**Max Student Numbers**	0
Prereq Named	None	**Postreq Named**	None	**Coreq Named**	None
Excluded Combinations	None	**Dependancies**	None	**Prereq Statement**	None
Ass Weight Exam	50	**Ass Weight Con**	50	**Ass Weight Other**	

This picture, captured from a Portsmouth University (UK) joke syllabus, is classic British dry humor where there is almost no hint that this listing is for a class that does not exist and that it is about the well-known simple and pointless course in basket weaving.

The University of Central Arkansas went one step further and proposed an interdisciplinary major in Underwater Basket Weaving that was published in a student magazine.
Shinnie, Ferri. "New degree to be offered." The Vino 2003, Volume 21 - Issue 4.
https://web.archive.org/web/20071103014910/http://www.uca.edu/divisions/academic/honors/pub/vino/0203/vino21_4.1/newDegree.htm

And there is a Finish word "puuhastelu" which means "busy work, basketweaving (useless or unproductive activity)."
https://en.wiktionary.org/wiki/puuhastelu#Finnish

All of these reflect and define a modern attitude toward the craft of basketry, i.e., it is seen as a simple unimportant lowly craft. The Encyclopedia Britannica at one point called it "humble and banal."
https://www.britannica.com/art/basketry

The next painting, entitled *Not Of the Fold*, shows a family that was shunned as the father was reduced to the demeaning job of making baskets.

This painting is entitled, "Not Of the Fold" by Englishman Frederick Morgan and painted circa 1880. "Not Of the fold" is a British expression meaning that a person or family does not belong to a normal accepted society; 'the fold' means something similar to 'the flock' which is more common in American English.
https://commons.wikimedia.org/wiki/File:Frederick_Morgan_-_Not_of_the_Fold.jpg

In earlier times, baskets and basket weaving were highly valued. They were vital for the success of the first ancient civilizations of Egypt and Babylon, for example. But I believe that about 100 years ago when mass production became available, baskets were replaced by manufactured goods that were so inexpensive basketry's long-time value became lost.

In any case, these denigrating attitudes mean that basket weaving is often not taken seriously, especially in colleges and universities. Yet, as I have written many times in my articles, this is a major mistake because basket weaving may have been one of the crucial technologies that led to the survival, evolution, and eventual dominance of our species.

BASKET WEAVING AS AN IMPORTANT CRAFT

Nevertheless, there is another side to the story. Many museums around the world collect and proudly display basketry. The finest baskets can sell for a substantial amount of money and ancient Native American Indian baskets, considered to be the pinnacle of the craft and the art form, can sell for thousands of dollars.
Because just about every society in the world had a basket technology that was often unique to that culture, there are museums worldwide that collect these works. Next follows a list of only some of what is available.

Museums With Significant Basketry Collections
About 80 museums in the United States alone are listed
http://basketmakers.com/topics/wheretosee/wtsmuseumsindex.htm

Major basket collections are included in such prestigious museums as the Metropolitan in NYC and the British Museum in London.

In the Metropolitan a search found 1,976 results for "baskets" (including 3500-year-old Egyptian baskets)
https://www.metmuseum.org/art/collection/search#!?page=2&q=baskets&perPage=60

An ancient coiled basket From Egypt, Upper Egypt, Thebes, Asasif, East of Pabasa, Radim, Burial. Dated circa 2030 – 1640 B.C., Middle Kingdom, Dynasty 13–17. Construction of Halfa grass and rush basketry. Metropolitan Museum of Art, NYC.
https://commons.wikimedia.org/wiki/File:Basket_MET_19.3.79ab_view_2.jpg

In the British Museum a search for "baskets" found 4,631 related objects.
https://www.britishmuseum.org/collection/term/x5373

It should also be noted that, for at least the last 100 years, basket weaving has been used to teach mathematics, geometry, and structure to young people, from kindergarten to seniors in high school. And this still continues today. See my last blog-article for a listing of some of these programs.

Basket-Weaving Education and Its Cognitive Aspects

https://deconstructingtime.blogspot.com/2021/02/basket-weaving-education-and-cognitive-aspects.html

And finally, containers and baskets are considered a cultural universal [1] meaning that virtually every culture, every society, every farming community, and every hunter-gatherer tribe made containers and baskets. They were made with local plants, local weaving patterns, and with the traditions of their society for a variety of local purposes. This in itself testifies to the importance of basketry.

CHANGING THE WAY BASKET WEAVING IS PERCEIVED

I believe that the term 'basket weaving' is now outdated as a term for academic or archeological research and should be updated to reflect the fact that it is:
#1. A technology
#2. That a wide variety of objects, from small to large, have been created from a wide variety of fibers with a wide variety of techniques with almost limitless possibilities
#3. That this craft may have begun very early in hominid or hominin evolution
#4. That many baskets can be thought of as tools
#5. That there were/are many basket weaving industries

FIXING THE PROBLEM #1: THE TERM BASKET IS NOT INCLUSIVE

Let's start with the basic term 'basket weaving'. I believe that in the past, this may have referred to a general type of craft that included baskets but also many more items made with this type of technology such as mats or hats or fish traps, or even reed boats. It was the general name for a kind of technology that was not just confined to baskets.

So it may have once been a little like the current usage of the word 'horsepower'. When a person buys a car or boat or powerful engine that lists a horsepower number, no one thinks about horses.

Words and phrases in a language have a way of changing over time. Sometimes they gain a more general meaning and sometimes a more specific meaning. In the case of basket weaving today, most people think of it only as applying specifically to baskets and not as a general technology.

Historically this may have been different. The Sumerians of Mesopotamia, who were superb basket weavers, characterized the technology in this much more general way. In the *Elementary Sumerian Glossary*, a basket weaver was defined as:"a reed craftsman, basket, and mat weaver."[2]

The Encyclopedia Britannica spelled it out quite well in the following (https://www.britannica.com/art/basketry)
"Though it would appear that basketry might best be defined as the art or craft of making baskets, the fact is that the name is one of those the limits of which seem increasingly imprecise the more one tries to grasp it. The category basket may include receptacles made of interwoven, rather rigid material, but it may also include pliant sacks made of a mesh indistinguishable from netting—or garments or pieces of furniture made of the same materials and using the same processes as classical basket making. In fact, neither function nor appearance nor material nor mode of construction are of themselves sufficient to delimit the field of what common sense nevertheless recognizes as basketry."

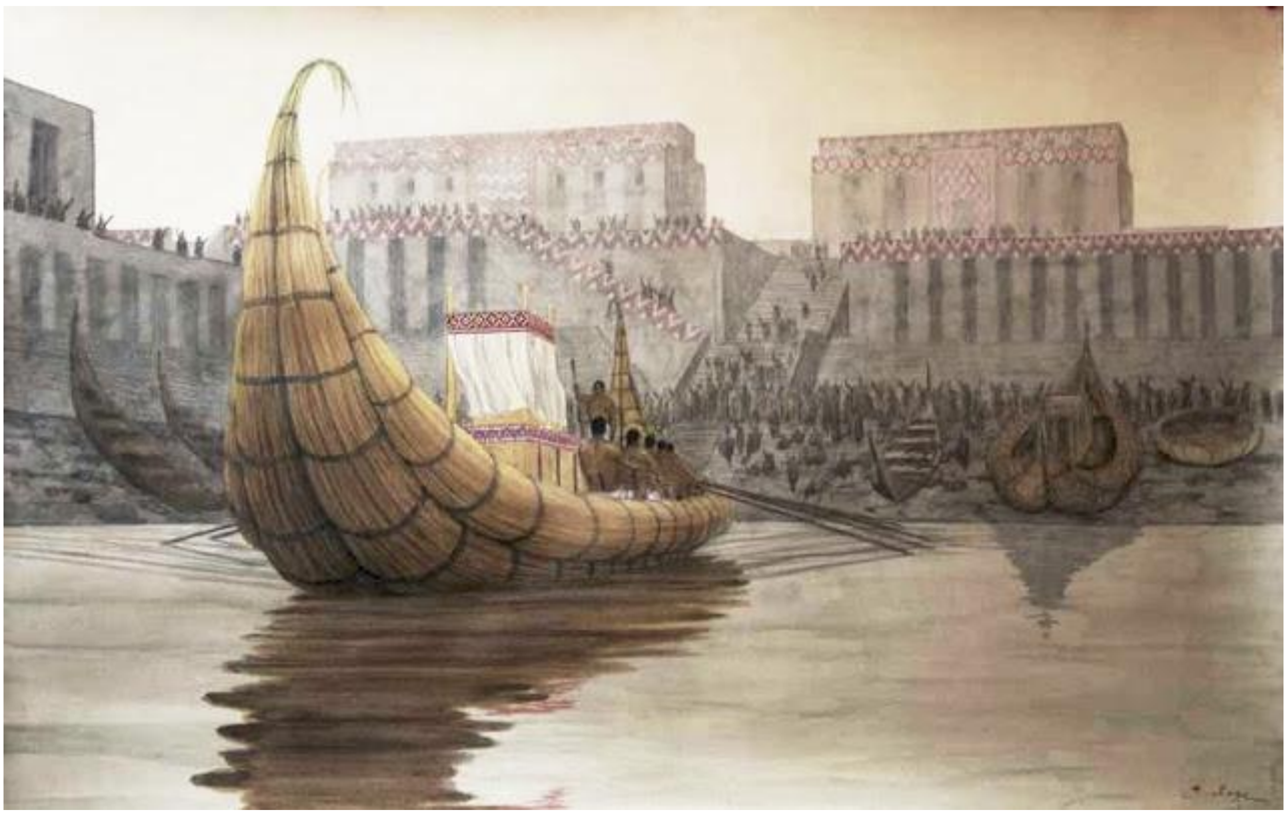
Called a mudhif or modhit, these large buildings, made entirely of reeds, were possible with basket weaving coiled construction.
"A mudhif, a traditional Marsh Arab guesthouse made entirely out of reeds. The Marsh Arab live a lifestyle that dates back 5,000 years." (Wikimedia.org)
https://commons.wikimedia.org/wiki/File:Iraqi_mudhif_interior.jpg
https://commons.wikimedia.org/wiki/File:Modhif_neserya_1.jpg

Nevertheless in the modern world, we are stuck with the name baskets as meaning containers and not much else (see the Oxford definition above) even though in the past it may have applied to a huge variety of items from small to large, from sandals to large grass houses. So we need a new term that can include the wide range of products that were/are possible with basket technology.

FIXING THE PROBLEM #2:

BASKET WEAVING IS(!) A TECHNOLOGY BUT IS NOT REGARDED AS SUCH

For some very odd reason basket weaving is generally not understood as a technology by historians or archaeologists. While Dr. Adovasio wrote a book about prehistoric basketry entitled *Basket Technology* [3], he is virtually the only academic who has made such a claim. And, at the same time, stone tool making is widely considered a technology. There is clearly some kind of disconnect here.



This picture is of a large reed boat at the harbor; it was constructed using coiled basket weaving techniques. This is a fanciful, but perhaps not inaccurate, painting of a ship at the port of Eridu, considered to be the oldest city of the first civilization of Sumer about 5000 years ago.
https://commons.wikimedia.org/wiki/File:%D0%A0%D0%B5%D0%BA%D0%BE%D0%BD%D1%81%D1%82%D1%80%D1%83%D0%BA%D1%86%D1%8F_%D0%BB%D0%BE%D0%B4%D0%BA%D0%B8_%D1%83_%D0%BF%D1%80%D0%B8%D1%87%D0%B0%D0%BB%D0%B0_%D0%B2_%D0%AD%D1%80%D0%B8%D0%B4%D1%83_%D0%BD%D0%B0_%D0%BA%D0%BE%D1%82%D0%BE%D1%80%D1%8B%D1%85_%D0%BF%D0%BB%D0%B0%D0%B2%D0%B0%D0%BB%D0%B8_%D0%B2_%D0%A3%D1%80%D1%83%D0%BA.jpg
Even larger ships were constructed and were capable of carrying over 25 tons as shown by Thor Heyerdahl when he recreated such a boat, the Tigris, in 1978. ("The Tigris expedition: a National Geographic special" (documentary about Thor Heyerdahl's expedition). National Geographic Society, broadcast on PBS 04/01/1979.)

If you think I am exaggerating, consider this: I did a Google search for these terms and here are the results:
GOOGLE SEARCHES (phrases searched in quotes)
SEARCH FOR TECHNOLOGY

Search = "prehistoric basket weaving technology"
No results found for "prehistoric basket weaving technology".

Search = "prehistoric basket technology"
No results found for "prehistoric basket technology".

Search = "paleolithic basket technology"
No results found for "paleolithic basket technology".

Search = "paleolithic baskets"
About 9 results (mostly from this blog).

BUT:

Search = "paleolithic stone tool technology"
About 4,900 results.

Search = "prehistoric stone tool technology"
About 6,410 results.

Search = "paleolithic stone tools"
About 23,400 results.

So, while the word 'technology' does not seem to be associated with basket weaving, it is a technology, nevertheless. It involves a wide range of designs, materials, types of weave, sizes, and uses. This means a new terminology about the craft of basket weaving needs to include the word technology.

> ***DOES BASKET WEAVING MEET THE CRITERIA FOR TECHNOLOGY?***
> ***A Definition:***
> ***Technology is "knowledge put into practical use to solve problems or invent useful tools."***
> ***My comment: Such as applying an understanding of woven structure to create a number of containers and other items such as fish traps?***
> **https://www.britannica.com/technology/technology**

Furthermore, there is the concept of tools. Even if we limit the discussion to containers, I believe that prehistoric hand-carried baskets were tools. Yet when I read about basketry, baskets are not often thought of as tools. But they were just that. A basket was a tool just as an Oldowan stone chopper or scrapper was a tool. Containers were/are essential and common to all cultures according to Dr. Donald Brown in his book *Human Universals* (1991) [4]. A basket was a tool to help gather food, for example. Or a basket container was a tool for storing food.

> ***DOES BASKET WEAVING MEET THE CRITERIA FOR TOOL MAKING?***
> ***A main definition of tool:***
> ***"A handheld device that aids in accomplishing a task."***

My comment: Such as a hand carried basket that is used to gather food and materials?
https://www.merriam-webster.com/dictionary/tool

GOOGLE SEARCHES (phrases searched in quotes)
SEARCH FOR 'TOOLS'

Search = "prehistoric basket tools"
No results found for "prehistoric basket tools".

Search = "prehistoric fiber tools"
No results found for "prehistoric fiber tools".

Search = "prehistoric stone tools"
About 44,100 results.

So the terms 'technology' and 'tool' are not associated with basket weaving. Because basket weaving has been locked out of these important concepts, this has sent a signal to academic scholars that this subject lacks a seal of approval that would justify serious study and funding. I believe that if these words began to be associated with basket weaving or woven-fiber technology it would spark interest among researchers, anthropologists, and archaeologists, and of course research grants, but especially young people who are deciding which path to follow.

But today this lack of respect for basketry and related technologies has meant that this subject matter has not been looked at very carefully by paleoanthropologists and archaeologists.

Speaking about the lack of archaeological interest in basketry, mats, and textiles, Grace M. Crowfoot wrote the following in *A History of Technology, Volume 1*. "In considering gaps in the knowledge of textiles, it must be remembered that there are vast areas where little archaeological study has been undertaken...Surviving pieces of rag were often rejected as without interest...Determination of the exact botanical origin of the fibres used in basketry and weaving has only quite recently been recognized as of archaeological importance."[5]

The words 'Technology', 'Tool' and 'Industry' are not normally associated with the term 'Basket Weaving' and yet Basket Weaving is all these things and more.

FIXING THE PROBLEM #3:

We need to get past the old world prehistoric technology categories, i.e., the three-age system of the Stone Age, the Bronze Age, and the Iron Age.

For almost three hundred years now, prehistoric technology has been characterized by the three-age system of the Stone Age, the Bronze Age, and the Iron Age which in a sense crowded out recognition of other technologies that might have occurred during these periods. Nevertheless, this three-age system has become entrenched. While these three ages are not incorrect, they should not be thought of as exclusive. A number of very old wooden spears and other items have been found from the Lower Paleolithic era, for example. And even well-preserved baskets and basket weaving items have been found from the New Stone Age or Neolithic time period.

Sophisticated basketry has been discovered from the Neolithic (New Stone Age) time period (see photo next) and impressions of advanced weaving have been found on clay fragments, dating back to 27,000 BP or the Upper Paleolithic (Old Stone Age) [6]. So in both cases, it has been clearly established that basket weaving technology existed alongside stone age tool technology and industries.

Baskets from the Middle Neolithic made between 7200 and 6800 BP and found in the Cueva de Los Murciélagos (literally "Bats' Cave") near Granada Spain.
https://commons.wikimedia.org/wiki/Category:Artefacts_from_the_Cueva_de_los_Murci%C3%A9lagos_in_the_Museo_Arqueol%C3%B3gico_Nacional_de_Espa%C3%B1a

The Clacton Spear Point is believed to be the tip of a wooden spear. It was found in Clacton-on-Sea (UK) in 1911. It has been dated to 400,000 years old and is considered to be the oldest worked wooden implement that has been found. Allington-Jones, L. "The Clacton Spear – The Last One Hundred Years." Archaeological Journal, 2015, pp. 172, 273–296.
https://commons.wikimedia.org/wiki/File:Clacton_Spear_2018.JPG

Yet the labeling of prehistoric technology has been limited and defined by what archaeologists could find in quantity -- i.e., what had survived the ravages of time, meaning stone tools, bronze implements, and iron implements while basket and fiber materials had for the most part decayed.

Nevertheless, it was obvious to everyone that stone tools, for example, were only the tip of the iceberg.
"In whichever way archaeological remains are interpreted, one must always be aware that the vast majority of the materials with which prehistoric people were surrounded and with which they worked is lost to us today. ...organic materials start to decay as soon as they are deposited in the ground."[7]

There are two reasons, according to Jim Adovasio, we don't think of baskets or textiles when we think of the Stone Age. One is that stones and bones, being far more durable, are far more common at archeological sites than artifacts made of fiber. But the other reason, says Adovasio, an archeologist at Mercyhurst College in Erie, Pennsylvania, is a bias on the part of archaeologists who study the era...Their emphasis has been on stone technology, large-animal hunting, and the accoutrements of machismo. Weaving isn't as exciting as running around sticking things into mammoths.
(Menon, Shanti. "The Basket Age." ***Discovery Magazine*****, January 1996 Issue,** http://discovermagazine.com/1996/jan/thebasketage619)

FINDING A NEW NAME FOR THIS SUBJECT MATTER

Here is a definition of basketry from the Encyclopedia Britannica which I think is a good definition to work from.

> **Definition of basketry:**
> **Basketry: art and craft of making interwoven objects, usually containers, from flexible vegetable fibres, such as twigs, grasses, osiers, bamboo, and rushes, or from...synthetic materials.**
> https://www.britannica.com/art/basketry

The following definition I have proposed contains keywords I would like to use. So, I suggest the term:

Woven-Fiber Technology

You will see that these terms are mentioned in the Britannica definition plus I have added the word technology.

When talking about the technology of a specific era, that era should be specified, such as:

Paleolithic Woven-Fiber Technology

Neolithic Woven-Fiber Technology

Ancient Woven-Fiber Technology

I have suggested the term "woven-fiber technology" as a name because it is short, clear, descriptive, and inclusive of a wide variety of fiber constructions. And it gets away from any negative connotations about baskets.

It also conveys much more information given the limited way that baskets are understood today. A woven-fiber technology can include baskets from very small to very large but also mats, clothing, storage chests, furniture, textiles, sacks, fish traps, nets, fences, thatched roofs, and even large grass houses and reed boats as I have described.

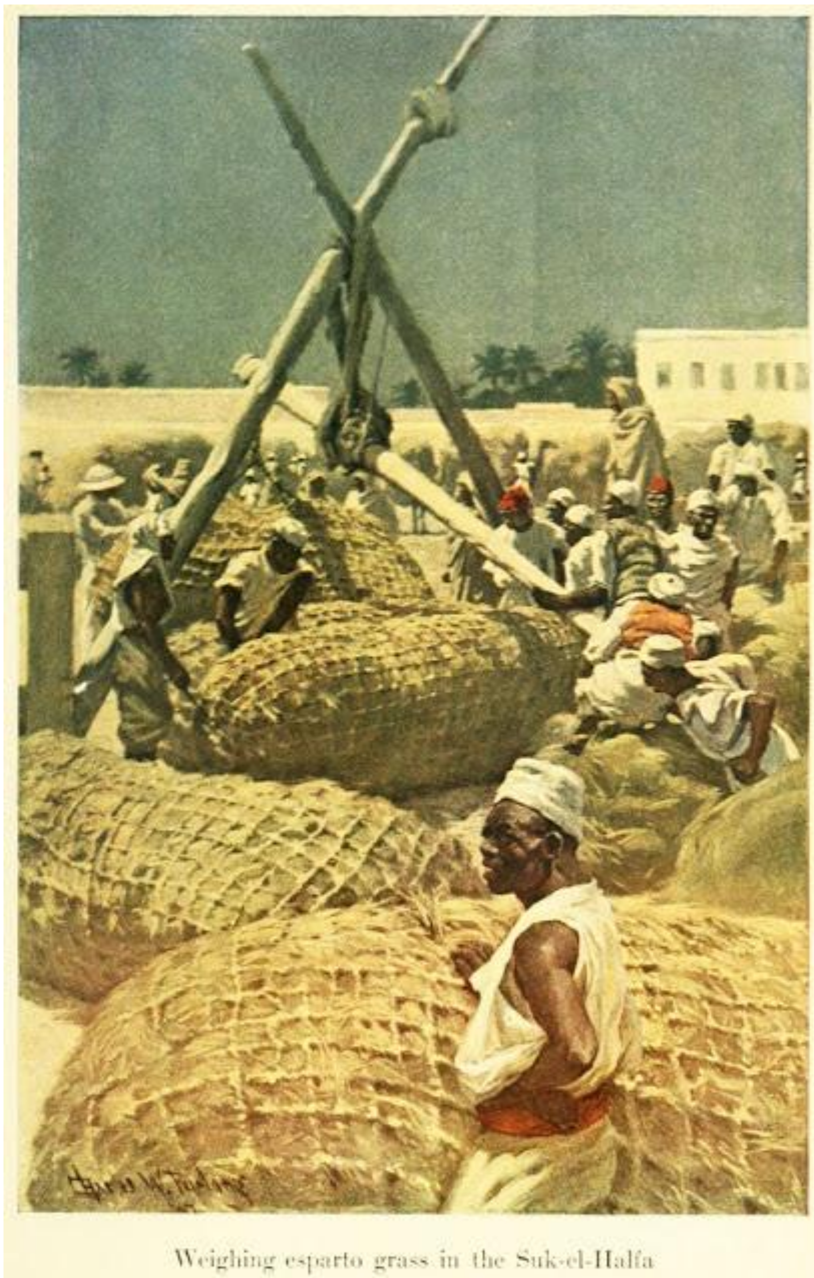
CONCLUSION

My specific suggestion for the name 'woven-fiber technology' is not important. What is important is to settle on a new name that can include all kinds of fiber weaving and that is considered a technology.

A proper name and terminology are essential if research into the origins and development of basketry is to advance.

AFTERWORD ABOUT THE ESPARTO INDUSTRY

The word 'industry' should also apply to basket weaving and woven-fiber technology but like the words technology and tool, this word is not associated with basket making even though there have been many such industries across the globe at different times.



Weighing esparto grass in Tripoli, North Africa.
Furlong, Charles Wellington. The gateway to the Sahara; observations and experiences in Tripoli. New York, C. Scribner's sons, 1909, p. 226.
https://archive.org/details/gatewaytosaharao00furl/page/n226/mode/1up?view=theater

GOOGLE SEARCH FOR 'INDUSTRY'

**Search = "paleolithic basket industry"
No results found for "paleolithic basket industry".**

**Search = "paleolithic stone tool industry"
About 2,180 results.**

What follows is one example of a 7000-year-old major basket industry that continues to evolve in Spain and North Africa. It is very interesting to note that according one author (below), Neolithic basketry was of a higher standard than modern products, showing that basketry had reached a high point in the Neolithic era, 7000 years ago.

This is only one example of a basket weaving industry. There were many others such as the bamboo basket weaving industries of Asia, the reed basket weaving industries of Mesopotamia, and the papyrus basket weaving industry of ancient Egypt.

THE ESPARTO BASKET WEAVING INDUSTRY OF SPAIN & NORTH AFRICA

This is a map of where esparto grew naturally in Spain and North Africa.
https://commons.wikimedia.org/wiki/File:Esparto_distribution.jpg

Numerous archaeological artifacts and remains of esparto basketry have been discovered that date from the Neolithic period and onwards in southeast Spain. THESE PIECES DEMONSTRATE HIGH STANDARDS OF QUALITY COMPARED WITH MORE MODERN PIECES. [ED: my emphasis] Among the abundant archaeological remains, some of the most outstanding are the artifacts dating back to 7,200 – 6,600 BP...in Cueva de los Murciélagos (Granada). These pieces represented clothes, hats, tunics, sandals, baskets, and ropes—all made with the finest techniques. In some cases, the artifacts included colored espartos.[8]

LEFT: A pair of esparto sandals from the Middle Neolithic made between 7200 and 6800 BP and found in the Cueva de Los Murciélagos (literally "Bats' Cave") near Granada Spain.
RIGHT: Traditional esparto espadrilles made today
https://commons.wikimedia.org/wiki/File:Sandalias_de_esparto_(29139609730).jpg
https://commons.wikimedia.org/wiki/File:Esparto_espadrilles.jpg

At one time, esparto weaving was a dominant industry in some regions of the country [Spain] – particularly Murcia, Valencia and Andulucia.
***Taste of Spain*. http://www.thetasteofspain.com/spanish-customs-and-traditions/the-art-of-esparto-weaving/**

"The decline of the esparto grass industry led to no little unrest among some of the native tribes of northern Africa."[9]
***Commercial Geography* by Jacques W. Redway**
Quoted in: http://www.finedictionary.com/Esparto.html

This is an esparto canteen; the Spanish word for canteen is “calabaza” which is pre-Roman. This watertight esparto vessel is created with special tight weaves after curing the esparto grass for a month and then processing. Next it is sealed with pine tar that has to be carefully applied. This kind of canteen technology existed in Europe in prehistoric times and also with the hunter-gatherer Native North American Indians.
https://commons.wikimedia.org/wiki/File:Esparto_canteen.JPG

"Calabazas de esparto are an ancient part of the Spanish basketry and are part of the culture of Esparto, unique intangible heritage of the Western Mediterranean"

Fajardo, José; Verde,Alonso. "Calabazas de esparto."
Ethnobiology Sheet 14, Summer 2015.
Braun_D_R_and_Hovers_E_2009_Current_issu.pdf

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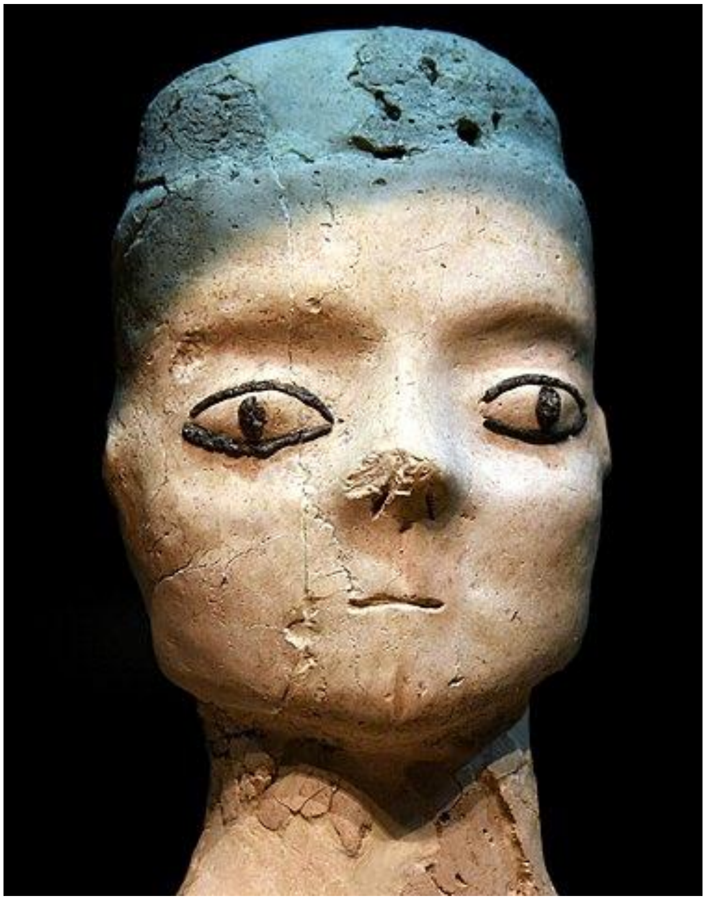
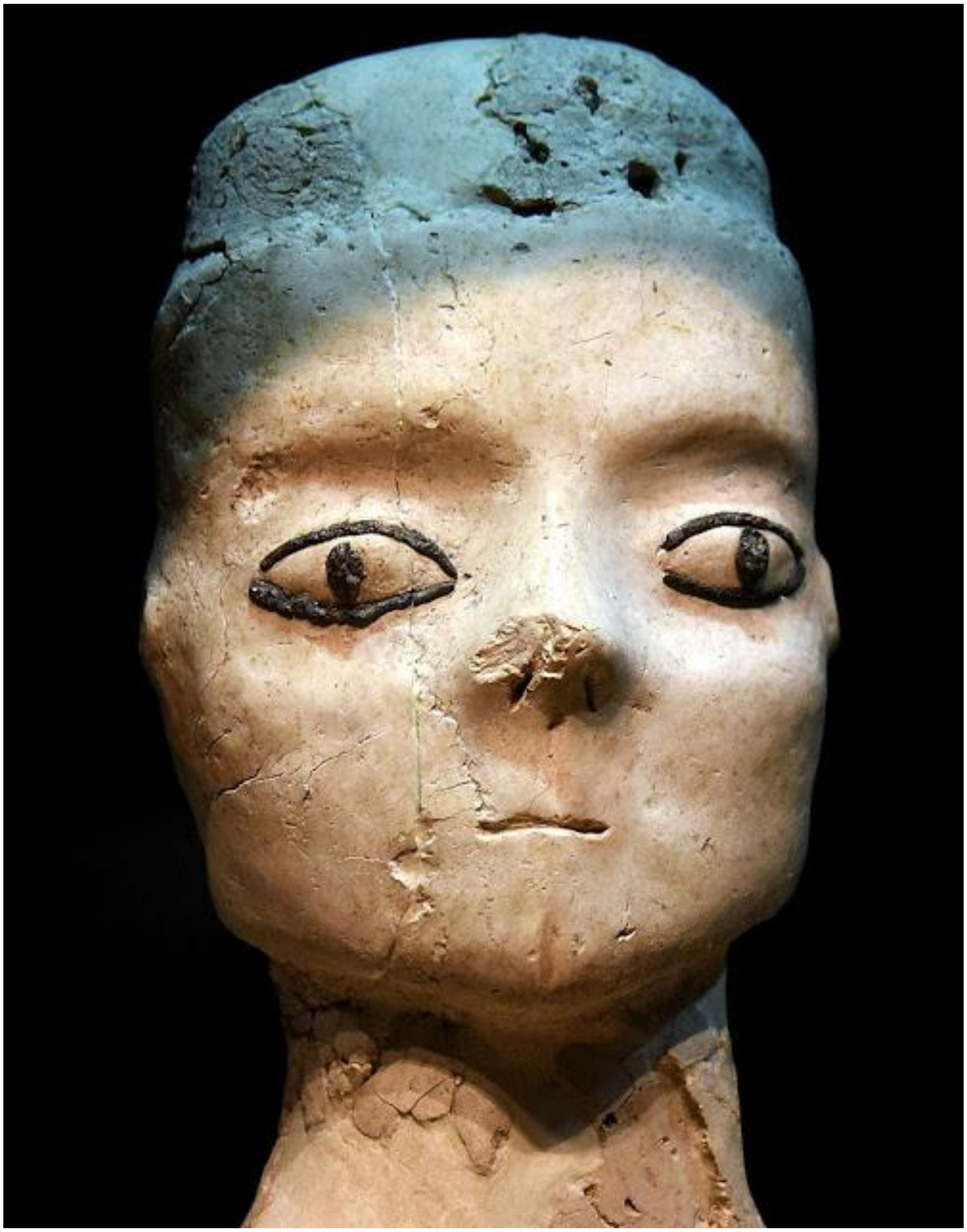
Article #12

The Crucial Importance of Basket Weaving Technology for the World's First Civilizations





9,000-Year-Old Neolithic Statue
It Utilized A "Woven Reed Core Wrapped Tightly With Twine"
"Human statue from Ain Ghazal city, in the outskirt of Amman, Jordan. Pre-pottery Neolithic period B, 8th millennium BCE."
https://commons.wikimedia.org/wiki/File:Head_of_a_human_statue_from_Ain_Ghazal_city_in_Amman,_Jordan_Museum.jpg

The latest dating indicates that this figure was made 3000 years before the beginning of the Sumerian civilization, This means that basket weaving technology with reeds was quite advanced by the Neolithic Pre-Pottery B time period. (Ben-Nissan, Advances in Calcium Phosphate Biomaterials)

https://commons.wikimedia.org/wiki/File:Head_of_a_two-headed_statue_from_Ain_Ghazal,_Jordan_Museum,_Amman.jpg

The following is quoted from an article about the Smithsonian exhibit of these ancient statues from Jordan at the Arthur M. Sackler Gallery. The exhibit ran 28 July 1996 -- 6 April 1997.

> The statues were formed by **modeling wet plaster on a reed core,** using plants that grow in Jordan along streams and rivers. **The bundles of reeds were lashed together using twine.** The reed core provided a sturdy form onto which the plaster was modeled. Over time, this reed core disintegrated, leaving behind the plaster "shell" of the statue and a hollow interior. When modeled, the wet plaster took the

> impressions of the reeds and twine, which are beautifully preserved on the inside surface of the statue. Reed and twine were ideal materials for making the statues' internal framework. The reeds are light, easy to bend when wet or damp, and locally available.
> After the ancient artisans completed the reed and twine core, they applied plaster in dough-like consistency until they created the desired shape.
> The head of each statue was modeled on a reed core wrapped tightly with twine to provide rigid support for the long, skinny neck. (Gunther, "Preserving Ancient Statues from Jordan")

PREFACE

> Sumer had once been desolate marshland with but few scattered settlements and had only gradually come to be a bustling, thriving and complex community after many generations of struggle and toil in which human will and determination, man-laid plans and experiments, and man-made discoveries and inventions played a predominant role. (Kramer, The Sumerians, p. 34)

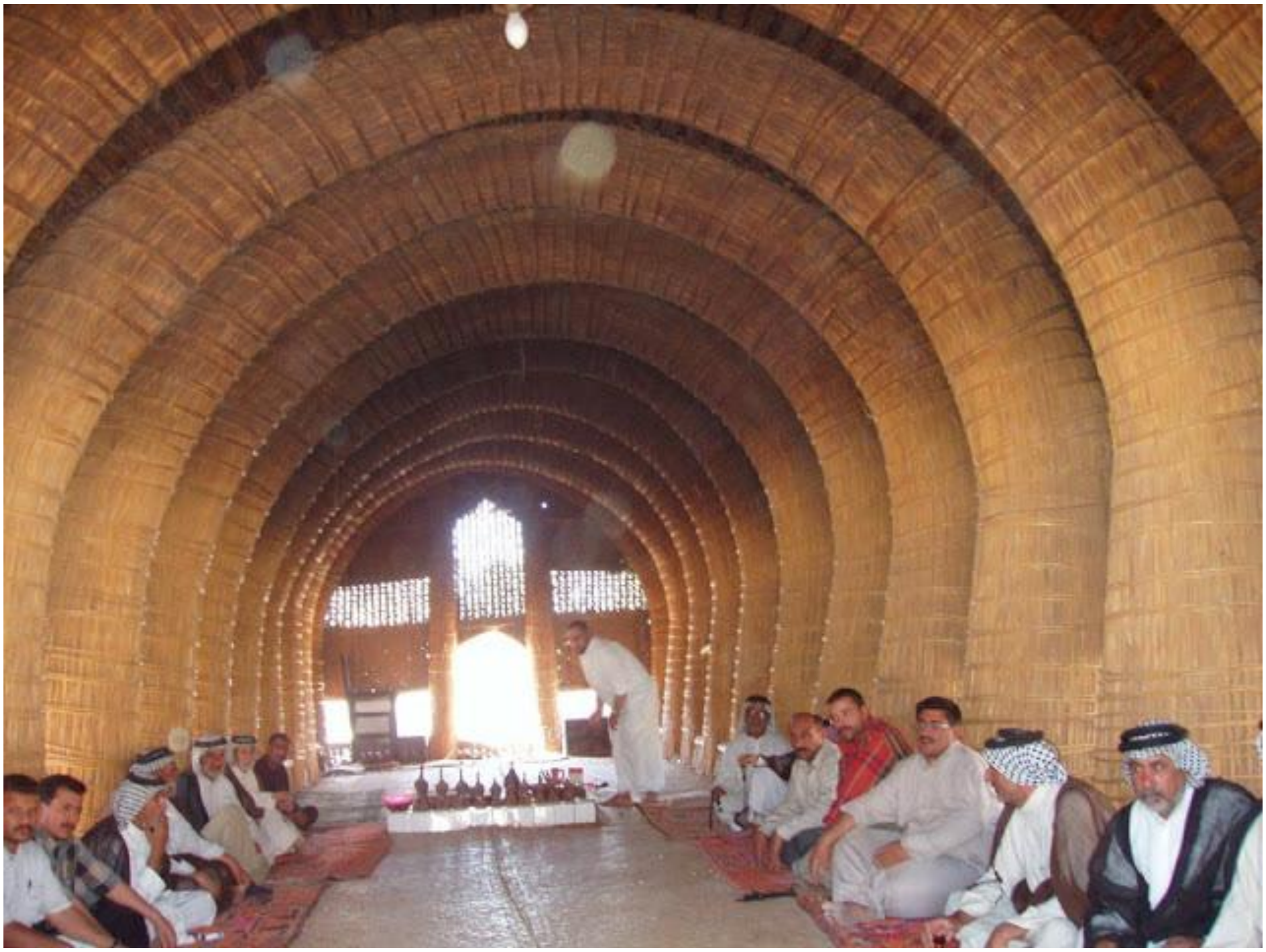
I believe that basket weaving technology (or 'woven-fiber technology', the alternate name I have suggested) was crucial to the development and emergence of the world's first civilization in Mesopotamia, the Sumerian culture. I do not believe that this first civilization could have blossomed without it.

In Sumerian times basket weaving was a general term that applied to a variety of weaving skills from small items to large structures. The highly revered 'Craft of Basket Weaving' (as listed in the important Sumerian MEs list of cultural essentials) was a general term that applied to a variety of weaving skills, skills that were essential for the growth of the worlds first cities. This term was defined as also meaning 'reed craftmanship' as stated in the Elementary Sumerian Glossary by Foxvog.

But, long before Sumer emerged as the world's first civilization, it is clear that this technology was quite advanced and that basket weaving technology, about a thousand years earlier, had reached a high point of development. For example, it had led to the construction of large sea-going ships made of bundled reeds that were sealed with bitumen.

The importance of basket weaving technology did not go unnoticed by the Sumerians. The power and symbolism of baskets, for example, was mythical -- as in the king's basket bearing ceremony when the king dedicated a new ziggurat, the magnificent temples of the Sumerians.

NOTE: This article is part of my series about the importance of basket weaving technology throughout human history, a technology that may have begun in the deep past.
AND
Basket weaving technology was also just as crucial to other emerging early civilizations such as that of Egypt, but for the purposes of this article I will concentrate on the first civilization, that of Sumer.



The interior of a mudhif made entirely of reeds.
This technology is at least 5000 years old, and perhaps older.
https://commons.wikimedia.org/wiki/File:Iraqi_mudhif_interior.jpg

INTRODUCTION

The name Mesopotamia comes from ancient Greek and translates to mean '[the land] between rivers', i.e., the land between the Tigris and the Euphrates rivers. And this is where the world's first civilization was created known as Sumer or Sumeria, with its prehistoric era beginning about 4100 BCE.

This land was very hot and dry with little rain and with a tangle of mashes filled with tall reeds, mud, and clay. And it experienced devastating floods at different times. There was no stone for buildings, no metal ores, and very little wood. It hardly seemed like a good place for the world's first civilization to emerge, much less to prosper. But that is exactly what happened. And it did so by turning all those elements, such as mud and marsh and the floods, into an advantage.

Central to the growth and development of this first civilization was basket weaving technology, or woven-fiber technology -- an alternate name that I have suggested. This is because reeds were one of the best materials for making baskets and many other woven items. The Sumerians were quite skilled at weaving reeds into a variety of configurations small and large. In addition, there was a plentiful supply of excellent quality bitumen, which when combined with reed items such as coatings for boats or coatings for baskets used as buckets, made them waterproof or able to hold water which was a key technology developed in the Neolithic era.

While it is difficult to establish exact dates for the beginning of this first civilization, with technologies such as complex irrigation and the mass production of bricks, these practices can be placed in general time periods such as millennia.

Before the rise of the Sumerians, the Ubaid Neolithic culture had preceded them. There is now clear evidence that reed ships were sailing the waters around Mesopotamia in the 6th millennium, well before the earliest beginnings of the first Sumerian cities which began toward the end of the 5th millennium or about 4100 BCE.

Reed boats were made with tight bundles of reeds which were then treated with bitumen to make the hull waterproof. This construction was basically basket weaving technology but on a large scale. Coiled baskets, for example, are made by bundling fibers. The recent discovery of these ancient reed boats shows that the Neolithic technology, at that time, with woven fibers was quite advanced. Later this fully developed technology was used in a variety of inventive and imaginative ways to help bring about the world's first civilization, including irrigation, agriculture, housing, and brick making.

The versatility and flexibility of basket weaving technology that was fully developed in the Neolithic (Ubaid) era along with an endless supply of reeds allowed the Sumerian culture to gain a foothold on the path to civilization. It was not the only technology but it was a fully developed fundamental technology that could be adapted to a wide variety of uses -- so, for example, while bricks were used in water management for irrigation, these bricks sat on a reed foundation that had been treated with bitumen, just as the sea-going ships had been coated with bitumen a thousand years earlier, and most early houses were grass houses that were made with bundled reed columns.

So as I said, while it would be almost impossible to nail down specific dates for the invention or beginning of a technology, it is very clear that sea-going reed ships existed long before the earliest beginnings of Sumerian civilization. This meant that basket weaving technology, as indicated by these ships, was quite advanced long before the Sumerians learned how to mass-produce sun-baked bricks, or invent writing, or invent the wheel.

The predominance of reeds, reed bundles, and reed structures
points to their significance to early Sumerian economies.
(Pournelle, The Sumerian World Edition, pp. 28-29)

In this article I want to make two points:

#1. Neolithic basket weaving technology (or 'woven-fiber technology' as I have suggested) was fully developed and quite sophisticated in the area of Mesopotamia perhaps a thousand years before the important inventions occurred that led to the world's first cities in Sumer.

#2. Basket weaving technology was fundamental and foundational to the development of Sumerian inventions. Well-designed durable work baskets were essential for hauling clay to make bricks, for example. In another example, reeds treated with bitumen were used as foundations for irrigation 'gates' and irrigation was the most important technology for these early cities.

PLUS:
In addition, basket weaving technology was essential for the maintenance and continuation of the world's first cities. Without baskets and basket technology, irrigation, agriculture, and modest home building would have been almost impossible. Also, reed ships imported critical materials such as copper that was not available in Sumer and that were essential for these cities.

To make my case I will:

-- Describe Pre-Sumerian basket weaving technology evidence from the remains of recently discovered Neolithic reed boats that sailed the waters around Mesopotamia.
-- Describe other examples of basket weaving technology that began well before the start of Sumerian culture.
-- Explain how basket-weaving technology worked with irrigation, agriculture, mass production of clay bricks, home building, shipbuilding, and more.
PLEASE NOTE: I have only included those practices and artifacts that I could find reliable documentation for. I assume that there were many other ways that basketry was utilized, such as the use of baskets in agriculture during planting, harvesting, transporting, processing and storing but I could only find what I have listed here.

Pictures from Egypt, for example, show an extensive use of baskets in agriculture, but I cannot find these for Sumer.

ABOUT NEOLITHIC REED SHIPS AND BASKET WEAVING TECHNOLOGY

This picture is of a large reed boat at the harbor; it was constructed using coiled basket weaving techniques. This is a fanciful, but perhaps not inaccurate, painting of a ship at the port of Eridu, considered to be the oldest city of the first civilization of Sumer about 5000 years ago.

https://commons.wikimedia.org/wiki/File:%D0%A0%D0%B5%D0%BA%D0%BE%D0%BD%D1%81%D1%82%D1%80%D1%83%D0%BA%D1%86%D1%8F_%D0%BB%D0%BE%D0%B4%D0%BA%D0%B8_%D1%83_%D0%BF%D1%80%D0%B8%D1%87%D0%B0%D0%BB%D0%B0_%D0%B2_%D0%AD%D1%80%D0%B8%D0%B4%D1%83_%D0%BD%D0%B0_%D0%BA%D0%BE%D1%82%D0%BE%D1%80%D1%8B%D1%85_%D0%BF%D0%BB%D0%B0%D0%B2%D0%B0%D0%BB%D0%B8_%D0%B2_%D0%A3%D1%80%D1%83%D0%BA.jpg

The Neolithic Origins Of Seafaring In The Arabian Gulf

By Robert Carter

Investigations in Kuwait by our team from the Institute have revealed that maritime trade began as early as the sixth-millennium bc. The coastal site we have excavated has yielded fragments of the waterproof coating that covered seagoing vessels made of bundles of reeds. These fragments consist of bitumen slabs with reed impressions on one side and barnacles on the other. Other finds from the site include imported goods, a pottery model of a reed-bundle boat, and what appears to be a depiction of a sailing vessel – all testifying to the importance of maritime trade.

Analysis of the material from Ras al-Jinz has shown that the bitumen was combined with chopped reeds, carbonates, and possibly fish oil, to make an amalgam. This process changed the physical properties of the bitumen, making it adhesive, tough, flexible, and light. [ED: This shows that even during the Neolithic era, an understanding of materials and their properties was quite advanced.]

Navigation in the Gulf during the Neolithic and Ubaid periods
The new discoveries...allow us to speculate on the mechanics of trade during the sixth and fifth millennia BC. First, the question of whether boats were used during the Neolithic period has been answered positively. The vessels were made of reed bundles, lashed together, and then coated with a bitumen amalgam – a technology that prefigures the techniques used to build trading vessels during the Bronze Age, some 3000 years later.

Existing evidence for trade
These new finds in Kuwait complement prior knowledge of a phase of interaction between southern Mesopotamia and the Arabian Gulf. Archaeologists have long speculated about a distinctive type of Mesopotamian pottery found in the Arabian Gulf region, known as Ubaid ware, which dates to the sixth and fifth millennia BC, and was made by the earliest known farming communities of southern Mesopotamia, now in Iraq. Some Ubaid settlements later became the mighty cities of the Sumerian civilization, such as Ur, Uruk, and Eridu, but during the Ubaid period city life and writing had not yet been developed, and settlements remained relatively small, sustained by agriculture, livestock herding and fishing. (Carter, "Neolithic origins of seafaring in the Arabian Gulf," pp.44-47)

Boat Remains And Maritime Trade In The Persian Gulf During The Sixth And Fifth Millennia BC By Robert Carter

"This find suggests that sailing was known by the Ubaid 3 period, [Ubaid 3 artifacts (5300–4700 BC)] and is the earliest known evidence for the use of mast and sail.
"These are fragments of the waterproof coating used to cover a reed-bundle hull, and represent the earliest boat remains in the Middle East, and the oldest known sea-going boat remains yet identified.
"The coating waterproofed the reed hull, protected it against mechanical damage and acted as an anti-fouling agent.

"These are impressions of the cords which held the reeds into bundles, or which lashed the bundles together to form a hull." (Carter, "Boat remains and maritime trade in the Persian Gulf during sixth and fifth millennia BC," pp. 52-63)

This is a model of Thor Heyerdahl's recreation of a reed ship, named the Tigris, which he built and sailed successfully in 1978. It covered 6800 kilometers during a voyage of 143 days, proving that large reed ships could have been constructed and were capable of carrying more than 25 tons. ("The Tigris expedition: a National Geographic special")
https://commons.wikimedia.org/wiki/File:Tigris_Model_Pyramids_of_Guimar.jpg

NOTE: Around the late third millenium wooden boats began to replace reed boats. However, a reed boat could carry 25-50 tons of material according to Thor

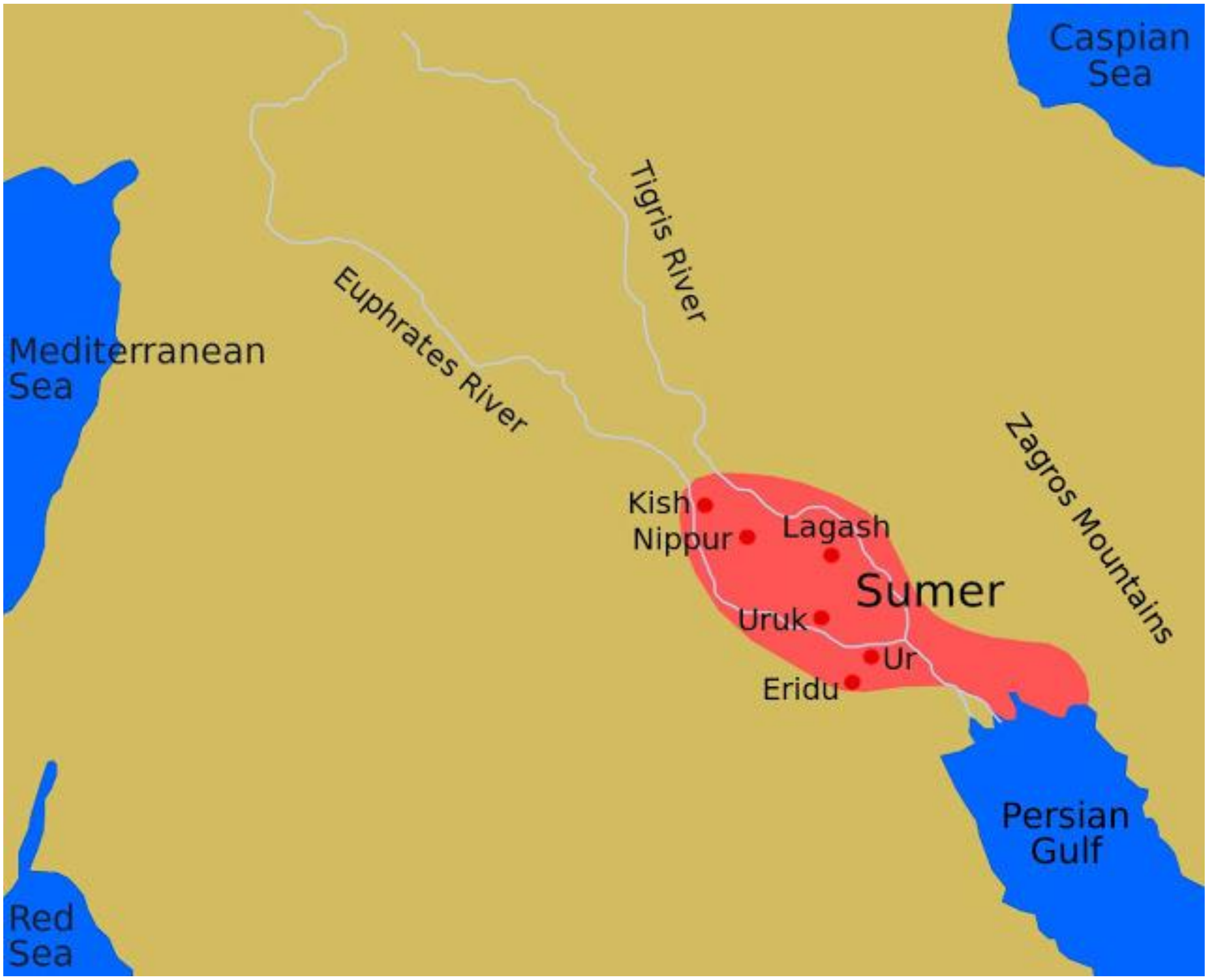
Heyerdahl who built the Tigris to prove his point. So reed boats probably continued to be used. And small reed boats continued be used in the many canals.

ANOTHER EXAMPLE OF EARLY BASKET WEAVING ADVANCED TECHNOLOGY

A pair of sandals from the Middle Neolithic. These are dated between 5200 and 4800 BCE (about 500 years before the beginning of Sumer) from the Cueva de Los Murciélagos (literally "Bats' Cave") in Albuñol (Province of Granada, Andalusia, Spain). (National Archaeological Museum)

https://commons.wikimedia.org/wiki/File:Sandalias_del_Neol%C3%ADtico_de_Albu%C3%B1ol_(M.A.N._Inv._595_y_596)_01.jpg

The Sumerian Civilization,
The world's first civilization



ABOUT BITUMEN

In ancient times, bitumen (also called asphaltum or tar) was primarily a Mesopotamian monopoly. The "land between the rivers" was blessed, like no other land, with all sorts of petroleum deposits. From north to south along the Tigris and Euphrates rivers, the country was littered with bitumen seepages, crude oil springs and even bituminous rock which released crude oil when heated. (Bilkadi, Bitumen - A History)

It may seem strange to highlight bitumen at the start of this list of Sumerian woven constructions, but bitumen was often used in combination with reed craftsmanship. This was a powerful combination that allowed the construction of reed boats and coracle (basket) boats, the use of reeds as part of the dam system, and the sealing of reed buckets for lifting water with the shaduf device (next). Plus bitumen was used to waterproof fired bricks and seal the outside of buildings.

Bitumen was well known and understood even in the Upper and Middle Paleolithic era. So its properties and usage already had a long history that the Sumerians would have known about.

> In a study entitled: "New evidence of adhesive as hafting material on Middle and Upper Palaeolithic artefacts from Gura Cheii-Râsnov Cave (Romania)" the researchers concluded that they had discovered bitumen usage by Paleolithic peoples. "All these hydrocarbons [found via chemical analysis] confirm that the black substance is highly weathered bitumen" (Cârciumaru et al., "New evidence of adhesive [bitumen]...on Middle and Upper Palaeolithic artefacts")
>
> For example, "Bitumen caulking of the reed boats was made by applying a heated mixture of bitumen, vegetal matter, and mineral additives and allowing it to dry and cool to a tough, elastic covering." (Hirst, "Mesopotamian Reed Boats Changed the Stone Age.")

In addition to bitumen, archaeologists have recently discovered new coatings used with basketry 10,000 years ago.

> The new analytical evidence obtained in this study has highlighted the diversity of materials comprising the exceptionally well-preserved organic coatings from artefacts of the Nahal Hemar cave, more than 10,000 years old. The complexity and originality of these coatings...is unique and the earliest known evidence of the use of these animal and plant products in the Near East. It represents a rare insight into the capacity of Neolithic people. Flax, already used for making strings, was domesticated, and employed in making textiles by twining...Several of the earliest Neolithic inventions demonstrating the experimental efforts needed to optimise resources for practical (strengthening baskets)...purposes. (Solazzo et al. "Identification of the earliest collagen- and plant-based coatings from Neolithic artefacts")

ABOUT IRRIGATION

Historians agree that the key to the successful rise of civilization in Sumer was due to irrigation. Irrigation led to surpluses and somewhat predictable crop yields which in turn allowed the cities to grow, prosper and diversify. Crop surpluses led to a culture that could support non-farming citizens such as craftsmen, scribes, teachers, artisans, administrators, nobles, and priests. Basket weaving technology was a key part of the irrigation system and engineering from the very beginning.

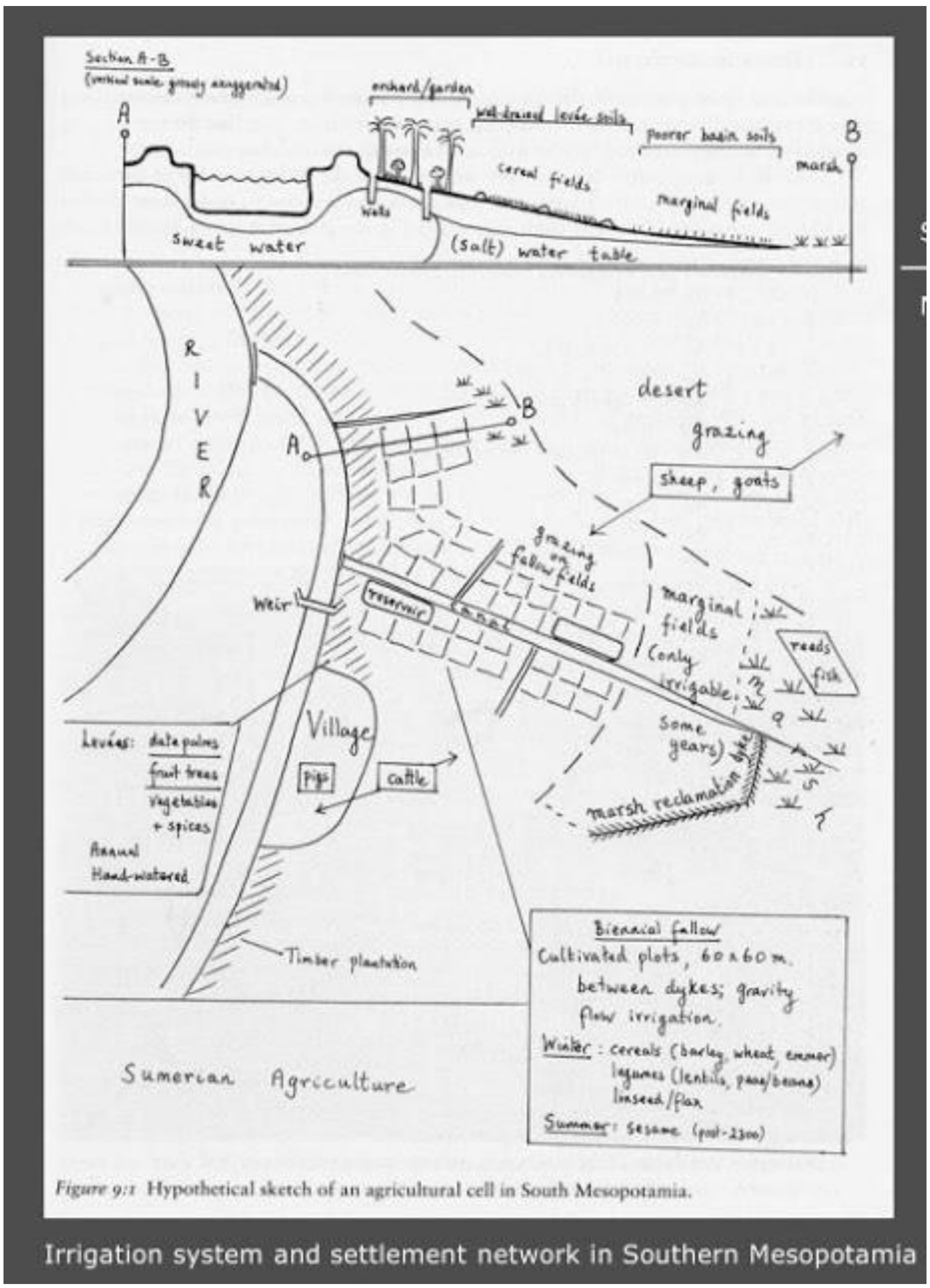


Figure 9:1 Hypothetical sketch of an agricultural cell in South Mesopotamia.

Irrigation system and settlement network in Southern Mesopotamia

(Postgate, Early Mesopotamia)

https://www.brown.edu/Departments/Joukowsky_Institute/courses/ancientneareast/files/9444529.ppt

> There was one overriding factor which fostered a strong spirit of cooperation among individuals and communities alike: the complete dependence of Sumer on irrigation for its well-being – indeed, for its very existence. Irrigation is a complicated process requiring communal effort and organization. Canals had to be dug and kept in constant repair. The water had to be divided equitably among all concerned. (Kramer, The Sumerians, p. 5)
>
> The first successful efforts to control the flow of water were made in Mesopotamia and Egypt, where the remains of the prehistoric irrigation works still exist.
> In many places where fields were too high to receive water from the canals, water was drawn from the canals...by a shaduf. These consisted of a bucket on the end of a cord that hung from the long end of a pivoted boom, counterweighted at the short end. ("Irrigation Systems, Ancient," Water Encyclopedia)


(LEFT) One man using a shaduf.
https://commons.wikimedia.org/wiki/File:Chadouf_%C3%A9gyptien,_dessin_de_voyageur_de_1890..jpg
(RIGHT) Several men at each level using shadufs to raise the water much higher in a multi-tiered system.
https://commons.wikimedia.org/wiki/File:Arts_et_m%C3%A9tiers._Vue_et_d%C3%A9tails_de_deux_machines_%C3%A0_arroser,_appell%C3%A9es_ch%C3%A2douf_et_ment%C3%A2l_(NYPL_b14212718-1268823).jpg

About the Shaduf

Although it is often associated with ancient Egyptian culture, it was the Sumerians who invented the shaduf and were the first to use it. It was a simple but clever instrument for easily elevating a substantial amount of water to irrigate fields. Powered by an understanding of leverage, this flexible device was probably the

most important invention in the history of civilization as it allowed farmers to bring in much higher crop yields and to deal with extended periods of drought. This device was so efficient and effective it is still used today.

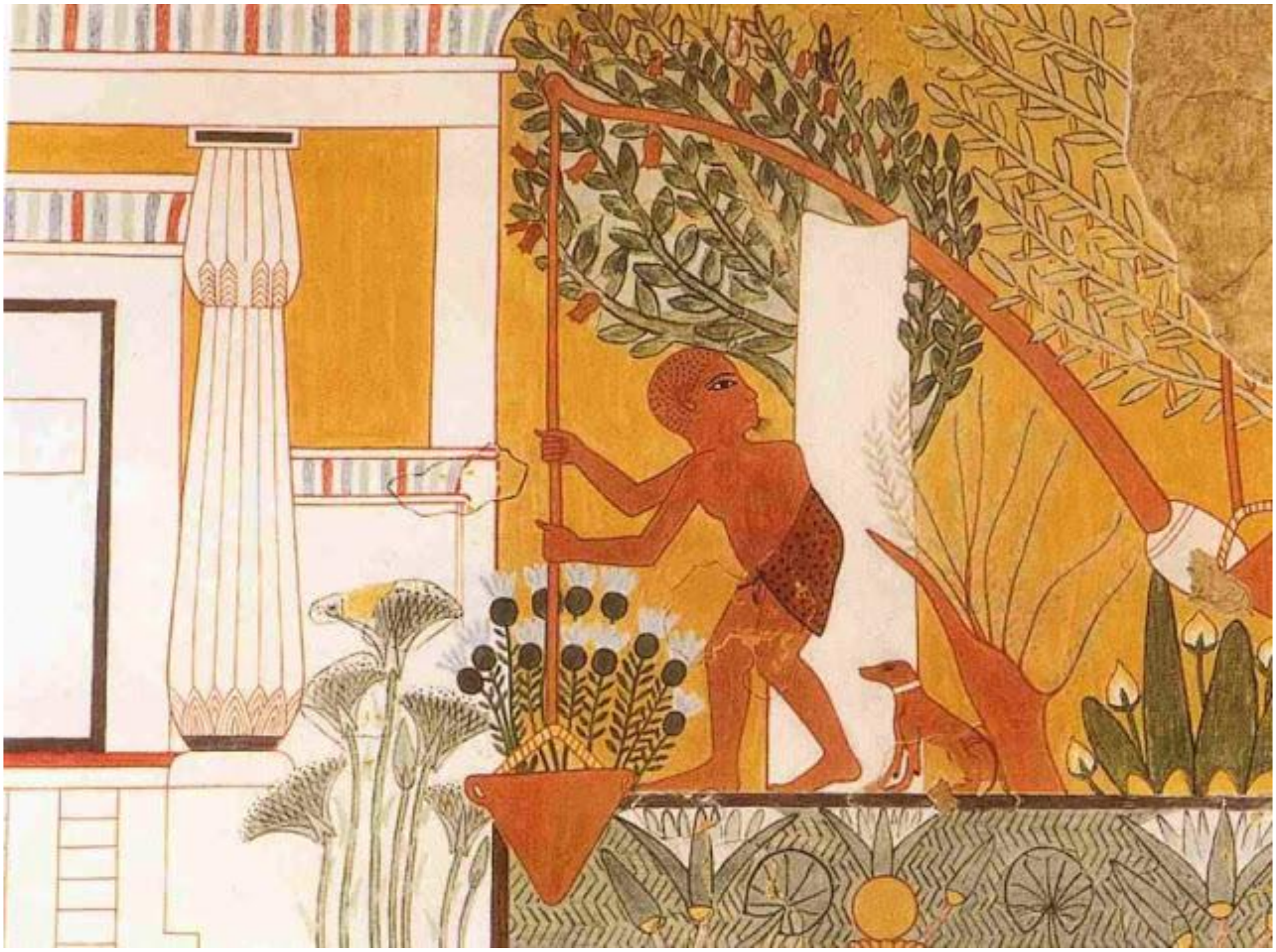
> It is estimated that one or two men can irrigate a quarter of an acre in 12 hours, for example a single shaduf could thus irrigate 0.1 ha of land in 12 hours [ED: or about a quarter of an acre]. (Stavros et al., "Evolution of Water Lifting Devices (Pumps) over the Centuries Worldwide")

Descriptions of this device usually state that a 'bucket' was attached to the water scooping end of the shaduf. Most people assume that meant a bucket made of metal. However, this device was invented before the smelting of copper, the first metal to be fabricated. So a basket sealed with bitumen was often used (or a skin bag).

> In the Sumerian Glossary the word for bucket included reed, wood or copper: **"ba-an-du: (reed, wood or copper determinative) bucket, pail; sowing basket."** (Foxvog, Elementary Sumerian Glossary)
>
> **As I have said, basket weaving technology was quite advanced at this stage so sturdy, reliable baskets sealed with bitumen were possible.**
>
> What Is a Shadoof?
> A shadoof is a mechanical irrigation tool that was first developed in a part of western Asia called the Fertile Crescent more than 4,000 years ago. It is still used to draw water in many parts of the world that do not have ready access to electric water pumps.
> In many ways, a shadoof resembles a seesaw. A strong pole, often made from wood or bamboo, is suspended across an upright structure so that the fulcrum sits roughly one-fifth of the way down its length. A heavy counterweight made from rocks and debris in a bucket, **basket** or animal hide is suspended from the short side of the pole, and a rope and bucket *[ED: which can be a basket sealed with bitumen -- see next]* are tied to the end of the long side.
> The invention of the shadoof is believed to have revolutionized agriculture in the ancient world by dramatically improving the efficiency of small-scale irrigation.(Downs, What Is a Shadoof?)
>
> Shadoof
> A shadoof, shaduf, dhenkli, picottah or counterpoise-lift, (an Arabic word, šaduf; also anciently known by the Greek name kelon or keloneion) is an irrigation tool. The shadoof was originally developed in ancient Mesopotamia. It is still used in many areas of Africa and Asia to draw water.
> The shaduf consists of an upright frame on which is suspended a long pole or

branch... at the long end of this pole hangs a bucket, skin bag, or **bitumen-coated reed basket.** When correctly balanced, the counterweight will support a half-filled bucket, so some effort is used to pull an empty bucket down to the water, but only the same effort is needed to lift a full bucket. (Shadoof, oilfieldwiki.com)

The Sumerians figured out how to collect and channel the overflow of the Tigris and Euphrates rivers—and the rich silt that it contained—and then use it to water and fertilize their farm fields. They designed complex systems of canals, with **dams constructed of reeds, palm trunks and mud whose gates could be opened or closed to regulate the flow of water.** (Kiger, "9 Ancient Sumerian Inventions That Changed the World")



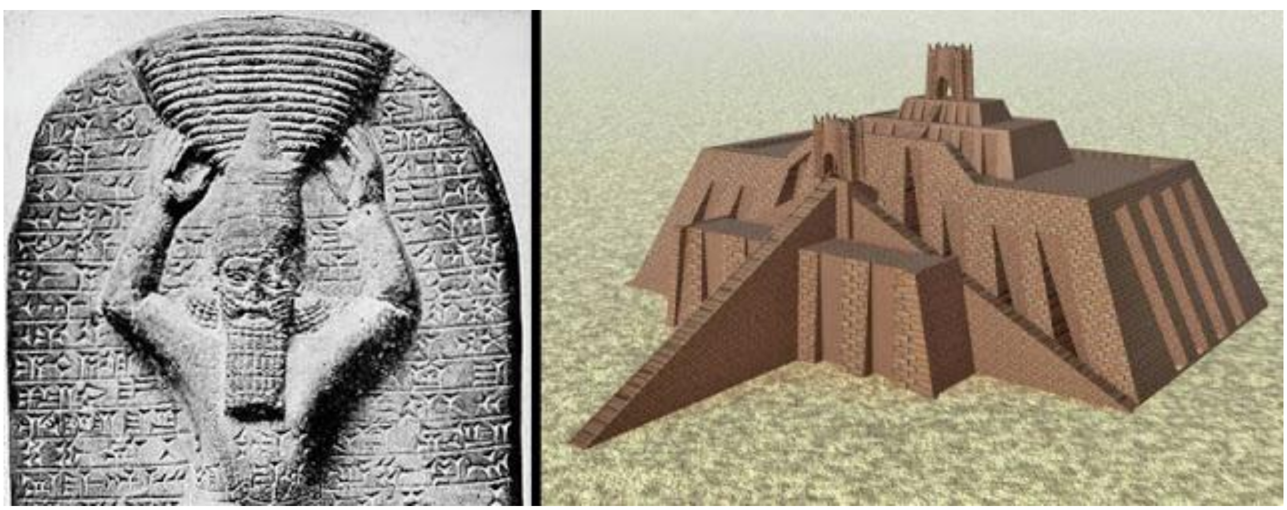
Egyptian picture of a man using a shaduf, circa 1300 BCE.
https://commons.wikimedia.org/wiki/File:Garden_Scene,_Tomb_of_Ipuy_MET_vs2973.jpg

Canals and levees formed the basis of land irrigation and flood control in ancient Sumer...This is an area of scarce rainfall but major flooding in late winter and spring. From around 3500 B.C. *[ED: the 4th millennium]* and over the next two millennia, **Sumerians pioneered control of the water flow and the development of agriculture whose produce would feed the populations of over 20 city**

states.
Sumerians built up the levees by making foundations of reeds impregnated with bitumen...Baked mud bricks, also bonded with bitumen, were placed on top of the foundations. This not only increased the height of river banks, it also protected them from erosion by water currents. During dry periods, Sumerians made a simple drainage system by hoisting water in buckets *[ED: with shadufs]* over the levees and watered cultivated land. They also poked holes into the hard and dry levee walls, allowing the water to flow and irrigate crops in adjacent fields. (Kielmas, "Ancient Sumerian Levees & Canals")

MYTHOLOGY AND IRRIGATION

The following Sumerian creation story is about the gods handing over the work of managing the marshes because the gods were tired of the task. And a principal tool for working the channels was work baskets; they were used to move, collect and haul the clay that the marshes were made of. While the mythology cannot, of course, help historians establish a specific early date for basketry, it may be useful in other ways. The myth does convey the idea that working with baskets was primal and fundamental and that baskets had deep roots in the birth of Sumerian culture. These roots were so deep they held a mythical power, indicating that they were important for Sumerian survival. For example, for thousands of years, Sumerian kings performed a basket-bearing ceremony when a new temple, a ziggurat, was about to be constructed. The king carried a basket on his head in this ritual and the ritual was considered obligatory.



LEFT) King "Ashurbanipal as High Priest" with a basket on his head.
https://commons.wikimedia.org/wiki/File:Assurbanipal_als_hogepriester.jpg
(RIGHT) "Computer reconstruction of the Zugurat of Ur-Nammu, currently located on the outskirts of Nasiriyah and built at the beginning of the 21st century BC."
https://commons.wikimedia.org/wiki/File:Ziggurat_of_ur.jpg

THE MYTH OF THE CREATION OF HUMANS WHO WERE BROUGHT INTO EXISTENCE TO TOIL WITH BASKETS

In the following creation myth, the minor gods were digging canals, piling up the silt, and crushing clay with their baskets. But after a while, they complained about bearing this toil. They persuaded the mother of the god Enki, Ninma, to convince her son, the creator of many things, to create human beings to do the work that the gods had been doing. Enki agreed and told his mother that after she created humans, she should "Impose on them the work of carrying baskets."

THE WORKER GODS REBEL AGAINST THEIR TOIL WITH THE LABOR-BASKET (Frymer-Kensky, translator, The Epic of Atra-Hasis Version 2) edited for brevity by Rick Doble

The God Enki
https://commons.wikimedia.org/wiki/File:Copia_de_Enki.jpg

[I:1-73] When the gods bore the work, carried **the labor-basket- the labor-basket of the great gods**- the work was heavy, much was the distress.
The seven great Anunnaki [the major gods] caused the Igigi [the minor gods] to bear the work.
The Anunnaki had cast lots and divided [the Cosmos]:
[they caused] the Igigi [to bear the work].
Forty more years . . . the Igigi bore the labor night and day.
They wearied, complained, grumbled in the workpits.

Enlil, the counselor of the gods, [encouraged them]
“Now, engage battle, stir up war and hostilities.”
The gods listened to his words.
They set fire to their implements, to their spades [they set] fire, their labor-baskets into the flames they threw.
“While Namma the birth-goddess is present,
let the birth-goddess create the offspring, **let man bear the labor-basket of the gods.”**
They called the goddess and asked [her], the midwife of the gods, wise Namma:
”You are the birth-goddess, creatress of man. **Create lullu-man [Primitive Man], let him bear the yoke. Let him bear the yoke...; let man carry the labor-basket of the gods.”**
Namma opened her mouth and said to the great gods, ‘It is not properly mine to do these things.
Enki is the one who purifies all; let him give me the clay, and I will do it.”
Enki opened his mouth and said to the great gods:
“At the new moon, the seventh day, and the full moon, I will set up a purifying bath.
Let them slaughter one god.
With his flesh and blood let Namma mix the clay.
God and man- let them be inseparably mixed in the clay; till the end of time

THE HUMAN RACE IS CREATED
TO DO THE WORK OF THE GODS
WITH THE LABOR-BASKET

[I:221-304) At the new moon, the seventh day, and the full moon, he set up a purifying bath.
Namma mixed the clay.
From the flesh of the god there was spirit.
She proclaimed “alive” as its sign.
After she had mixed the clay, she called the Anunnaki [the great gods]
The Igigi [the minor gods] cast their spittle on the clay.
Namma opened her mouth and said to the Igigis,
“You commanded me a task-I have completed it.
You slaughtered a god together with his rationality.
I have removed your heavy labor, have placed your labor-basket on man.

ABOUT AGRICULTURE

Sumerian Farmer's Almanac, as it is called, was the first farmer's almanac. It has been dated to circa 1600 BCE.

> While the field is drying, let your obedient (household (workforce)) prepare your tools for you, make fast the yoke bar, hang up your new whips on nails, and let the hanging handles of your old whips be mended by the artisans. Let the bronze ..... your tools "heed your arm"; let the leather "headbinder", goad, "mouth-opener", (and) whip uphold you (in matters requiring discipline and control); **let your bandu-basket crackle;** (all this) will make a mighty income for you.
>
> (Kramer, The Sumerians pp. 340–342)

The bandu-basket was a hopper according to the Oracc Museum at the University of Pennsylvania. (epsd2, Oracc Museum)

> bandu [HOPPER] N (0x) wr. ba-an-du5 "hopper, sowing basket"
> bandudu [BASKET] N (139x) Early Dynastic IIIb, Ur III, Old Babylonian, Middle Babylonian, Neo-Assyrian, Neo-Babylonian = "seeding basket of a plow; bucket

And a hopper is defined as:

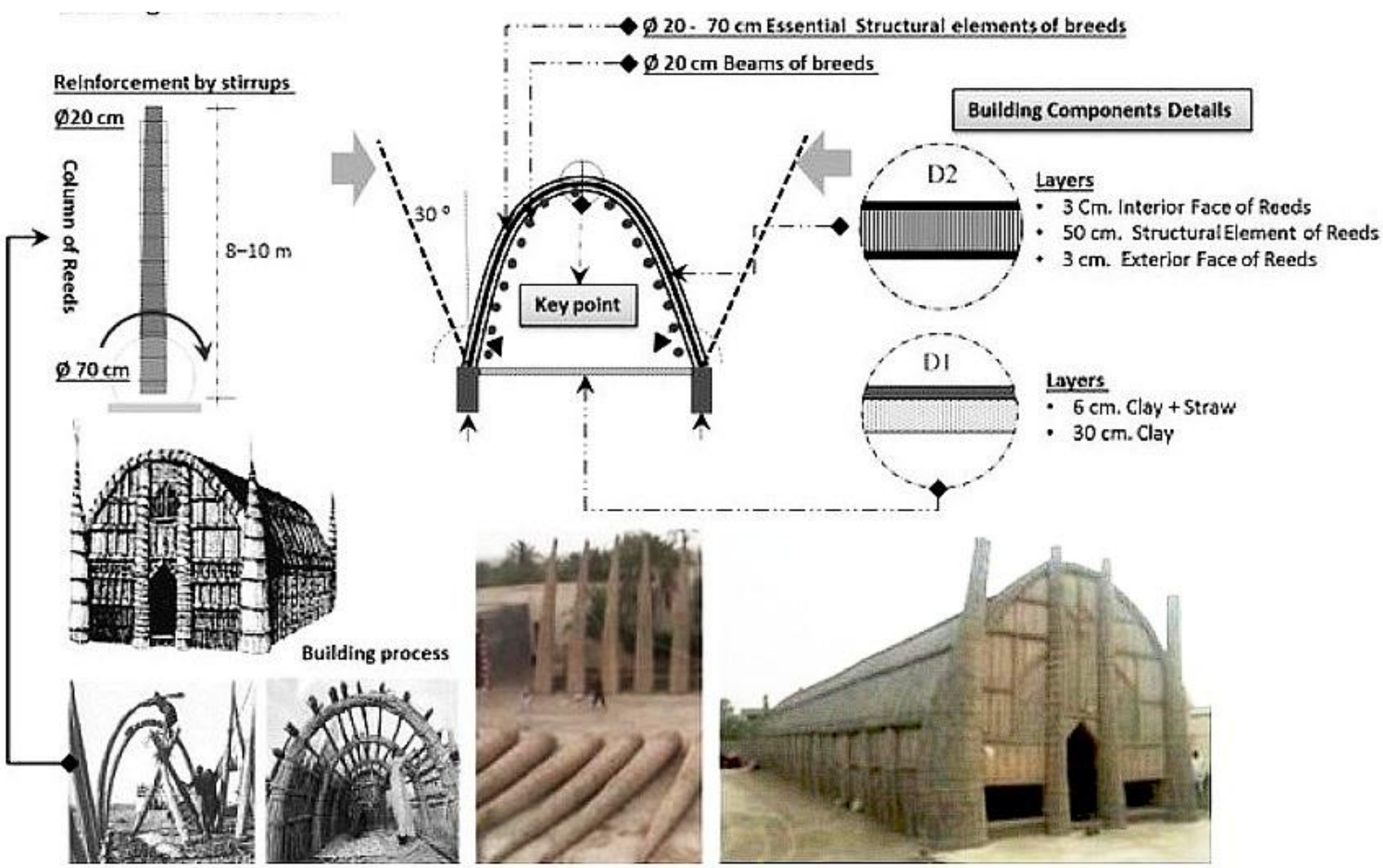
> A container for a bulk material such as grain, rock, or trash, typically one that tapers downward and is able to discharge its contents at the bottom. (hopper definition, Lexico.com)

> Mesopotamian Farming Tools
> **To carry the freshly cut harvest back to the settlement, Mesopotamians used baskets made out of reeds.** Reeds grew abundantly in the marshes of the rivers. They provided excellent material for collecting and carrying goods from the field. Reeds also quickly grew back. They grew naturally in the area and did not have to be planted, watered, or harvested.
> Early plows were made from wood. Later plows had copper parts, which broke up hard soil better.
>
> ("Mesopotamian Farming Tools," Discovery Education)

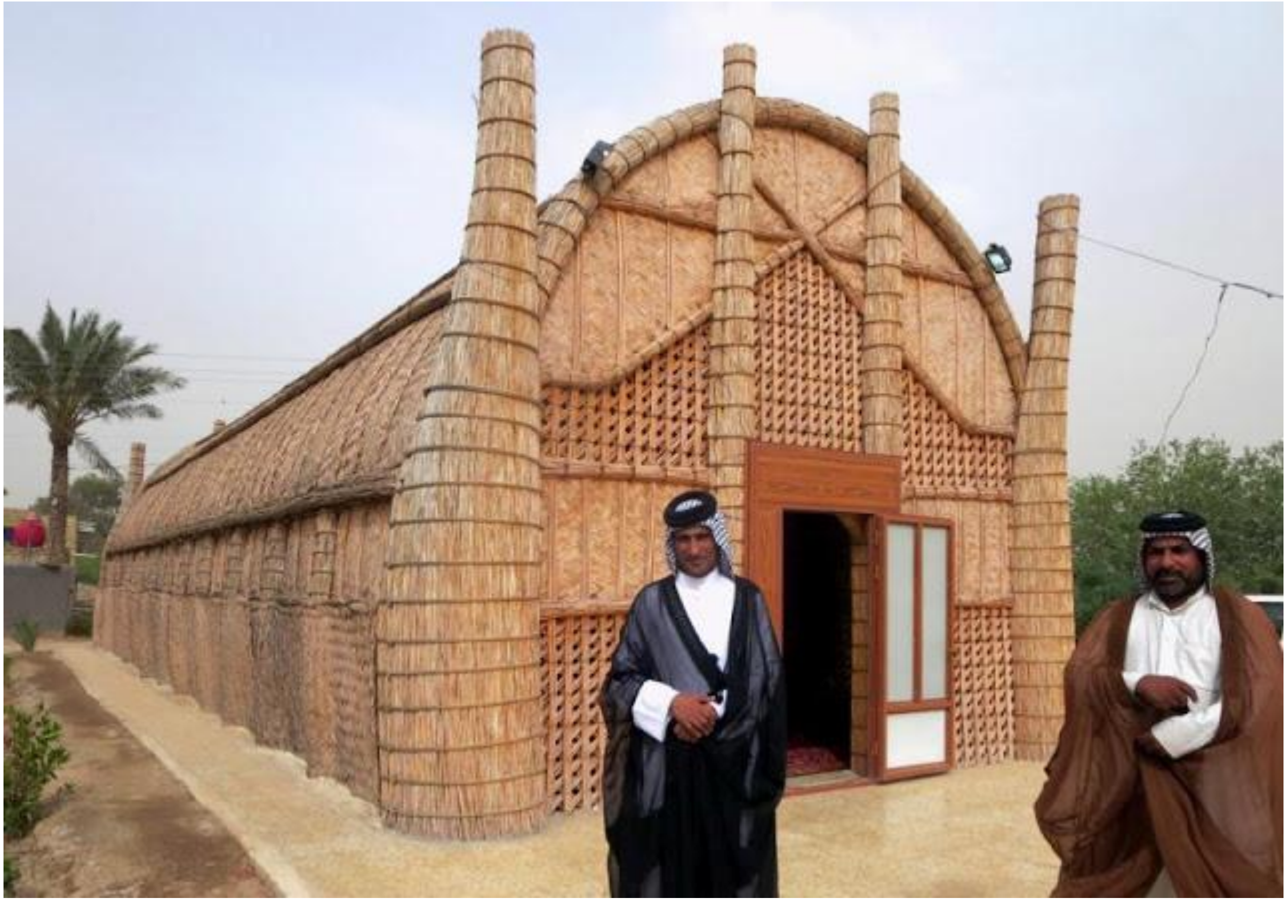
ABOUT HOUSING

There has been a misconception about housing in Sumerian cities. It was assumed that most of the homes were made of brick since brick was widely available. But many if not most were made from bundled marsh reeds. Known as grass houses, they were comfortable and well designed. Again, like the reed boats, these homes were built using basket weaving technology. While homes in the center of cities may have been made of brick, homes in the outlying villages and those away from the city center were often grass houses.

Large ceremonial buildings were called mudhifs and smaller family homes were call rabas. They were built using the same basic design. While evidence of the ancient structures has long since decayed, most historians believe that the basic technology for these buildings probably began in the Neolithic. So again, as I have stated in this article, advanced basket weaving technology or reed craftsmanship was available to the Sumerians from the earliest days of the civilization which gave it a head start.

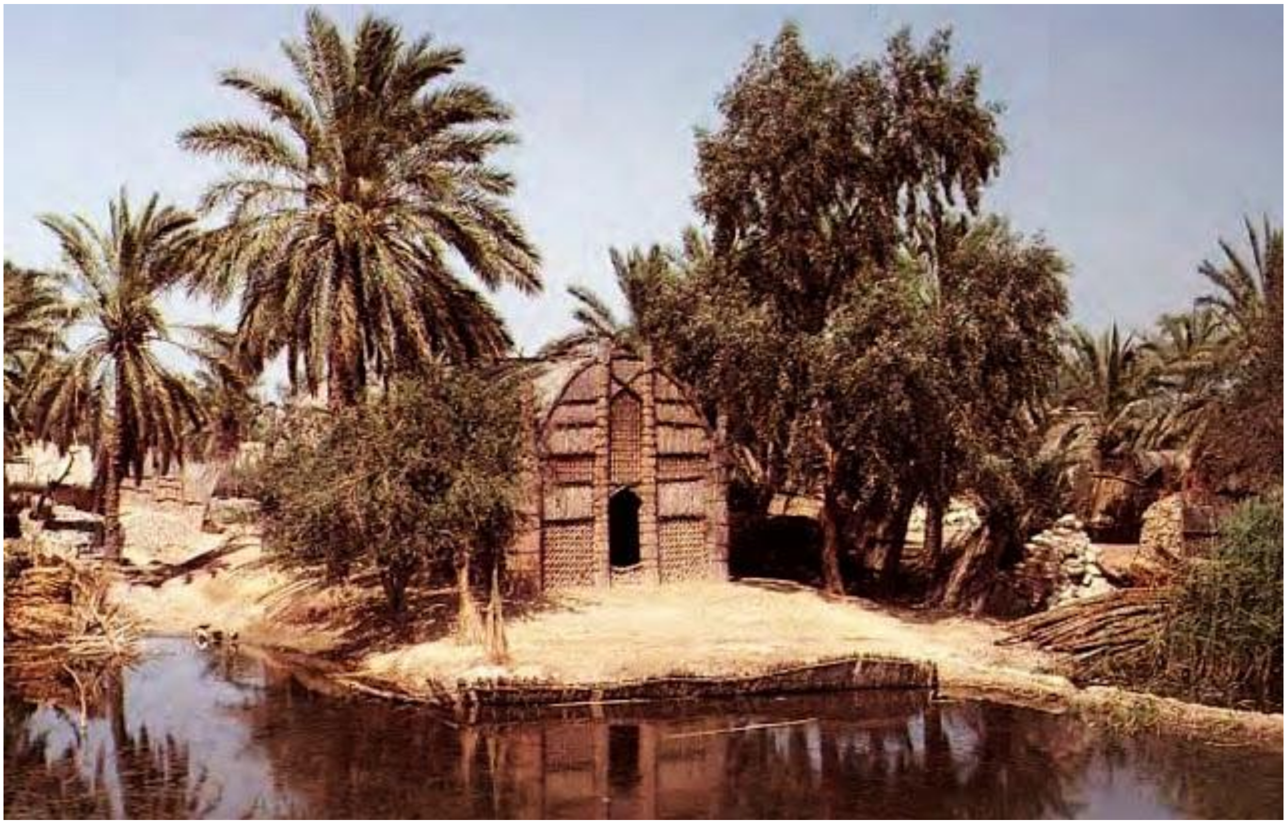


Mudhif construction details. Image used with permission.
(Almusaed et al., "Building Materials in Eco-Energy houses from Iraq and Iran")
https://www.researchgate.net/publication/273480113_Building_Materials_in_Eco-Energy_houses_from_Iraq_and_Iran



Mudhif Reception Hall
https://commons.wikimedia.org/wiki/File:Mudhif_Reception_Hall_(30943793762).jpg

Detail of the front of a mudhif community building under construction.
https://www.army.mil/article/31452/soldiers_construct_traditional_meeting_hall_in_southern_iraq



A raba or family home based on mudhif construction.
https://www.brown.edu/Departments/Joukowsky_Institute/courses/ancientneareast/files/9444529.ppt

This picture of a mudhif on a Sumerian ceremonial trough dated ca. 3000 BCE, means that this architecture is at least 5000 years old. However, it is my guess that because its construction is similar to reed boats, since it uses bundled reeds for construction, it is much older and belongs to the late Neolithic period as does the reed boat remains that were found and mentioned earlier in this article. (The British Museum, WA 120000, neg. 252077)

The origins of Sumerian civilization in Mesopotamia are still debated today, but archaeological evidence indicates that they established roughly a dozen city-states by the fourth millennium B.C...homes were constructed from bundled marsh reeds or mud bricks... (Andrews, "9 Things You May Not Know About the Ancient Sumerians")

The creative genius of these people emerged early - about 4500 B.C. - as they adapted to their harsh marshy environment. In a land barren of trees and without any stone quarries, they built astounding shelters of the only material available: fragile marsh reeds - bundling the reeds together with bulrush fiber, constructing frameworks of reed columns, roofing the structure with reed matting... (Bilkadi, Bitumen - A History)
"The homes of the affluent were built of sun-dried bricks while those of people of lesser means would have been constructed from reeds. It should be noted, however, that these buildings were still considered houses and were not the `huts' so often imagined.
The historian Bertman describes the construction of these homes, writing: (Mark, "Daily Life In Ancient Mesopotamia,")

To build a simple house, tall marsh plants would be uprooted, gathered together, and tied into tight bundles. After holes were dug in the ground, the bundles of reeds would be inserted, one bundle per hole. After the holes were filled in and firmly packed, pairs of bundles that faced each other would be bent over and tied together at the top, forming an archway. The remaining bundles would then be joined together in similar fashion…reed mats would then be draped over the top to cover the roof, or hung from a wall opening to make a door (Bertman, Handbook to Life in Ancient Mesopotamia, p 285)

(LEFT) https://www.army.mil/article/37269/mudhif_houses_capture_spirit_of_iraqi_culture
(RIGHT) https://www.army.mil/article/31452/soldiers_construct_traditional_meeting_hall_in_southern_iraq

While the reed industry was the core of Sumerian basket weaving technology, it was not the only plant that was used. Date trees were valued for their wood and their leaves were also used for thatching:

> Date trees were also an excellent source of leaves for house thatching, while the wood from the trunk was used for building. ("Ancient Mesopotamia," YL Social Studies 07, Canada)

ABOUT BRICK MAKING

> To make up for the dearth of minerals and stones, they learned to bake the river clay and mud, the supply of which was practically inexhaustible...*[ED: clay was moved and manipulated with the aid of work baskets]* In lieu of the scarce building timber, they cut and dried the huge and plentiful marsh reeds, tied them into bundles or plaited them into mats *[ED: wove the mats],* and with the help of mud-plastering fashioned them into huts and byres. *[ED: all of which required the skills of a basket weaver.]* Later the Sumerians invented the brick mold for shaping and baking the ubiquitous river clay and so had no more building-material problem. (Kramer, The Sumerians, pp. 3-4)

Sun-baked bricks.
https://commons.wikimedia.org/wiki/File:Mudbricks_in_Palestine_2011.jpg

> Clay from the riverbanks would be mixed with straw for reinforcement and packed into small brick-shaped wooden molds, which would then be lifted off so the mud bricks could dry on the ground in the hot sun…Sun-dried brick was notoriously impermanent, especially as a consequence of yearly downpours. The alternative, oven-baked brick, was expensive, however, because of the fuel and

skilled labor required for its manufacture. As a result, it tended to be used for the houses of kings and gods rather than the homes of ordinary people. (Bertman, Handbook to Life in Ancient Mesopotamia, p 285 - 286)

Fired clay brick stamped with the name of Amar-Sin, Ur III, from Eridu.
https://commons.wikimedia.org/wiki/File:Fired_clay_brick_stamped_with_the_name_of_Amar-Sin,_Ur_III,_from_Eridu,_currently_housed_in_the_British_Museum.jpg

Mass-Produced Bricks

To make up for a shortage of stones and timber for building houses and temples, the Sumerians created molds for making bricks out of clay, according to Kramer. While they weren't the first to use clay as a building material, "the innovation is the ability to produce bricks in large amounts, and put them together on a large scale,"... Their buildings might not have been as durable as stone ones, but they were able to build more of them, and create larger cities. (Kiger, "9 Ancient Sumerian Inventions That Changed the World")

ANOTHER MYTH ABOUT THE CREATION OF HUMANKIND
THE CREATION OF THE PICKAX
or
THE SONG OF THE HOE

There is much we do not understand in the following Sumerian myth because a lot of the text has been lost, but the general idea is clear. The God Enki separated heaven and Earth so that humankind would have a hospitable environment to live in. Later He molded men, like making bricks from molds. He gave power to the pickax and the basket. Then he gave the pickax to the gods who in turn gave it to the people and who then built cities with the pickax and baskets. The assumption is that work baskets were used to gather clay for the bricks to be molded and then used to maneuver finished bricks during construction.

The following is a translation by Samuel Noah Kramer from his book *Sumerian Mythology,* pp. 51-53.

> Enlil, the lord whose decisions are unalterable,
> Enlil, who brings up the seed of the land from the earth,
> Took care to move away heaven from earth,
> Took care to move away earth from heaven.
> [ED: at the dawn of creation]
> In order to make grow the creature
> [ED: to provide a hospitable environment for humankind]
> which came forth,
> [ED: the creation of humankind]
> In the "bond of heaven and Earth" He stretched out. . .
> He brought the pickax into existence, the "day" came forth,
> He introduced labor, decreed the fate,
> **upon the pickax and basket he directs the "power."**
> ...
> He set...the holy crown, upon his head,
> The head of man he placed in the mold,
> [ED: a further step in the creation of humankind -- men and women were made from molds just like Sumerian bricks were made from molds]
> ...
> Upon his black-headed people
> [ED: the Sumerians he created]
> He looked steadfastly.
> The Anunnaki

[ED: the greater gods]
who stood about Him,
He placed the pickax as a gift in their hands,
They soothe Enlil with prayer,
They give the pickax to the black-headed people to hold.
...
The pickax and the basket build cities.

An Ethiopian farmer at work on his land with a traditional pickax (hoe)..
https://commons.wikimedia.org/wiki/File:Ethiopian_farmer_at_work_on_his_land.jpg

There was a particular word for the essential heavy-duty baskets that were used to haul clay and bricks. These baskets were probably not elegant but quite rugged and durable. Here is a listing and definition of that word from the ePSD2 dictionary of ancient languages in Mesopotamia. (ePSD2, Oracc Museum)

dupsik [BASKET] N (307x) Early Dynastic IIIb, Old Akkadian, Lagash II, Ur III, Old Babylonian, Middle Babylonian, Neo-Assyrian, Neo-Babylonian wr. dupsik; ešdupsik; gidupsik; zub-sig3; tu-up-ši-ikdupsik; gidupsikdu-su; gidupsikdu-us2-su "a basket (for carrying earth and bricks)"

ABOUT TRADE

Since Sumer was lacking many normal resources, the Sumerians engaged in trade. They made extensive use of copper for their plows, for example, which made a significant difference in their ability to grow crops. But in order to get this copper, they initially needed large reed boats. Apparently, the quality of their baskets was good enough that they could export these even though most societies made their own baskets. This suggests that the Sumerian baskets had a special quality that made them especially useful.

In addition to maritime trade, several overland routes were established. These caravans used pack animals such as donkeys probably with rugged baskets or woven sacks, slung over their backs, to carry the items for trade.

> Mesopotamia trade grew organically from the crossroads nature of the civilizations that dwelt between the rivers and the fertility of the land. Because of irrigation, southern Mesopotamia was rich in agricultural products, including a variety of fruits and vegetables, nuts, dairy, fish and meat from animals both wild and domestic. Other than food items, Mesopotamia was rich in mud, clay and reeds out of which they built their cities. For most other essential goods, such as metal ores and timber, Mesopotamia needed trade.
> Craftsmen in Mesopotamia created a variety of trade goods from fine textiles to sturdy, nearly mass-produced pottery made in temple workshops to leather goods, jewelry, **basketry**, devotional figurines and ivory carvings among others.
> ...
> A busy sea route went through the Persian Gulf across the Arabian Sea to the Indus valley in what is today’s northern India and Pakistan. By the 3rd millennium, Mesopotamia trade went in all directions.
> By the time of the Assyrian empire, Mesopotamia was trading exporting grains, cooking oil, pottery, leather goods, **baskets,** textiles and jewelry and importing Egyptian gold, Indian ivory and pearls, Anatolian silver, Arabian copper and Persian tin. Trade was always vital to resource-poor Mesopotamia.
> Long-distance trade was carried out by caravans using donkeys as pack animals. Donkeys could carry about 150 pounds and travel on the plains and into the mountains, places were wheeled carts couldn’t go. (Rank, "Mesopotamia Trade: Merchants and Traders")

Donkey with traditional baskets in Spain.
https://commons.wikimedia.org/wiki/File:Donkey_panniers.jpg

ABOUT COPPER AND BRONZE

Copper was the first metal to be widely utilized and the Sumerians, even though they had to import it, were the first to understand how to smelt it at high temperatures. Their skill with smelting copper ore led to the discovery of bronze which was an alloy of copper and tin (or arsenic) and was much harder than copper by itself. Yet while copper and bronze may have replaced some basket items, basketry still played a major role. For example, copper ore was often imported via reed boats, boats built with basket technology.

> Since their homeland was largely devoid of timber, stone and minerals, the Sumerians were forced to create one of history's earliest trade networks over both land and sea. Their most important commercial partner may have been the Island Of Dilmun (present day Bahrain), which held a monopoly on the copper trade. (Andrews, "9 Things You May Not Know About the Ancient Sumerians")

> Virtually all the ore used by the ancients was handpicked with only the most worthwhile material being taken. Originally it was probably smelted by the Sumerians in shallow pits using charcoal as the fuel. How they first derived the necessary draught to raise the temperature sufficiently to melt the ore is still a matter of speculation, but it may have been done by banking over the furnace with

clay and leaving an opening directed towards the prevailing wind. Bellows were certainly known by about 2500 B.C. and some form of bellows must have been employed still earlier in order to account for the more ancient bronzes. Not until 2000 B.C. or later did these improvements reach Egypt, where hieroglyphs of that period show air being blown into the furnace through a straight tube. The bellows type reached Egypt a little later. ("Early Smelting Practice," Copper.org)

Around 3500 BC the first signs of bronze usage by the ancient Sumerians started to appear in the Tigris Euphrates valley in Western Asia. It is thought that bronze properly appeared in the region around 3000 BC. ("History of Branze," makin-metals.com)

ABOUT BASKET BOATS

Two very different kinds of boats were based on basket weaving technology. First were the sea-going reed boats that were capable of carrying tons of cargo as described earlier in this article. Second were the much smaller round coracle boats, also known as basket boats because their structure was based on a basket design. Coracles were generally used on the rivers. Many historians believe that coracles were invented early and may have existed in the Neolithic era.

(LEFT) https://commons.wikimedia.org/wiki/File:Hogenakkal_Coracle.jpg
(RIGHT) https://commons.wikimedia.org/wiki/File:Kuphar_Quffa_Baghdad_1914.jpg

According to Brighthubengineering.com, the Coracle is known as one of the world's oldest boats...The Coracle may have predated the written word. Some believe that anglers used these watercraft during Prehistoric Times. *[ED: as they were excellent fishing vessels]* ("The Coracle History," Roundabout Watercrafts)

ABOUT THE CRAFT OF BASKET WEAVING

The word for basket maker was an older word, a word that was Pre-Sumerian, indicating that basket weaving had reached a high point of development before the Sumerians arrived in Mesopotamia. The Sumerian expert, Samuel Kramer, wrote that the word for basketmaker is a pre-Sumerian word as were some others, such as the words for farmer, weaver and leatherworker.

> Benno Landsberger of the University of Ankara and a specialist in cuneiform research, concluded that these words "must therefore belong to the language spoken by...pre-Sumerian people. It therefore follows that the basic agricultural techniques and industrial skills were first introduced in Sumer not by the Sumerians but by their nameless predecessors. Landsberger called this people Proto-Euphrateans...which is...useful from the linguistic point of view."
> "In archeology, the Proto-Euphrateans are known as the Ubaid people."
> (Kramer, The Sumerians, p. 41)

While the term 'basket weaver' was used in the Sumerian language, it referred to a variety of weaving skills. Specifically, a basket weaver was defined as "a reed craftman, basket and mat weaver" (Foxvog, Elementary Sumerian Glossary)

PLEASE SEE THE APPENDIX
AT THE BOTTOM OF THIS ARTICLE
for a list of over 100 ancient Mesopotamian words
about basket weaving,
baskets, woven mats, reed craftsmanship,
reed constructions and weaving with palm leaves

THE MYTH OF:
Inanna and Enki:
The Transfer of the Arts of Civilization from Eridu to Uruk

The 'craft of basket weaving' was highly respected and considered to be one of the pillars of Sumerian culture. It was included in the approx. 100 MEs, a list of elements that made up Sumerian culture, an essential list decreed by the gods, which in this myth were passed over to Inanna and human culture.
In this myth basket weaving is mentioned, specifically, a number of times emphasizing its importance.

Inanna, queen of heaven, and tutelary goddess of Erech, is anxious to increase the welfare and prosperity of her city, to make it the center of Sumerian civilization, and thus to exalt her own name and fame.

She therefore decides to go to Eridu, the ancient and hoary seat of Sumerian culture where Enki, the Lord of Wisdom, who "knows the very heart of the gods," dwells in his watery abyss, the Abzu.

For Enki has under his charge all the divine decrees that are fundamental to civilization. And if she can obtain them, by fair means or foul, and bring them to her beloved city Erech, its glory and her own will indeed be unsurpassed.

[ED: After feasting the drunken Enki willing agrees to turn over the decrees to Inanna.]

"O name of my power, O name of my power,
To the pure Inanna, my daughter, I shall present . . . .
The exalted scepter, staffs, the exalted shrine, shepherdship, kingship."

He thus presents, several at a time, over one hundred divine decrees which are the basis of the culture pattern of Sumerian civilization.

Among these divine decrees presented by Enki to Inanna are those referring to lordship, godship, the exalted and enduring crown, the throne of kingship, ... heroship and power ...rejoicing of the heart...the craft of the carpenter, metal worker, scribe, smith, leather worker, mason, and **basket weaver...**

"O name of my power, O name of my power,
To the bright Inanna, my daughter, I shall present . . .
The arts of woodworking, metalworking, writing, toolmaking,
leatherworking...building, **basketweaving."**
Pure Inanna took them.

Inanna is only too happy to accept the gifts offered her by the drunken Enki. She takes them, loads them on her "boat of heaven," and makes off for Erech with her precious cargo. (Kramer, Sumerian Mythology, pp. 64-67.)

CONCLUSION

Civilization was able to gain a foothold partly because a fully developed basket weaving technology was available from the earliest beginnings of the Sumerian cities. Much of this sophisticated technology had been developed thousands of years earlier in the Neolithic era.

In combination with bitumen, a wide variety of objects were created. This technology was crucial at the start and continued to be important as the civilizations matured. So while copper, bronze, and wood items plus bricks and mass-produced pottery may have replaced some basket products, basket weaving technology continued to play a major role. Grass houses, reed and coracle boats, work baskets for hauling clay and bricks and crops, mats, bundled reeds with bitumen as foundations for irrigation control, plus dozens of personal items like carry-baskets, boxes, and chests, were a continual and essential part of the culture.

AFTERWORD

THE IMPORTANCE
OF BASKET WEAVING TECHNOLOGY
IN ANCIENT EGYPT

In both Egypt and Mesopotamia the basket had mythical importance.
(LEFT) The Egyptian god Heh (or Huh) kneeling on a basket
https://commons.wikimedia.org/wiki/File:Egyptian_-_Kneeling_Heh_on_a_Basket_-_Walters_48425_-_Back.jpg
(RIGHT) King Ashurbanipal of Mesopotamia as the high priest performing the basket-bearer ritual. The kings of Mesopotamia were known as priest-kings.
https://commons.wikimedia.org/wiki/File:Assurbanipal_als_hogepriester.jpg

The god Heh or Huh was frequently depicted with a basket and one knee raised as in this picture of "Kneeling Heh on a Basket." He also often holds a palm branch in each hand. (Remler, Egyptian Mythology, A to Z)

> "Heh was one of the oldest Egyptian gods in ancient Egyptian history, the deification of eternity in the Ogdoad. The name Huh also spelled as Heh, Hah, Hauh, Huah, or Hahuh, whose name means endlessness. He was the god of infinity and time, the god of long life and eternity." ("Egyptian Gods: Huh" egyptian-gods.org)

"Relief of god Heh holding the cartouche of Thutmoses III,
New Kingdom, 18th dynasty (1479-1425 BC)"
https://commons.wikimedia.org/wiki/File:LSR_Pharao_-_Thutmoses_Kartusche.jpg

Showing the use of reed boats in both Mesopotamia and Egypt.

(TOP) Mesopotamian reed boats circa 700 BCE.

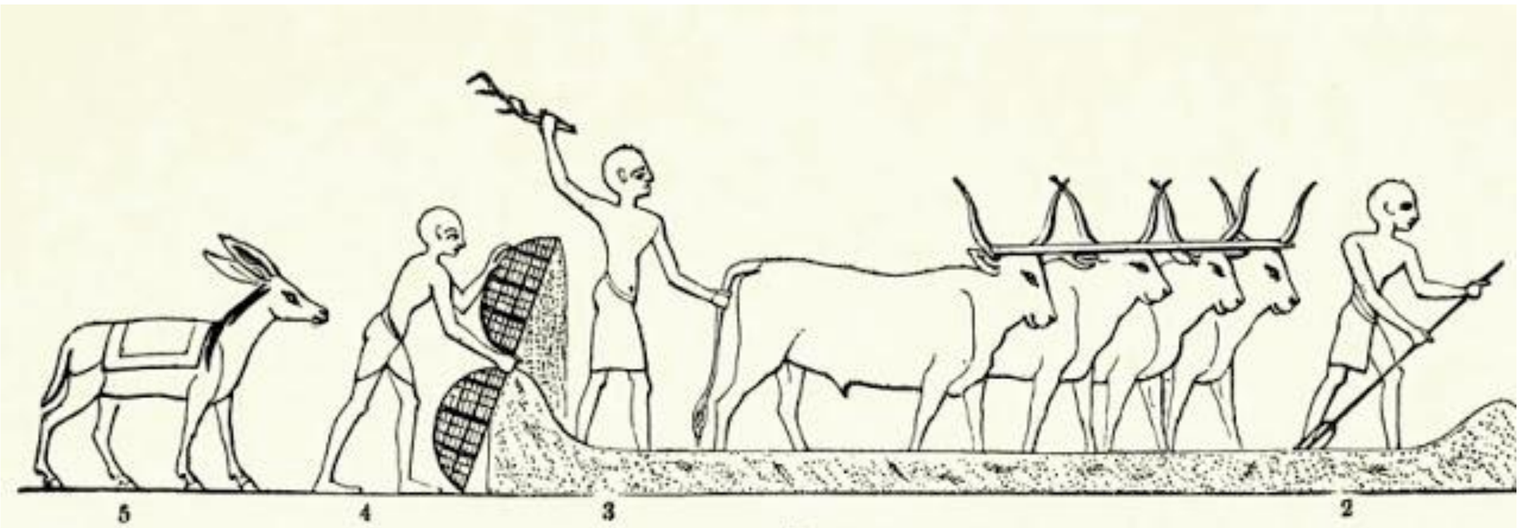
Picture from *A History of Babylon..*

(King, Leonard. A History of Babylon. London, Chatto and Windus, 1915, p. 201.)

(BOTTOM) Egyptian reed boat with baskets on the boat, circa 700 BCE.

https://commons.wikimedia.org/wiki/File:Boating,_Luxor,_tomb_of_Mentuemhet,_Third_Intermediate_Period_to_Late_Period,_Dynasties_25-26,_c._690-664_BC,_limestone,_pigment_-_Oriental_Institute_Museum,_University_of_Chicago_-_DSC07798.JPG

FROM THE FARM TO THE TABLE
ANCIENT EGYPTIANS
USED AND DEPENDED ON BASKETS



No. 429. The *tritura.*

Fig. 1. The steward, or the owner of the land.
2. throws the ears of wheat into the centre that the oxen may pass over them and tread out the grain.
3. The driver.
4. brings the wheat to the threshing floor, in baskets carried on asses.
The oxen are yoked together that they may walk round regularly.

https://commons.wikimedia.org/wiki/File:A_second_series_of_the_Manners_and_customs_of_the_ancient_Egyptians_(Page_87)_BHL21584712.jpg

https://commons.wikimedia.org/wiki/File:Maler_der_Grabkammer_des_Nacht_002.jpg

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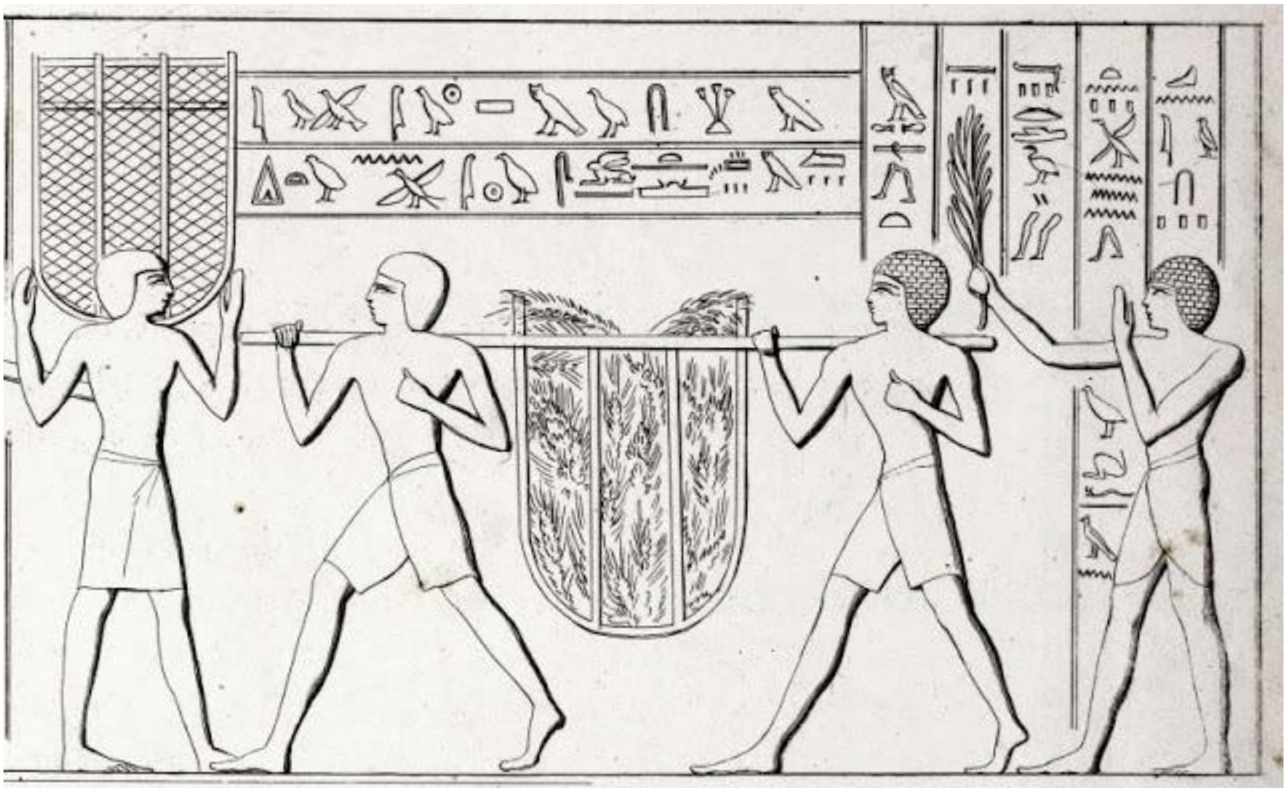
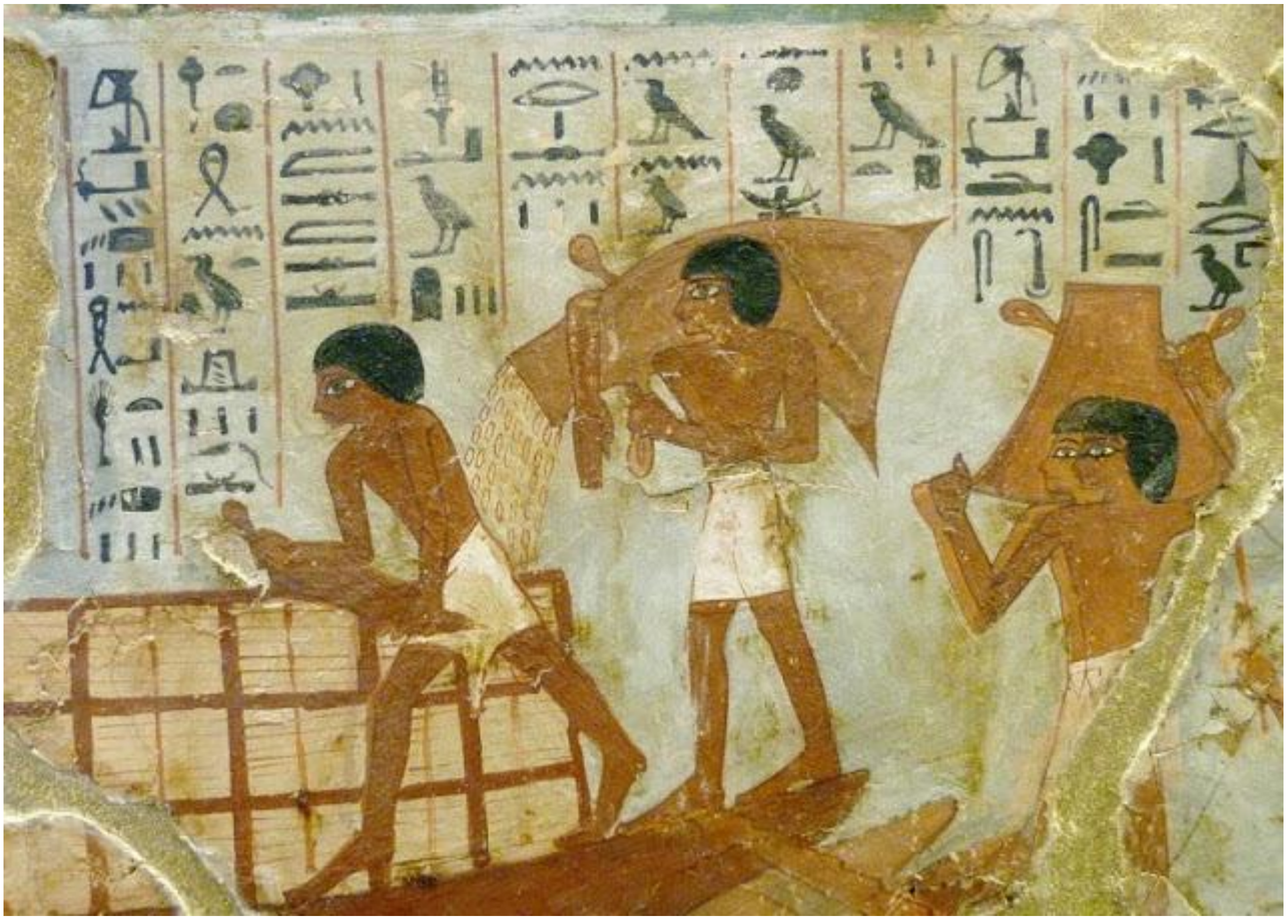


https://commons.wikimedia.org/wiki/File:Mietitura_delle_spighe-_ricolta_e_battitura_delle_medesime_(NYPL_b14291206-425523).jpg

Both the Egyptians and Mesopotamians used woven sacks.
This picture of a person carrying a sack is from the city of Ur in Mesopotamia.
https://commons.wikimedia.org/wiki/File:Standard_of_Ur_-_Peace_Panel_-_Sumer.jpg



Egyptian workers carrying sacks.
https://commons.wikimedia.org/wiki/File:Tombe_d%27Oumsou_1b.jpg

Ancient Egyptian model of a granary with workers holding sacks of grain, circa 2000 BCE.
https://commons.wikimedia.org/wiki/File:Model_of_a_Granary_with_Scribes_MET_20.3.11_EGDP014047.jpg

Offer bearers carrying baskets circa 2400 BCE.
https://commons.wikimedia.org/wiki/File:V_dinastia,_mastaba_di_ti,_2400_ac_ca._10.JPG

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APPENDIX

Over 100 Words Altogether About Basket Weaving, Baskets, Woven Mats, Reed Craftmanship, Reed Constructions And Weaving With Palm Leaves

As anthropologists know, multiple words for certain practices or materials or objects indicate that these were important to and prevalent in the culture.

THESE DEFINITIONS COPIED FROM:
ePSD2 sux Summaries:
A dictionary of words in ancient Mesopotamian languages.
Oracc Museum, University of Pennsylvania.
<http://oracc.museum.upenn.edu/epsd2/cbd/sux/summaries.html>

WORDS FOR CRAFTSMEN AND WORKERS

ad.KID [WEAVER] N (864x) Early Dynastic IIIa, Early Dynastic IIIb, Ebla, Old Akkadian, Lagash II, Ur III, Old Babylonian, Middle Babylonian, Neo-Assyrian, Neo-Babylonian wr. ad-KID; ad-KIDzabar "basket weaver; reed worker"

nam.ad.KID [BASKET-WEAVING] N (4x) Old Babylonian wr. nam-ad-KID "the craft of the basket-weaver"

nitagtag [BASKET MAKER] N (1x) Neo-Assyrian wr. lu2ni2-tag-tag "basket maker"

kuštaga [MAT WEAVER] N (2x) Neo-Assyrian, Neo-Babylonian wr. lu2kuš-tag-ga "mat weaver"

ninnitaga [RUSH WEAVER] N (1x) Neo-Assyrian wr. lu2ninni5-tag-ga "rush weaver"

tugdu [FELTER] N (507x) Early Dynastic IIIa, Early Dynastic IIIb, Old Akkadian, Lagash II, Ur III, Old Babylonian wr. tug2-du8 "felter; rope maker"

mangagagaz [WORKER] N (4x) Ur III wr. KA-gaz; mangaga-gaz "worker of palm fibers"

dupsik gur [WORK] V/t (0x) wr. dupsik gur17 "to do corvee work (lit. to carry the basket)"

BASKET RELATED WORDS

bandu [HOPPER] N (0x) wr. ba-an-du5 "hopper, sowing basket"

bandudu [BASKET] N (139x) Early Dynastic IIIb, Ur III, Old Babylonian, Middle Babylonian, Neo-Assyrian, Neo-Babylonian wr. ba-an-du5; ba-an-du8-du8; giba-an-du8-du8; ba-an-du8; giba-an-du; giba-an-du8; giba-an-du5; urudba-an-du8-du8; ba-an-du8-du8zabar; giba-an-du-du8; giba-an-du8-zu; ešba-an-du8-du8; ba-an-du-du; ba-an-du-tu; ešba-an-du8 "seeding basket of a plow; bucket" bisa [BASKET] N (1653x) Early Dynastic IIIb, Old Akkadian, Lagash II, Ur III, Old Babylonian, Middle Babylonian, Neo-Assyrian, Neo-Babylonian, Hellenistic, unknown wr. bisa; gibisa; ešbisa; bisa3; bisa2; bisa2pi-sa-an-na; pi-sa-anbisa; pi-sa-anbisa2; dugbisa2pi-sa-an; imbisa2; ešbisa3; ešbisa3pi-sa-an; eš pi-sa-anbisa3; bisa-bisa; bisa2-na; dugbisa2 "basket; frame; box; downspout"

bisahal [BASKET] N (1x) Old Babylonian wr. gibisa-al "a basket"

bisanindaar [BASKET] N (1x) Old Babylonian wr. bisa-ninda-ar "bread basket"

bisasuh [BASKET] N (2x) Old Babylonian wr. gibisa-su4; bisa-su4 "a basket"

dupsik [BASKET] N (307x) Early Dynastic IIIb, Old Akkadian, Lagash II, Ur III, Old Babylonian, Middle Babylonian, Neo-Assyrian, Neo-Babylonian wr. dupsik; ešdupsik; gidupsik; zub-sig3; tu-up-ši-ikdupsik; gidupsikdu-su; gidupsikdu-us2-su "a basket (for carrying earth and bricks)"

EN [~BASKET] AJ (112x) Early Dynastic IIIa, Lagash II, Ur III, Old Babylonian wr. EN "a qualification of reed baskets and reed mats"

gabil [BASKET] N (59x) Early Dynastic IIIb, Lagash II, Ur III, Old Babylonian, Neo-Assyrian wr. gab2-il2; gab2; gigab2-il2 "a basket"

gi.gur.DU [BASKET] N (2x) Old Babylonian wr. gi-gur-DU "basket"

gigurda [BASKET] N (13x) Old Babylonian, Neo-Assyrian, Neo-Babylonian wr. gi-gur-da "a basket"

gigurzidga [BASKET] N (2x) Ur III wr. gi-gur-zid2-ga6 "basket for carrying flour"

gihan [BASKET] N (33x) Ur III, Old Babylonian, Neo-Babylonian wr. gi-a-an "a basket for wool"

gipad [BASKET] N (0x) wr. gi-pad "a basket for dates"

gisab [BASKET] N (1x) Old Babylonian wr. gi-sab "basket"

gur [BASKET] N (5x) Old Babylonian, Middle Assyrian, Neo-Assyrian wr. gur; kur4; ešgur "a basket"

gurdub [BASKET] N (882x) Early Dynastic IIIb, Old Akkadian, Lagash II, Ur III, Old Babylonian wr. gurdub; gigur-dub; gurdub2; gigurdub2; gur-dub; gigurdub; ešgurdub "a basket"

gurub [BASKET] N (2x) Old Babylonian wr. gu2-ru-ba; gu2-ru-ub; gu-ru-ba; gu-ru-ub "a basket"

iri du [PROVIDE WITH BASE] V/t (8x) Ur III, Old Babylonian wr. iri3 du3; iri3 du "to provide (a basket) with a base"

irlam [BASKET] N (349x) Early Dynastic IIIb, Old Akkadian, Lagash II, Ur III, Old Babylonian wr. ir3-lam; gigi7-lam; KIŠ-lam; gi-lam "a basket"

hal [BASKET] N (296x) Early Dynastic IIIa, Old Akkadian, Lagash II, Ur III, Old Babylonian wr. gial; al; a-al "a basket"

halhallum [BASKET] N (1x) Ur III wr. al-al-lum "a basket"

il [BASKET] N (2x) Middle Babylonian wr. il2; ešil2 "a basket"

kaskal [BASKET] N (480x) Ur III wr. gikaskal "travel basket"

kaskal ninda si [BASKET] N (0x) wr. gikaskal ninda si "bread basket"

kigub [STATION] N (141x) Early Dynastic IIIb, Old Akkadian, Lagash II, Ur III, Old Babylonian, Middle Babylonian, Neo-Assyrian, Hellenistic, unknown wr. ki-gub; ki-gub-ba; ki-gubzabar; eški-gub "station, position; stand (for a basket)"

kita [BASKET] N (11x) Old Babylonian, Middle Babylonian, Neo-Babylonian wr. eškid-da; eški-ta; eša2-da; kid-da "basket" lumasabil [CARRIER] N (0x) wr. lu2-ma-sa2-il2 "a basket carrier"

masab [BASKET] N (256x) Early Dynastic IIIb, Old Akkadian, Lagash II, Ur III, Old Babylonian, Middle Babylonian, Neo-Babylonian, Hellenistic wr. gima-sa2-ab; ma-sa2-ab; ma-sa2; ma-sab; gima-sab; gina-sa2-ab; ma-sa2-abkug-sig17; ma-sa2-abzabar; ma-sa2-abkug-babbar; urudma-sa2-ab "basket"

mudla [BASKET] N (3x) Old Babylonian, Middle Babylonian wr. ešmudla; mu-ud-lamudla; mudla "basket"

nashapu [BASKET] N (2x) Neo-Assyrian, Neo-Babylonian wr. na-as-a-pu "basket"

pad [BASKET] N (24x) Ur III, Neo-Assyrian, Neo-Babylonian wr. gipad; pad; gipad3; pad3; gipad3-da "a basket"

sašu [TURBAN] N (121x) Old Akkadian, Lagash II, Ur III, Old Babylonian, Middle Babylonian, Neo-Assyrian, Neo-Babylonian wr. tug2sašu; sašu; sa-šu2; zag-šu2; tug2šu2-sa; sa-šu; sa-šu4; sa-šusašu "cap, turban; cover (of basket or pot)"

sigda [BASKET] N (70x) Ur III wr. gisi-ig-da; ešsi-ig; gisi-ig; si-ig-da; ešsi-ig-da "a basket"

šu [BASKET] N (5x) Early Dynastic IIIb, Ur III wr. eššu4 "basket"

šuguru [~DATES] N (64x) Old Akkadian, Lagash II, Ur III, Old Babylonian wr. šu-guru5; šu-gur5-ru "container for fruit, basket"

MORE THAN 60 WORDS RELATED TO WOVEN REED CONSTRUCTIONS

al [FENCING] N (1x) Neo-Babylonian wr. gial "reed fencing"

al.PI.na [REED FENCE] N (1x) Old Babylonian wr. gial-PI-na "reed fence"

asal [~ARCHITECTURE] N (12x) Ur III, Old Babylonian wr. a-sal; eša-sal4; a-sa-al; a-sal4; a-sal4zabar; na-sal-am3 "reed column (at door posts)"

azad [SHELTER] N (7x) Old Babylonian, Middle Babylonian, Neo-Assyrian wr. a-zar; giazad(A.LAGAB×AL.ŠU2); giu2azad(A.LAGAB×KUL.ŠU2.MA2.A); u2azad(A.LAGAB×AL.ŠU2.A); u2azad(LAGAB×AL.ŠU2); azad2; azad(A.LAGAB×AL.ŠU2); azad(U2.A.LAGAB×AL); u2-azad(A.LAGAB×AL.X) "reed shelter"

bandul [MAT] N (4x) Neo-Babylonian wr. giba-an-dul "a reed mat"

barhuda [TOOL] N (5x) Old Babylonian wr. bar-u-da "a tool; a reed cutter"

dimuš [SHELTER] N (7x) Neo-Assyrian wr. dimuš "reed shelter, nest; reed stalk"

dirig [RAFT] N (5x) Old Babylonian, Neo-Babylonian wr. dirig; gidirig; a-dirig "reed raft"

DUB.NAGAR.UM [OBJECT] N (0x) wr. giDUB-NAGAR-UM "a reed object"

e gisigak [REED HUT] N (8x) Old Babylonian, Middle Babylonian wr. e2 gi-sig "reed hut"

ešgi [SHRINE] N (0x) wr. eš3-gi "a reed shrine"

garadin [BUNDLE] N (71x) Old Akkadian, Lagash II, Ur III, Old Babylonian, Middle Babylonian, Neo-Assyrian, Persian wr. garadin; garadin3; garadin6; gigaradin4; garadin7; garadin9; garadin10; garadin2; garadin8; garadin(GAD&GAD.GAR&GAR); garadin(TAB.GAR.ŠE); garadin(ŠE.EŠ2.PI.GAR); gigaradin; gi ka-ra-dingaradin5; garadin4; gigaradin5 "bundle (of reeds), stack of sheaves" gi du [ERECT A FENCE] V/t (51x) Ur III, Old Babylonian wr. gi du3 "to erect a reed fence; to make reed compartments in a boat"

gi gul [PROCESS REEDS] V/t (1x) Old Babylonian wr. gi gul; gi gu-ul-gu-ul "to process reeds"

gi.sa.du.DI.a [REED EFFIGY] N (2x) Neo-Assyrian wr. gi-sa-du-DI-a "reed effigy"

giil [REED-CARRIER] N (23x) Ur III wr. gi-il2 "reed carrier"

gidimdim [REED OBJECT] N (2x) Neo-Assyrian, Neo-Babylonian wr. gi-dim-dim "reed object"

gidu [FENCE] N (44x) Early Dynastic IIIa, Ur III, Old Babylonian, Middle Babylonian, Neo-Assyrian, Neo-Babylonian wr. gi-du3; gi-du3-a; gi4-du3 "reed fence"

gilim [ROPE] N (151x) Old Akkadian, Lagash II, Ur III, Old Babylonian, Neo-Assyrian, Neo-Babylonian, Persian, unknown wr. gigilim; gilim; gigilim-sa; kilib "a rope of twined reeds; reed post"

girgi [REED STRIP] N (4x) Old Babylonian wr. gir-gi4; gir-gi "reed strip"

girila [REED OBJECT] N (2x) Neo-Assyrian wr. gigiri3-la2 "reed object"

gisal [SCREEN] N (98x) Ur III, Old Babylonian, Middle Babylonian, Neo-Assyrian, Neo-Babylonian, Hellenistic, unknown wr. gi-sal; gi-sa; ešgi-sal "reed screen; eaves"

gisal gul [PROCESS REEDS] V/t (0x) wr. gi-sa gul "to process reeds"

gisig [FENCE] N (38x) Ur III, Old Babylonian, Middle Babylonian, Neo-Assyrian, Neo-Babylonian, unknown wr. gi-sig; gi-sig7 "a reed fence; a reed hut"

gišid [REED] N (190x) Old Akkadian, Ur III wr. gi-šid; ga-šid "fully matured reed"

gišu [REED COIL] N (3x) Neo-Assyrian wr. gi-šu2-a; gi-šu2 "reed coil"

gizukeš [REED BUNDLE] N (1x) Neo-Assyrian wr. gi-zu2-keš2 "reed bundle"

gu la [BUNDLE] V/t (1x) Early Dynastic IIIa wr. gu la2 "to bundle (reeds or grass)"

gud [NEST] N (100x) Old Babylonian, Middle Babylonian, Neo-Assyrian, Hellenistic, unknown wr. gud3; gigud3; gud3gu-ud; gud; u2gud3 "nest, reed nest, shelter; coil of bird's nest"

guhšu [ALTAR] N (18x) Old Babylonian, Neo-Assyrian, Neo-Babylonian, Persian wr. gušu2; gigum2-gum2-šu2; gušu; gigušu; gum2-šu2; gigu-gu-un; gigu-gu-un-šu2; gigu-un-šu2; gigušu2 "a reed altar; (a part of) a container"

gula [SHEAF] N (167x) Early Dynastic IIIa, Early Dynastic IIIb, Old Akkadian, Ur III wr. gu-la2 "sheaf of reeds"

gurna [CONTAINER] N (54x) Ur III wr. gigur-na; gur-na "a reed container"

guru [BUNDLE] N (20x) Ur III, Middle Babylonian, Neo-Assyrian wr. giguru5; guru5; giguru5-uš "a reed bundle"

hurda [REED MAT] N (5x) Ur III, Old Babylonian, Middle Babylonian wr. u-ur-da; u-ur2-da; ur-da; ur-du; giur-da; giur-du "a reed mat; mat door"

KA.gir [MAT] N (28x) Early Dynastic IIIb, Ur III wr. KA-gir; KA-gir14-ra; giKA-gir; KA-gir3; KA-gir4 "a reed mat"

kazir [OBJECT] N (3x) Ur III wr. ka-zi-ir "qualification of a mat or reed object"

kid [MAT] N (803x) Early Dynastic IIIa, Early Dynastic IIIb, Old Akkadian, Lagash II, Ur III, Old Babylonian, Middle Babylonian, Neo-Assyrian wr. gikid; kid; kid2 "a reed mat or woven object" kidmah [MAT] N (5x) Ur III, Old Babylonian wr. gikid-ma "a reed mat"

kidmahhal [MAT] N (1x) Old Babylonian wr. kid-ma-al "a mat"

kidmamah [MAT] N (1x) Old Babylonian wr. kid-ma2-ma; gikid-ma2-ma "a reed mat"

kidmaniina [MAT] N (0x) wr. gikid-ma2-niin-a "a reed mat; boat-cover"

kidmašagak [MAT] N (2x) Old Babylonian wr. gikid-ma2-šag4-ga "a reed mat"

kidmašua [MAT] N (144x) Ur III, Old Babylonian, Middle Babylonian, Neo-Assyrian wr. muru(KID.ŠU2.MA2); gimuru(KID.ŠU2.MA2); gikid-ma2-šu2-a; KID-MA2-U-A; giKID-MA2-U-A; gikid-ma2-šu2; kid-ma2-šu2-a; giKID-U-MA2; KID-U-MA2; KID-U-MA2-A; KID-ŠU2-MA2-GI; giKID-ŠU2-MA2-A; kid-ma2-šu2 "a reed mat; boat-cover; rushes, thicket; boat cover"

lugize [REED-CUTTER] N (3x) Ur III, Old Babylonian wr. lu2-gi-ze "reed-cutter"

madala [BUNDLE] N (39x) Ur III, Old Babylonian, Neo-Assyrian, Neo-Babylonian wr. ma2-da-la2; ešma2-da-la2; gima2-da-la2; ma2-da-lum; urudma2-da-lum; ešda-la2 "bundle of reeds, reed-bundle; raft; a metal object"

mahatum [SIEVE] N (1x) Ur III wr. gima-a-tum "a type of reed sieve"

mansimšual [SIEVE] N (0x) wr. ma-an-sim-šu-al2 "a reed sieve"

muru [MAT] N (14x) Old Babylonian, Middle Babylonian, Hellenistic wr. gimuru(KID.MA); gimuru(KID.ŠU2.MA2) "a reed mat used as a cover"

nimah [MAT] N (0x) wr. ni2-ma "a reed mat"

nisiga [MATTING] N (12x) Ur III, Old Babylonian, Neo-Babylonian wr. gini2-si-ga; ni2-si-ga; gini2-sig-ga; gini2-sig "matting; a part of a reed-rope door; a reed fence"

piri [LION] N (348x) Early Dynastic IIIa, Early Dynastic IIIb, Old Akkadian, Lagash II, Ur III, Old Babylonian, Middle Babylonian, Neo-Assyrian, Neo-Babylonian, Persian, Hellenistic, Uncertain, unknown wr. piri; piri-piri; piri3; bi2-ri-i3; ešpiri; pi-ri-a2; gipiri; tug2piri-piri; piri2 "lion; lion figurine; bull, wild bull; reed knot"

sa [BUNDLE] N (8636x) Early Dynastic IIIa, Early Dynastic IIIb, Old Akkadian, Ur III, Old Babylonian, Middle Babylonian wr. sa; gisa; sa2 "reed-bundle"

salillan [REED FENCE] N (4x) Neo-Assyrian, Neo-Babylonian wr. gisa-lillan "reed fence"

saha [UNMNG] N (10x) Ur III wr. sa-a "describing a reed object"

šakkaru [TOOL] N (1x) Neo-Assyrian wr. na4šak-ka-ru-u "a stone tool of the reed worker"

šerrum [MAT] N (291x) Ur III wr. šer7-ru-um; šer7-um; gišer7-ru-um; gišer7-um; šer7; šer7-ru; gišer7-ru "a reed mat"

šertab [FENCE] N (11x) Early Dynastic IIIa, Old Babylonian, Neo-Assyrian wr. še-er-tab; sir2-dib "a reed fence; frame"

šeš [OBJECT] N (1x) Old Babylonian wr. eššeš "a metal or reed object"

šutug [REED-HUT] N (22x) Old Akkadian, Ur III, Old Babylonian, Middle Babylonian, Neo-Assyrian, Neo-Babylonian, Uncertain wr. gišutug; šutug; šutug2; gišutugšu-tuk; gišutug2; eššutug "reed-hut, reed shelter"

ududu [REED-BUNDLE] N (6x) Early Dynastic IIIb, Old Babylonian, Neo-Assyrian, Neo-Babylonian wr. u2-du3; giu2-du3-du3; ešu2-du3-du3 "reed bundle"

ugra [REED-BUNDLE] N (7x) Middle Assyrian, Neo-Assyrian wr. ugra; giugra "bundle of reeds, reed-bundle" um [ROPE] N (13x) Old Akkadian, Old Babylonian, Middle Babylonian wr. um; gium "reed rope"

ušera [REED-BUNDLE] N (7x) Middle Assyrian, Neo-Assyrian, Neo-Babylonian wr. ušera "bundle of reeds, reed-bundle"

OTHER WOVEN-FIBER RELATED WORDS

kad [TIE] V/t (53x) Early Dynastic IIIa, Early Dynastic IIIb, Old Akkadian, Ur III, Old Babylonian, Middle Assyrian, Middle Babylonian, Neo-Assyrian, Neo-Babylonian wr. kad4; kad5; kara2; kad8; gar3; ka-ad; kad3; kad3-kad3; kad4-da; kad4-kad4; kad6; qatkad5 "to tie, gather; to itch, scratch; to weave a mat"

gilim [ROPE] N (151x) Old Akkadian, Lagash II, Ur III, Old Babylonian, Neo-Assyrian, Neo-Babylonian, Persian, unknown wr. gigilim; gilim; gigilim-sa; kilib "a rope of twined reeds; reed post"

šatuku [MATTRESS] N (67x) Old Akkadian, Lagash II, Ur III, Old Babylonian, Middle Babylonian, Neo-Assyrian, Neo-Babylonian wr. ša3-tuku5; ša3-tuku; ša3-an-tuku; ša3-tug2tuku5; tug2ša3-tuku5; šag4-ba-tuku; ša2-ba-tuku; tug2ša-tuku2; ša3-da-ga "mattress; webbed mat (for a bed); felt; padding"

mangaga [FIBERS] N (158x) Old Akkadian, Ur III, Old Babylonian, Neo-Assyrian wr. mangaga; mangaga(KA×(U.U.U)); ma-an-ga-ga; ešma-ga-ga; ešman-ga-gu; ešmangaga; man-ga-ga "date-palm fibers"

su [FIBERS] N (58x) Old Babylonian, Middle Babylonian, Neo-Assyrian, Neo-Babylonian, unknown wr. ešsu11; su11; ešzi; su11zu; ešsu11zu; su; su6 "date-palm fibers"

gugiresir [ASSIGNMENT] N (54x) Ur III wr. gu2-gir; gu2-gir-esir2; gu2-gir-esir2-ra; gu2-gir-ra "a work assignment, treating palm leaflet mats with bitumen"