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By Lauran Neergaard
AP Writer



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Homo sapiens

Man (Homo sapiens) has been successful as a species, not because he has mastered modern technologies but because he mastered the skills necessary to compete for daily survival. Each epoch in the history of man has identified at least one major skill in man's ability to change and improve his environment. These skills were basic to those beings who lived thousands and thousands of years ago and are practiced by everyone today with technical refinements and modern adaptation to fulfill our own requirements.

I said that.....

Mac Maness

Important: This site is designed using FrontPage 2002 and Explorer Browser. If you are not using Explorer, the result may be screwy...

Sometimes, when we are walking through the forest, we don't see the trees...I received an e-mail recently that made that point come home clearly...

"Interesting, to be sure, but what is an Abo??"

Lewis

Let's refer to Mr. Webster for enlightenment...

ab-o-rig-i-ne

(²b"....-r'j"....-n¶) n. 1.

A member of the indigenous or earliest known population of a region. 2. **aborigines.**

The flora and fauna native to a geographic area.

There are many reasons why we do what we do... learn, practice and teach primitive living skills.

Some of the reasons are..

If you are a practicing "abo", e-mail us about why you "do what you do" and we will post it. Let others know why the experience is sooooo satisfying!!

Yo... Brothers and Sisters
There is to be a "Gathering" in
Maryland this summer...
Don't Miss It!!

MAPS Meet 2003

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Featured Article of the Week

The Fire Plow

The Fire Plow was adapted from their book, [Earth Knack: Stone Age Skills for the 21st Century](#), and published in the Bulletin of Primitive Technology, Issue #13, Spring 1997.

[If you have any questions concerning this article, please contact us](#)



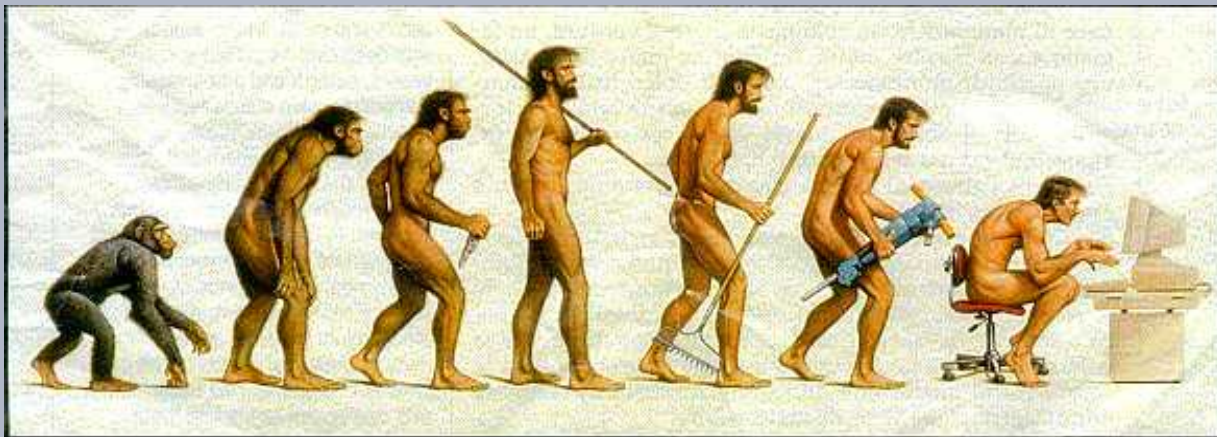
**What
is this Abo
doing?**

Click on the pic
for the answer

**Join your Hunter-
Gatherer
brothers and sisters
at the
RIVERCANE
RENDEZVOUS**



April 29- May 4 near Hayesville, NC
**Special Guests: Robin Blankenship (of Earth
Knack)
and others to be announced soon**



Somewhere, something went terribly wrong

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We honor our individual heritages by learning the basic living skills of those who came before us.

Why do we learn and practice these skills?

"The learning and practice of aboriginal skills can help its all get in touch with our own roots, no matter what our particular heritage may be (Asian, Native American, European, African, etc.). Here in North America, we look to the Indian Peoples and the ancestors of these people to teach us the skills that are 'native' to this place. Yet, if we go back far enough into our own pasts, we discover that we are all aboriginal peoples at some time in someplace.

The 'stone age' is the great common denominator of humanness. 'Primitive' (first) skills are our shared inheritance."

Steve Watts, 1985

President: The Society of Primitive Technology

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HAND- DRILL FIRE MAKING

By Steven Edholm, © 1992, revised 1994

Reprinted from the SPT Bulletin of Primitive Technology, Fall, 1996

Hand-drill fire making was practiced by variously primitive people worldwide. While it may not be quite as reliable as the bow and drill method, with which more people are familiar, it is still quite effective in the hands of a proficient individual. It is also lighter in weight, easier to construct, and does not require the use of a string or cord as does the bow and drill. However, like the bow and drill, a hand-drill kit will usually provide many fires once a good combination is found. People who relied on this technology undoubtedly prized good kits and under everyday circumstances did not count on being able to construct one on the spot when a fire was needed.

In this method of fire making, a smooth shaft, the drill, is twirled between the palms in a hole, which is burned into another piece of wood, the hearth, by the twirling or drilling action. This drilling action, a combination of speed and downward pressure, creates great friction at the interface of the two woods and causes the drill and/or hearth materials to burn and slowly crumble into a charred powder. A notch is provided in the side of the hearth as an exit for this powder. Constantly exuding through the notch, fresh from intimate contact with the source of heat, the powder eventually reaches a peak temperature and ideal conditions for the formation of an ember. The ember is then transferred to tinder, which is manipulated and blown into flame.

Materials

The following suggestions on materials are based on research and experience, both mine and others'. You can use them as a guideline, but remember that many of them were discovered through experimentation and that there are many more materials/combinations which await discovery.

Also remember that while a given species, in a certain condition and sometimes in a specific combination with another species, may very often be successful, it will sometimes just not work.

Drills

Drills from weed stalks and yucca are harvested dead. Drills from woody plants, trees, and shrubs are usually harvested "green". Dead drills can be used right away, and if a good one is found and weather conditions are favorable a fire can often be made on the spot.

The best hand-drills from trees and shrubs often seem to be what is called nascent growth. Nascent growth is straight, tall and slender with few or no side branches. It also tends to have a large pith to wood ratio (more on the pith side) which seems to be a valuable quality in a hand-drill. Nascent growth usually results from the plants being burned, pruned or damaged in some way the previous year or two. Road crews frequently whack down entire trees and shrubs which can grow back as a profusion of arrow shafts, hand-drills, and atlatl darts. Look in a fire area a year or two after the fact, or if you know it is the type of plant, which will sprout back easily, you could cut it down and wait a year or two.

- Peel green drills while fresh. They can be tied in a tight bundle and allowed to season. This will do away with some of the job of straightening later. They will, however, dry faster if left singly. I've gotten fires from green drills seasoned two days in hot sun and wouldn't be surprised if one long hot day would do it. You could, of course, bake drills dry over a fire if you've got one.

- The ideal drill is smooth and straight. Try to smooth off any major bumps and sharp spots or they'll shred your hands. This is especially important with weed stalks like mullein. Various zig-zaggy and crooked drills will often work OK as long as the working tip spins in one spot as you drill. Most drills will need some straightening by heat.

- Sight down the drill to spot major bends and crooks. Heat one of these (with-out scorching the wood). Bend it straight while still hot, allow it to cool a minute and

then repeat on other bends until it's at least fairly straight.

For drills try: maple, elderberry, willow, mock orange, mullein stalks, buckeye, teasel stalks, oceanspray, willow, box elder, seep cattail (dead leaf stalks inside old leaf clumps), currant, sotol, yucca, and anything else that seems like it might work.

Hearths

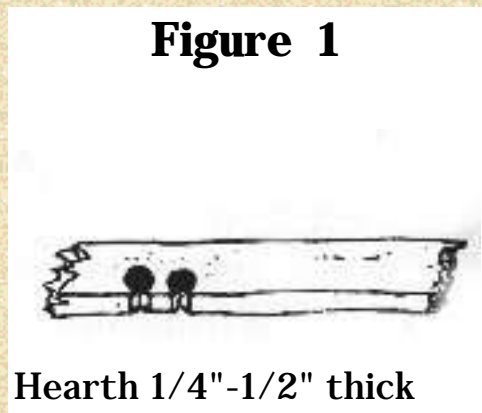
Hearths can be split out of stumps or logs. I prefer this to branches, which often seem too hard. Smaller vines, roots, and branches can be flattened on the bottom to prevent wobbling during drilling.

- Somewhat weathered but not rotten wood such as an old stump, exposed dead roots, or driftwood seems to work well,
- I've heard of using very hard hearths but don't know anyone who uses one regularly. Generally, a fairly softwood is preferred,
- Hearths should be well seasoned. Reasonable dimensions are given in Figure 1.

For hearths try: box elder, redwood, incense cedar, clematis, yucca stalks, maple, buckeye, elderberry, cottonwood, saguaro, seep willow, red cedar, roots of cotton-wood, fir, pine, maple and others. Experiment and diversify.

Tinder

- Some tinders catch and spread the coal well but won't actually burst into flame easily or at all. Cattail down, the fluff from milkweed seedpods and dogbane fibers fall into this category,
- Other finders make good bulk material for the outer layers of the nest, flame well, but won't always spread and catch the coal. Certain grasses, as well as lichens, moss, and coarsely shredded bark fall into this category,
- Some tinders accomplish both. Examples of this are dead mugwort leaves rubbed between the palms, soaproot fibers, and finely shredded barks of willow, maple, cottonwood, and sagebrush. Old bird and rodent nests are often ideal as they are. In fact, use them as a model to construct the nest of tinder which will receive your hand-drill coal.



Hearth 1/4"-1/2" thick

- make a nest of coarser material.
- line the inside with somewhat finer stuff.
- put a small amount of really fine tinder in the center to catch and spread the coal.

Have a nest like this ready and a good supply of kindling prepared before you begin drilling. Keep your tinder dry.

FACTORS IN HAND- DRILL FIRE MAKING

- inspiration
- composition of materials
- condition of materials (damp, cold, greasy)
- speed (twirling)
- downward pressure
- efficiency

Composition and condition of materials have been dealt with above.

Speed and downward pressure are self explanatory but trying to do both at once can be difficult for beginners to accomplish efficiently, It is necessary to achieve a smooth transfer of power to the tip of the drill, spinning the drill at a fairly high speed while maintaining a consistent downward pressure. In trying to achieve this transfer much energy is expended; however, expending a minimum amount to reach the desired end, or being able to deliver a massive amount to the appropriate spot when necessary, requires an efficient use of energy. The combination of these details is "technique".

It is often difficult to spot efficiency problems but here are a few hints and some concepts to keep in mind:

- Make a few passes down the drill until your muscles feel barely fatigued. Then take a minute or two to rest. Resting helps to tone the muscles, allowing them to work more efficiently.

-You can expend a lot of energy by holding tension in your body. Try to relax the parts of your body, which are not working, and breathe. Don't hold your breath through the whole thing.

-Make sure you are using/moving both hands, not holding one still while moving the other.

-Try using different parts of the hand. I get my best power from the meaty part of the palm just below the pinky finger, but in warming up the set I often use the full palm and fingers which makes for a longer stroke.

-If the drill slips across your hand, lick your palm lightly. The moisture will increase your grip.

-If the board isn't sitting solid and moves while you are drilling, do something to make it stationary. Otherwise another waste of energy is incurred.

-Try to keep the drill fairly straight up and down while you're working. If it's moving from side to side a lot, the consistency of the downward pressure is compromised and energy is wasted. If you tip the drill towards or away from you, it may bind against the side of the hole, causing unnecessary drag.

-When you've drilled halfway through the board, the drill will probably begin to bind in the hole. Open the edges of the hole out with a knife. DO NOT whittle the tip of the drill down or the problem will be compounded.

-If the drill jumps out of the board while you are drilling, it wastes heat and sets you back somewhat. It's also a symptom of drastic inconsistency in downward pressure.

Try this exercise:

-Get into drilling position with your hands at the top of the drill.

-Instead of drilling, just push the drill into the board and hold it there. This force is the downward pressure that you want to maintain while drilling.

-Maintaining that pressure, slowly move your hand back and forth. This action is hand-drilling in slow motion. It may give you a better idea of what needs to be happening.

-Now, speed up!

Strength's a factor in hand-drilling, but not as much as most people think. Success is mostly in technique. Some very young, old, or handicapped people may have a prohibitive lack of strength and/or coordination, but don't limit yourself, or others, prematurely, There's only one way to find out,

However, don't expect to succeed too easily. Some people don't get fires or coals in our full day classes even with a lot of coaching. Just keep practicing and try tandem drilling with a friend. Two or more people taking turns can often get a fire where one cannot.

If you're one of the naturals and succeed easily, don't think you've got it made, especially if you want to be able to rely on this skill for your survival someday. Practice, diversify in materials, and observe others' techniques.

Before you actually try hand-drilling, remember to give your hands a break. I don't know of anything that will give you blisters faster than hand-drilling except sliding down a rope. Practice a little 2 to 3 times a week until you build up some calluses. It won't take long. Conversely, when calluses become too deep they may have to be shaved down a few layers or they can hurt your hands even worse than blisters.

MAKING FIRE

Seating the drill

The first step is to burn a slight depression in the hearth, thereby determining exactly where the drill will ride, and allowing you to cut the notch accurately. Start by carving a slight depression in the top of the hearth about the same diameter as the drill tip. Make it about 1/8" in from the edge of the hearth.

When drilling, you can sit on your butt and hold the board steady with the out side of one foot or you

can kneel on one knee while the other foot holds the board. I prefer the former. Try both.

The business end of the drill, the thicker end, should be flattened oft so that it will spin well in the depression you carved. Start drilling, moving your hands from the top to the bottom of the drill. Carefully but quickly shift your hands back to the top of the drill one at a time. The drill should not come oft the board while you move your hands or heat will be lost.

If the drill begins to squeak against the hearth, put in a few grains of sand or dust to break up the polish and create friction.

If the drill doesn't burn into the hearth very well, reread the previous tips on technique and just keep practicing.

When the drill has burned into the hearth somewhat and is spinning in one place, it is well seated. You can now cut the notch.

Notching

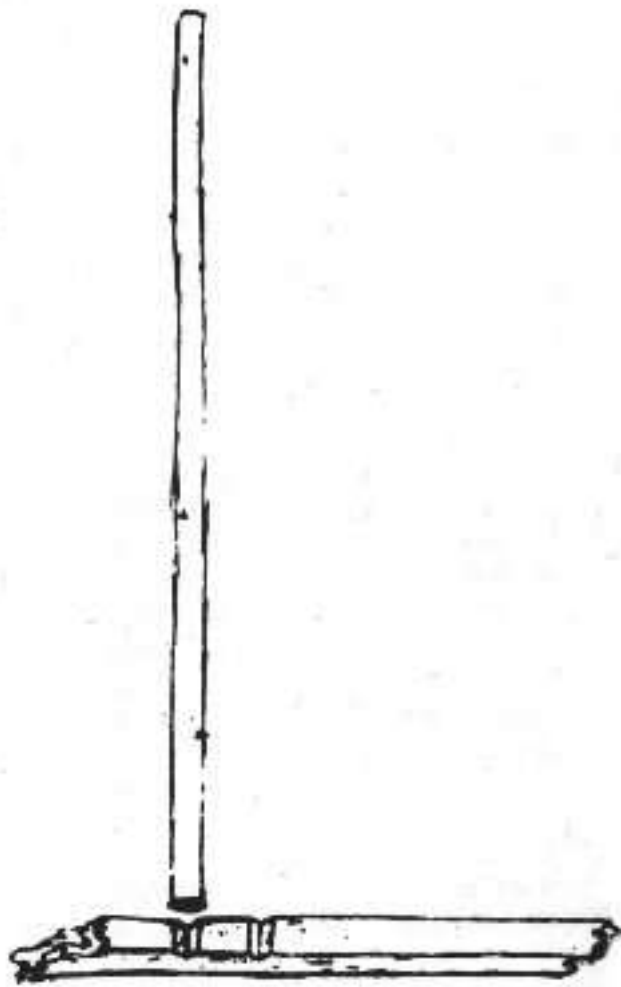
The notch should be placed about 1/2 way to the center of the seating. The inside of the notch should be smooth and not too wide (see Fig. 1). (For future reference, if the powder piles up around the hole on top of the board while you are drilling, the notch is probably not deep enough.)

Before you begin drilling, place a dry leaf or small chip of bark under the notch to catch the coal.

Making the coal

Now everything is set and you can begin drilling in earnest. It will be necessary to

Figure 2



- Drill should be 18"-24" long & 1/4"-1/2" in diameter
- Thinner drills cause more blisters while thicker ones feel awkward to use
- Thicker end at top...thinner end at bottom

work hard but don't expend yourself too quickly. It's safer to increase your input gradually and save some energy for later than to use it all right away just to get there quicker.

You can't always tell whether or not the powder has ignited. If a copious amount of smoke is coming up from the powder itself, you've usually got a coal. Always make a few more strong passes down the drill to be sure.

If the powder continues to smoke strongly even after you stop drilling, you've got a coal. But don't panic. You have probably worked very hard to get your coal and are most likely shaky from exertion. The next step is to rest awhile. You can blow gently on the coal but let it get established a little before you move your foot. At this stage the coal is spreading through the loose powder, and being jolted could break it apart and snuff it out. We've timed these coals burning for over 3 minutes on their own with no manipulation. I usually allow 15 to 30 seconds for the coal to form a nice cohesive lump.

Creating Flame

Take your foot off the board carefully so as not to damage the coal. If need be, you can gently "pry" the coal out of the notch with a knife tip as you move the board away. Again the object is to not shatter and scatter the coal. Keep it lumpiform. Pick up the piece of bark you put under the notch to catch the coal on and gently dump the ember onto the finest material in the center of your tinder bundle. From here you will be manipulating the bundle constantly as you blow until it bursts into flame.

1-Start immediately by folding the bundle in, snuggling it around the coal slightly, and blowing gently. If you blow too hard at first you could scatter the coal and possibly put it out,

2-The coal should start to spread and burn a cavity in the center of the bundle. Always try to keep that cavity small by folding and pushing the bundle inwards. If you pack it too tightly it will go out from lack of oxygen but if you don't pack it enough it could go out because of lack of fuel,

3-Don't stop blowing for too long, and too long is not very long at all. When you cease to blow things start going out fast.

4-You should only be blowing through a small hole in the front of the tinder bundle. (No gaping open fronts.) Keeping things closed up minimizes heat loss and maximizes the burning nucleus.

5-Hold the bundle up and downwind so that at least most of the smoke doesn't go right in your face.

The idea is to have the bundle burst into flame before your fingertips get burned trying to hold and manipulate your crumbling tinder. If it gets too hot to hold, put it on the ground (preferably in a fire pit) and use two sticks to manipulate and pack it together, blowing extra hard and long.

At this point it would also be advisable to have reasonable fire building skills so that you can expand on your fire once you get a flame and so you don't have to stand in front of a smoking fire of variously misplaced chunks of green, rotten, large, pressure treated, or otherwise unsuitable fuel units. But that's another story. **Good luck!**

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Caveman Cannibalism Confirmed

By Lauran Neergaard
AP Writer

WASHINGTON - In a firelit cave in southern France 100,000 years ago, a group of hunters bent over their meal, expertly slicing flesh from carcasses and sucking marrow from the bones.

But a closer examination uncovers a grisly scene: These were Neanderthals, and they butchered six fellow people just like they did deer- the first real proof, say scientists, that Neanderthals practiced cannibalism.

Whether some Neanderthals ate their own kind has been a controversy since the turn of the century, when Neanderthal bones bearing suspicious scars were discovered in Croatia. Critics argued that maybe those bones had been gnawed by animals, cut for some burial ritual or merely damaged by the primitive techniques of 1890's archaeology.

But the discovery by a team of French and American scientists, who preserved the Moula-Guercy cave on the Rhone River like a crime scene and used forensics techniques to examine the bones, should settle the issue, they say.

"This one site has all of the evidence right together. It's as if some-body put a yellow tape around the cave for 100,000 years and kept the scene intact," said co-investigator Tim White, a University of California, Berkeley, paleontologist.

"The hominid and deer carcasses were butchered in a similar way, with the objective being the removal of soft tissues and marrow," said lead investigator Alban Defleur of the Universite du Mediterranee at Marseilles. This "is clear evidence," he wrote in today's edition of the journal Science.

Now the question is why these primitive people - an evolutionary cousin of modern humans, although most scientists think they are not direct ancestors - were cannibals.

How to determine cannibalism from ancient bone is tricky. White published a book in 1992 about cannibalism among Anasazi Indians of the U.S. Southwest that concluded certain markings could definitively differentiate bones cut for consumption from those that were perhaps damaged by a rockslide or broken in a fight.

Deileur found 100,000-year old bone fragments from six Neanderthal skeletons scattered among piles of animal bones in the Moula-Guercy cave, and sought White's help in investigating.

Two marks on a child's skull show how the chewing muscle in front of the ear was sliced off the bone by a rough stone tool found in the cave. All skulls were cracked open, and limbs defleshed and smashed for their marrow. It is very hard to crack a fresh femur - striations from a hammerstone and the stone anvil are visible on one.

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Roast nut diet of the ancient vegetarians

By David Brown

from The Daily Telegraph June 4, 1995

THE remains of Britain's earliest recorded vegetarian community have been discovered at an ancient settlement on a small island off the west coast of Scotland.

They gave early man something of a Squirrel Nutkin image because it appears that hazelnuts made up a formidable share of his diet.

Archaeologists on Colonsay, in the Hebrides, are excited by the finds including a shallow pit containing the remains of thousands of burned out hazelnut shells from the Mesolithic period dating back 8,000 years.

The pit lay beside another circular hollow close to the shore which is believed to be the traces of one of the earliest examples of a house ever found in Scotland.

No traces of animal bones or shells from the abundant fish around the island have been uncovered - giving rise to the conclusion that these early islanders lived on what they gleaned from the local vegetation.

The precise function of the nut-pit is not clear, but archaeologists believe it may have been the place where the nuts were roasted and shelled, or

where they were stored for later use.

Although similar hoards of hazelnut shells have been found at other sites, including Farnham in Surrey, the sheer size of the Colonsay find has startled the research team.

The journal of the Council for British Archaeology, says of the find: "The scale of the activity, unparalleled elsewhere in Scotland, suggests the possibility that Colonsay contained a community of enforced vegetarians."

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No carefree life for Mesolithic people

by Rob Young

Hunter-gatherers worked much harder for their living than has previously been thought.

Until recently archaeologists were confident that they understood how Mesolithic people used the landscape during the long period from the end of the last Ice Age to the advent of settled farming (c 10,000 - 4,500BC).

The traditional view was of small bands progressing through the forested countryside, often exploiting coastal and inland / upland areas, in a seasonal round prescribed by the movements of animals and the ripening cycles and availability patterns of plants. Within this scheme of things, there may have been attempts to manipulate these resources through forest clearance.

The general picture, fleshed out from the study of modern foragers, was that things were fairly laid-back with abundant resources making life 'easy'. Current research, however, is challenging this view of the last hunter-gatherers in the British Isles, and suggests that Mesolithic people worked harder for their living, in a far more organised way, than has previously been thought. Most of the evidence is dated to the mid - later Mesolithic period, but there is no reason to assume it does not broadly apply to the period as a whole.

The basic models of social organisation have been criticised on the grounds that their interpretations were borrowed wholesale from anthropological studies of modern hunter-gatherer groups. Now, computer-based, analytical techniques such as GIS (geographical information systems), as

well as a number of outstanding recent finds, are transforming our understanding of Mesolithic settlement and food-procurement; refinements in techniques of pollen and charcoal analysis have demonstrated that the impact of hunter-gatherers on the contemporary forest cover may have been much more intensive than was previously thought; and direct analysis of human and animal skeletal remains is changing our ideas about what people ate and when.

From the Western Isles to the uplands of the North and South Pennines and right down on the south coast of England, new field projects have shifted the focus away from the examination of individual sites towards the integrated study of whole landscapes, emphasising the highly complex, organised, and intensive way in which Mesolithic groups made a living.

Work in the Western Isles by Steven Mithen and his colleagues from Reading University, and in North-East England by Chris Tolan-Smith of Newcastle University, has highlighted some of these developments. Field walking in Islay and the Tyne Valley has shown distinctive areas of repeated land-use in the Mesolithic, with certain sites used again and again for the same purpose - which contrasts with the older view of unorganised groups driven pell-mell across the landscape by chance and circumstance.

One particularly interesting discovery came through Mithen's excavation at Staonsaig on Colonsay, which revealed evidence for long-term, intensive plant food processing on the east coast of the island dating from c 7000BC, including the shelling, roasting and storage of hazelnuts and the tubers of the lesser celandine (see BA, [June 1995](#)).

The potential importance of plants as an element of the Mesolithic diet has been played down, or largely ignored, until recently. This is due, in the main, to archaeologists' tendency to be 'meat-fixated' when they think about Mesolithic subsistence. It is also a reflection of the fact that plant remains rarely survive and that when they do they are difficult to recover. The Colonsay evidence clearly shows how intensively, and purposefully, plants were exploited, even in areas removed from the mainland. Moreover, in Scotland and Ireland pre-Neolithic cultivated cereal pollen has been recovered, suggesting early experiments with the growing of crops.

The most innovative aspect of the work in the Western Isles, though, was the use of GIS to model the nature of the Mesolithic landscape, and to set the recorded sites into a broader context.

A GIS is a computerised database which allows detailed information about the spatial relationships of features in the landscape to be stored and manipulated. It can operate at the scale of individual sites, at the general landscape level and at the national level. From a Mesolithic research point of view it permits details of the location of finds - flint scatters in the main - to be analysed in a multitude of ways. In particular a GIS allows the location of sites to be examined in relation to things like distance to permanent water, changes of slope, extent of view, contemporary vegetation cover, and so on.

The Islay project has used the technique to examine the extent of views from certain Mesolithic settlement and hunting camps. This 'viewshed' approach, as it is known, suggests that sites were recurrently and intentionally placed in similar sorts of locations on the island - such as rock spurs and high ground overlooking valley bottoms. This in turn permits speculation about developed hunting strategies which allowed for the observation of game movement in certain parts of the landscape.

The technique has also been applied by Penny Spikins of Newcastle University to map, from pollen evidence, the vegetation cover that may have existed across the whole of Britain. The impression is of a landscape that was difficult to move through, and that rivers were the principal channels of movement between lowland and upland areas. Groups of hunter-gatherers were forced, by this difficult environment, to adopt survival 'strategies' rather than relying merely on chance.

All of these innovations in settlement and landscape study have to be set against the background of a massive increase in knowledge about the complex nature of Mesolithic forest clearance.

It has long been accepted that Mesolithic groups did manipulate the vegetation cover, particularly in the upland parts of Britain, largely by fire. This may have been done for a variety of reasons. For example, setting fire to an area of woodland would have made hunting easier, by attracting animals to graze in cleared areas as the young shoots regenerated. It may also have been done to drive animals in a particular direction in the course of hunting expeditions, or to encourage the growth of plantfoods like hazelnuts, as the light-loving hazel plant is one of the first shrubs to recolonise a cleared area.

In the past such clearances were regarded as one-off events, unrepeated and planned for short-term gain. The development and application of what

is known as 'fine resolution pollen analysis' (FRP), however, has shown just how intensive this kind of environmental manipulation may have been, and how much more regularly it may have taken place. A conventional pollen diagram is prepared by sampling a vertical core of peat, for example, at intervals as widely spaced as 10cm - 15cm, to give an idea of vegetation change over time. Minuscule deposits of charcoal in the core provide evidence of forest-burning. Because of the wide sampling intervals, however, this provides only rough information. With FRP, samples are taken at intervals of 1mm - 2mm, which has the potential to give us a much more detailed knowledge of vegetational change, almost on a year by year basis.

A pioneer of this research is Ian Simmons of Durham University. His work on the North York Moors has shown that what appear, on conventional pollen diagrams, to be single episodes of Mesolithic forest burning are in fact often regular, repetitive, almost cyclical small-scale events. Mesolithic people were returning again and again, following deliberate planning, to the same areas. Such repeated usage of the same places may seem odd, considering the underpopulation of Britain as a whole, but it suggests that Mesolithic groups had a strong sense of place and of their own territory.

Another area of research that will contribute significantly to the debate about seasonality is the work on Mesolithic diet by Rick Schulting and Mike Richards, postgraduates at Reading and Oxford universities. Using a technique known as stable isotope analysis, they are looking in detail at both human and animal skeletal remains for evidence of the varying amounts of terrestrial and marine resources in the diet, measuring rates of protein uptake among other things. Early results are that, perhaps unsurprisingly, a great deal of sea-fish was eaten on Mesolithic Colonsay, and also on Caldey Island off the South Wales coast at a period thought to be Mesolithic. By contrast, Mesolithic remains from inland sites such as Thatcham in Berkshire or Aveline's Hole in Somerset suggest very high meat diets with little contribution from fish - even freshwater fish. Interestingly, work on Neolithic bones suggests that no seafood was eaten at all, either on the coast or inland. Overall, however, this work is set to have a dramatic impact on the accepted models of Mesolithic seasonal movement and resource exploitation.

The concept of seasonal movement of Mesolithic groups, from one camp to another, is still with us. But it has been refined, as we have begun to understand the intensity and sophistication with which Mesolithic people exploited the landscape for their own ends.

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Earliest Modern Tree Lived 370 Million Years Ago

LONDON (Reuters) - The earliest known modern tree was an extinct plant that lived about 370 million years ago, a team of international botanists said Wednesday.

The plant, called Archaeopteris, had the same structure of modern trees but it took millions of years for it to evolve into the mighty giants that fill forests today.

For decades, botanists' descriptions of the first tree were based on leaves and bit of wood in fossil rocks.

In a report in the science journal Nature, Brigitte Meyer-Berthaud of the University of Montpellier in France and colleagues in the U.S. and Germany described how they found 150 fossilized examples of the extinct plant in three locations in Morocco.

``Here we describe the largest group of anatomically preserved Archaeopteris remains ever found...and provide the first evidence that, in terms of development and branching strategies, these 370-million-year-old plants were the earliest known trees,`` they said.

The samples of the plant showed tree branching and big roots which previously had only been conjecture.

``The attachment of branches was the same as modern trees, with swelling at the branch base to form a strengthening collar and with internal layers of wood dovetailed to resist breaking,'' Stephen Scheckler of the Virginia Polytechnic Institute, who collaborated on the research, said in a statement.

``We had always thought that this was modern - but it turns out that the first wood trees on earth had this exact same design.''

Some of the trees that Meyer-Berthaud, Scheckler and Jobst Wendt of the University of Tübingen in Germany found were up the 50 years old, making them the first long-lived perennial.

``Other plants ran out of the ability to grow,'' said Scheckler. ``These trees could grow for 10-50 years or more. They had no apparent life span.''

The researchers added that before the plant became extinct it had had a major impact on ecosystems. It was the first plant to develop an extensive root system and had an impact on soil chemistry.

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The First Americans

By Sharon Begley and Andrew Murr

Newsweek, April 26, 1999

New digs and old bones reveal an ancient land that was a mosaic of peoples—including Asians and Europeans. Now a debate rages: who got here first?

As he sat down to his last meal amid the cattails and sedges on the shore of the ancient lake, the frail man grimaced in agony. A fracture at his left temple was still healing; deep abscesses in his gums shot bolts of pain into his skull. Still, he was a survivor, at fortysomething long-lived for his people. But soon after he finished the boiled chub that



'Skull wars:' Facial reconstruction of the 'Spirit Cave Man,' based on bones found in Spirit Cave, Churchill County, Nevada (David Barry-- Courtesy Nevada State Museum; facial reconstruction by Sharon Long)

he had netted from a stream in what is now western Nevada, he felt his strength ebbing like a tide. He lay down. Within hours he was dead, felled by septicemia brought on by the dental abscess. When his people found him, they gently wrapped his body in a rabbit-fur robe and secured his bulrush-lined leather moccasins, his prize possessions; he had patched them twice with antelope hide on the right heel and toe. Surely he would want them where he was going. His people dug a shallow

grave in a rock shelter, lined it with reed mats and laid him within. Some 9,400 years later, anthropologists would discover him. They would name him Spirit Caveman.

He wasn't supposed to be there. Spirit Caveman is the wrong guy, in the wrong place, at the wrong time. According to the standard anthropology script, anyone living in America 9,000 years ago should resemble either today's Native Americans or, at the very least, the Asians who were their ancestors and thus, supposedly, the original Americans. But Spirit Caveman does not follow that script—and neither do more than a dozen other skeletons of Stone Age Americans. Together, the misfits have sparked a spirited debate: who were the First Americans?

The emerging answer suggests that they were not Asians of Mongoloid stock who crossed a land bridge into Alaska 11,500 years ago, as the textbooks say, but different ethnic groups, from places very different from what scientists thought even a few years ago. What's more, stone tools, hearths and remains of dwellings unearthed from Peru to South Carolina suggest that Stone Age America was a pretty crowded place for a land that was supposed to be empty until those Asians followed herds of big game from Siberia into Alaska. A far different chronicle of the First Americans is therefore emerging from the clash of theories and discoveries that one anthropologist calls "skull wars." According to the evidence of stones and bones, long before Ellis Island opened its doors America was a veritable Rainbow Coalition of ethnic types, peopled by southern Asians, East Asians—and even, perhaps, Ice Age Europeans, who may have hugged the ice sheets in their animal-skin kayaks to reach America millenniums before it was even a gleam in Leif Ericson's eye. "It's very clear to me," says anthropologist Dennis Stanford of the Smithsonian Institution, "that we are looking at multiple migrations through a very long time period—migrations of many different peoples of many different ethnic origins."

The standard story of the peopling of the Americas holds that wanderers from Northeast Asia fanned out across the Great Plains, into the Southwest and eventually the East to become the founding populations of today's Native Americans. Stone spear points found in Clovis, N.M., in the 1930s were dated at 11,000 years ago and hailed as evidence of the oldest human settlement in the New World. The story was so tidy that any skeletons that seemed to challenge this "Clovis model" were shoved back into the closet by the mandarins of American anthropology; any stone tools that seemed older than Clovis were dismissed as misdated. Clovis had American archeology in a stranglehold; James Adovasio of Mercyhurst College in Pennsylvania calls its defenders the "Clovis mafia."

The small band of hunter-gatherers made its summer camp on the riverbank, at the northern end of the region through which they followed the seasonal game. The location, 45 miles southeast of what is now Richmond, Va., was ideal: winds from the north kept the flying insects down. Some of the band would spend their days striking long, slender quartz flakes from stone cores; others made triangular and pentagonal spear points for the hunt. It was 15,050 years ago; the erstwhile "First Americans" would not make the trek across the Bering Strait for 3,500 more years.

Now there are too many skeletons in the closet to ignore. Pushed by a 1990 federal law that requires museums to return Native American remains to their tribes, scientists—called in to figure out who belongs to whom—have amassed a database of "craniometric profiles." Each of the 2,000 or so profiles consists of some 90 skull measurements, such as distance between the eyes, that indicate ancestry. For most skeletons, it has been pretty straightforward to tell a Hopi from a Crow. But some skulls stand out like pale-skinned, redheaded cousins at a family reunion of olive-skinned brunettes. The oldest American found so far, an 11,500-year-old skeleton from central Brazil, resembles southern Asians and Australians, anthropologist Walter Neves of the University of So Paulo reported last year. One skull from Lime Creek, Neb., and two from Minnesota—all 7,840 to 8,900 years old—resemble South Asians or Europeans. Some of the other misfits:

Buhl Woman, found in 1989, died 10,600 years ago at the age of 19 or so. "She doesn't fit into any modern group," says anthropologist Richard Jantz of the University of Tennessee, "but is most similar to today's Polynesians."

- Spirit Caveman bears less resemblance to American Indians than he does to any other ethnic group except African Bushmen. His face is not flattened or wide, his nose is not narrow—all traits of Amerindians. He "does not show affinity to any Amerindian sample [we used]," conclude Jantz and Douglas Owsley of the Smithsonian. Instead, with his long head, wide nose, forward face and strong chin, he resembles the Aboriginal Ainu of Japan or other East Asians.
- Kennewick Man, found on July 28, 1996, by two college students watching a hydroplane race on the Columbia River in Washington, looks almost nothing like a Native American. His face is narrow, with a prominent nose, an upper jaw that juts out slightly and a long, narrow braincase. Although early reports described him as Caucasoid or even European (which led the Asatru Folk Assembly, followers of an ancient Nordic religion, to claim him), in fact the 8,000-year-old man most resembles a cross between the Ainu and the Polynesians.

America, it seems, was a mosaic of peoples and cultures even 11,000 years ago. Based on their study of 11 ancient skulls, conclude Owsley and Jantz in a paper to be published in the *American Journal of Physical Anthropology*, America was home to "at least three distinct groups ... None of the fossils [except for one] shows any particular affinity to modern Native Americans ... [Skull measurements] depart from contemporary American Indians, often in the direction of Europeans or South Asians."

One explanation for the lack of a family resemblance between the oldest Americans and today's Amerindians is that the original Americans might simply have changed in appearance over the generations. "You'd expect them to look different," says anthropologist David Hurst Thomas of the American Museum of Natural History. "They're separated by 9,000 years of evolution." A more radical explanation is that the First Americans—perhaps from Polynesia, perhaps from Europe—left no descendants. Whoever got here first, in other words, were not the ancestors of today's Pequot, Shoshone and other tribes. Instead, they were obliterated by later arrivals who made war or made love: killing them or mating with them. Kennewick Man, for instance, had a stone spear point in his hip. Its shape suggests it came from what scientists call the Cascade culture, people who were just moving into the area. "It may be a sign of ethnic conflict," says anthropologist James Chatters, who first inspected K Man.

The possibility that today's Native Americans are not the descendants of the original Americans is not going down easily. "If you tell the Native Americans that they weren't first," says Thomas, "you're asking for trouble." That conclusion, even if proved, has no direct legal ramifications for Native Americans' hard-won gains, such as the right to fish ancestral waters and the right to establish casinos. "But it may be just a step before legislation starts being rolled back," Thomas warns. Some Americans resent the newfound wealth of some tribes, and "if the discoveries make today's Native Americans just another Ellis Island group, it makes it hard for them to preserve their sovereignty."

Already, Native Americans are protesting this line of research. The Shoshone-Bannock demanded custody of Buhl Woman and reburied her. The Northern Paiute are asking that Spirit Caveman be reburied, and the Umatilla of Washington want Kennewick Man. "We know that our people have been part of this land since the beginning of time," said Armand Minthorn, a Umatilla religious leader, in a statement. "Scientists believe that because [Kennewick Man's] head measurement does not match ours, he is not Native American. Our elders have told us that Indian people did

not always look the way we do today."

The determined band passed up the quartz in the nearby deposits, trekking beyond the Green River in what is now Wyoming and Utah, all the way to the northern Bighorn, 600 miles away. There they found the obsidian and quartz crystal they would fashion into stone points and flakes—and never use. Instead, they would bury their caches on a layer of compacted red ocher. Their neighbors had equally strong preferences, but for them the quest was not for exotic materials but for sources imbued with spiritual significance. Rejecting the local quartz, they climbed the peaks to chip out red jasper found at 9,000 feet and flake it into stone tools that they, too, would cache, unused. Stones that lay nearer their gods would make a fitting offering.

For years, no authority would accept any deviation from the party line that the First Americans were the Clovis people of 11,000 years ago. But in 1977, archeologist Tom Dillehay of the University of Kentucky began excavating a site deep in the Chilean hills called Monte Verde. There, some 30 hunter-gatherers lived beside a creek 35 miles inland of the Pacific until a rising peat bog pushed them out—and preserved the site like volcanic ash over Pompeii. The band lived in low, tentlike structures lashed together with cord and covered with bark and mastodon hide to keep out the rain, says Dillehay. Outside were work areas, and fire pits lined with clay. A hut set apart from the others may have served as either a paleohospital or a Stone Age Studio 54: inside, Dillehay found five chewed quid made of boldo leaves, which contain both an analgesic and a mild hallucinogen. Boldo was clearly prized: the nearest supply lay more than 100 miles north, so either someone made a long trek or arranged trades with distant inlanders. Belying the image of the original Americans as full-time big-game hunters, the Monte Verdeans ate a varied diet: freshwater mussels and crawfish, wild potato, fruits and nuts, small game like birds that they brought down with stones and the occasional mastodon that they felled with fire-hardened lances. But the paradigm killer was this: Monte Verde was inhabited 12,500 years ago—1,000 years before the original Americans supposedly flocked across the Bering Strait.

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For years archeologists dismissed Dillehay's claim. At scientific conferences, he recalls, "others would be introduced as doctor this and doctor that. I was always 'the guy who is excavating Monte Verde.' Some people wouldn't even shake my hand." Even worse, the Clovis model had such a stranglehold that scientists "would dig until they hit the Clovis level and just stop." Few looked for older bones and tools. Four or five possible pre-Clovis sites in South America were never reported because the scientists feared that doing so would wreck their reputations.

That changed two years ago, when archeology's pooh-bahs finally accepted that Monte Verde was indeed 12,500 years old. The floodgates opened. Sites once dismissed as misdated are being re-examined. At Meadowcroft Rockshelter in Avella, Pa., for instance, where for 26 years Adovasio has been excavating under an overhang that juts out from a rock face 43 feet above the ground, scientists are now reconsidering his claim that the charcoal, stone tools and woven material buried there are at least 14,000 and possibly 17,000 years old. At Saltville, in western Virginia, archeologists are studying what may be a Stone Age mastodon feast. Stone and bone tools (including an ivory-polisher), mastodon bones and fire-cracked rock along an ancient riverbank have been unearthed from a layer that may be 14,000 years old. Saltville has a distinguished pedigree: a friend sent Thomas Jefferson a mastodon tooth from the site in 1782.

Jefferson was curious enough about the prehistory of America that when he dispatched Lewis and Clark to survey the West, he asked them to look for signs of ancient settlements. He might have turned his curiosity closer to home. Archeologists led by Michael Johnson had stopped digging at Cactus Hill in Virginia when they found Clovis material, dated at 10,920 years old, three feet down. But with the theory of the First Americans shifting beneath their feet, they dug deeper—and came upon stone blades and cores (the rock chunks from which flakes are struck) in a layer 15,050 years old. "This looks like a good candidate for a Clovis precursor to me," says the Smithsonian's Stanford. Like Johnson, archeologist Albert Goodyear of the University of South Carolina had never felt much need to dig below the Clovis layer in his Topper site on the Savannah River. But last spring he and colleagues found, beneath the Clovis layer, stone blades and flakes by the score in layers three feet down—a depth that, he estimates, corresponds to more than

12,000 years. "This is pretty substantial evidence," says Goodyear, "that people were here long before we thought."

And they may have come from somewhere no scientists in their right mind would have considered only a few years ago: a French Connection. There are striking similarities between the stone tools attributed to the Clovis culture, in the Americas, and the stone tools attributed to the so-called Solutrean culture of France and the Iberian Peninsula. Both made beveled, crosshatched bone rods, notes archeologist Bruce Bradley. Both made idiosyncratic spear points of mammoth ivory. Both made triangular stone scrapers. Yes, two separate peoples might have invented the same thing, as David Meltzer of Southern Methodist University points out: "These similarities may represent finding the same answer to the same problem" of killing and butchering game. But there's a twist. "The oldest of these tools in America," says Bradley, "are in the East and Southeast, not the Southwest" —where they should be if the Clovis people trickled in from Siberia and then fanned out across the continent. And since glaciers did not retreat from America's midsection until 11,500 years ago, anyone inhabiting the Eastern Seaboard before then must have come from the East rather than the Bering Strait.

How? Crossing the open Atlantic would have posed a perhaps insurmountable challenge, even though people traveled in boats from southern Asia to Australia at least 40,000 years ago. "We don't give early people enough credit," says Stanford. "Yeah, they lived in caves—but they were pretty smart, too." Smart enough, perhaps, to have navigated along the ice sheet and seasonal pack ice that spanned the ocean from England to Nova Scotia. "They could have made it if they worked the glacier for seals and water birds," says Johnson. "They would have seen migratory birds flying west; they would have known there was land in that direction." Similarly, the Asians who reached America from the West may have been seafarers, too.

Deep in the craggy uplands 450 feet above the Amazon, the people of Caverna da Pedra Pintada look nothing like the stereotype of the First Americans as bison-fur-wearing big-game hunters. This band drew sustenance from the river and the forest, dining on turtles, frogs, snakes, fish and fresh-water mussels, as well as Brazil nuts and palm nuts. And they

did more. The cave floor is splattered with gobs of red and yellow iron-based paint, dripped 11,000 years ago. The Stone Age artists created exuberant scenes of snakes and other animals and even handprints—designs? signatures?—including children's.

"We are rewriting the textbooks on the First Americans," says Stanford. The new edition will show that "the peopling of the Americas was never as simple as simple-minded paradigms said." Instead, it will tell of an America that beckoned to far-flung people long before the Mayflower or the Santa Maria or the Viking ships, of an unknown continent so alluring that men and women endowed with a technology no more sophisticated than sharp rocks braved Siberian tundra and Atlantic ice packs to get here. It is still the New World. But it is thousands of years older than we thought—home to settlers so diverse that it was, even millennia ago, the world's melting pot.

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Ancient kernel sheds light on early humans

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ASSOCIATED PRESS

BERKELEY -- A corn kernel identified as the oldest corn ever discovered in the United States is changing archaeology's focus from New Mexico and the Colorado plateau to southern Arizona as the cradle of early farming in the Southwest.

The kernel -- from a cob about the size of a child's finger -- was discovered by UC-Berkeley archaeologist Steven Shackley and two University of New Mexico colleagues in the summer in a cave thousands of feet above the Arizona desert.

Radiocarbon analysis at the Center for Accelerator Mass Spectrometry at Lawrence Livermore National Laboratory shows the kernel is 3,690 years old. The kernel is the oldest ever found anywhere outside central Mexico, where corn has been dated back 4,700 years.

"The Southwest has been continuously inhabited at least 12,000 years, but these discoveries are pushing back in time the transition to agriculture and village life," said Jonathan Mabry, a Tucson archaeologist who made some of the village discoveries.

"These finds have made a lot of textbooks obsolete," he added.

The discoveries also provide clues to the origin of the people the Navajos call the Anasazi, who created the cliff dwellings of Mesa Verde in Colorado and the pueblos in Chaco Canyon, N.M.

Archaeologists are beginning to believe the Anasazi may have been the descendants of those early farmers around Tucson and their ancestors who farmed in canyons of the Southwest and Northern Mexico, Shackley said.

Shackley discovered the corn with two University of New Mexico Maxwell Museum colleagues, archaeologist Bruce Huckell and his wife, Lisa Huckell, a paleoethnobotanist.

Their search brought them for the past two summers to McEuen Cave in the Gila Mountains, about 70 miles northeast of Tucson.

Corn residue has been found in Panama roughly dated from 5,000 to 6,000 years old, and experts believe corn probably originated as a tropical grass somewhere in Central America.

"The McEuen Cave discovery is another piece of information that indicates that maize arrived in the Southwest much earlier than we used to think -- now obviously at least 4,000 years ago -- and that brought rapid changes in the way people lived," Shackley said.

Recently, archeologists discovered evidence of 3,000-year-old human villages and irrigation canals near Tucson during construction of Interstate 10.

"We now know that by 3,000 years ago, these hunter gatherers settled down and lived in farming villages," he said. "That's a very new idea."

Their discovery also brings smiles to the Hopi, whose language traces back to Uto-Aztecan and who are among the most likely descendants of the ancient farmers.

"To the Hopi, in our belief system, corn is very, very old. Now science is proving it to be as old as we have always believed," says Leigh Kuwanwisiwma, director of the Hopi Cultural Preservation office in Kykotsmovi, Ariz.

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Settlers May Have Crossed Atlantic

By JOSEPH B. VERRENGIA
AP Science Writer

= SANTA FE, N.M. (AP) _ In a radical new view of pre-history, two prominent archeologists say North America's first inhabitants may have crossed the icy Atlantic Ocean some 18,000 years ago from Europe's Iberian Peninsula. The theory, presented at a weekend conference, is at odds with the long-held notion that the continent's first settlers came across a land bridge from Asia. The conventional view is the stuff of college entrance exams and Far Side cartoons _ wandering cavemen wrapped in animal hides and lugging enormous spears, crossing the land bridge from Asia to hunt woolly mammoths. Archeologists say some nomads almost certainly made their way into Alaska and found an ice-free highway down into the continent some 13,500 years ago. Their culture has been named Clovis for their distinctive weapons that have been found in digs nationwide. But according to the new theory, the continent's first inhabitants may have crossed the Atlantic more than 18,000 years ago from Europe's Iberian Peninsula _ the area that is now Spain, Portugal and southwestern France. Belonging to a group known as the Solutreans, these pre-modern explorers are believed to have originally settled the Eastern Seaboard, according to the researchers. Over the next six millennia, their hunting and gathering culture may have spread as far as the American deserts and Canadian tundra, and perhaps into South America. The researchers, Dennis Stanford and Bruce Bradley, concede the Solutreans may not have been the only paleo-explorers to reach the Western

Hemisphere. But judging by their distinctive style of projectile points and other clues in the archeological record, they may have been the first settlers who brought to North America what, until now, has been considered the Clovis culture. ``There is very little in Clovis - in fact, nothing - that is not found in Solutrea,' said Stanford, who is anthropology curator at the Smithsonian Institution. ``Their blades are virtually indistinguishable.' Stanford and Bradley, an independent researcher from Cortez, Colo., offered their stunning reinterpretation of the standard settlement theory at an archeology conference in Santa Fe. The meeting was devoted to re-examining Clovis research seven decades after it was accepted as historical bedrock. Other scientists say the Solutrean alternative is such a radical departure that it might take years to adequately evaluate. Stanford and Bradley's new explanation, they noted, is based primarily on comparisons of projectile points and other artifacts already discovered on both sides of the Atlantic. No unequivocal Solutrean settlement remains have been found in North America, they said. Researchers who believe Clovis and the Bering Sea land-bridge theory is outdated point to sites at Monte Verde, Chile as well as Pennsylvania, Virginia and South Carolina as being settled in 12,500 B.C. to 16,000 B.C. But Clovis defenders say many artifacts from those digs are so crude that they may be rocks that have broken naturally rather than actual stone tools fashioned by prehistoric hands. Still, observers said, the older Solutrean projectile points from Europe and the more recent Clovis points from the Americas closely resemble each other. That's what makes the new ``Out of Iberia'' theory so tantalizing. ``There is no question about it,' Kent State University archeologist Kenneth Tankersley said. ``There are only two places in the world and two times that this technology appears - Solutrean and Clovis.' How seafaring Solutreans could have arrived in North America is unknown. Based on his knowledge of modern native cultures above the Arctic Circle, Stanford said it is not farfetched to imagine Solutreans sailing to the New World in skin boats. With a strong current and favorable weather, the trip might have taken as little as three weeks, he calculated. By this time in pre-history, he said, South Pacific islanders had been sailing open waters for at least 20,000 years.

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A NOTE ON INDIAN BOW MAKING, OR THE SECRETS OF SINEW REVEALED

By Dick Baugh

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Sinew, the shredded fibers of animal tendon, was used for cordage, binding points on arrow shafts, and for backing material for bows. Why sinew? What are its properties which make it so desirable for these uses? Obviously it is tough and it shrinks when it dries, but how much? A fairly extensive search of the Stanford library, asking professors of biomechanics, mechanical engineering, and archeology yielded no useful information. It looked like I would have to get my hands dirty and do some experiments on the stuff but first, what did we already know about sinew?

Saxton Pope, a professor of Medicine at the University of California in the first part of this century, an intimate of Ishi's, and an ardent bowman, wrote a delightful little book about Indian bows and arrows titled Bows and Arrows. He stated that when Ishi made sinew-backed bows he did not worry much about cutting through the heartwood on the back of the bow. This was in contrast to all of the old-time books which describe the fabrication of longbows out of yew, osage orange, or any of the other classic bowyer's woods. The standard caveat when building a self bow (wood only) was to be very careful about having the back of the bow (the

part away from the archer) follow the grain of the wood exactly or else it would break where you cut through the wood fibers.

Pope also did experiments with miniature yew bows backed with rawhide or catgut. His conclusion was that adding the backing made very little increase in the cast or ability of the bow to shoot a long distance. Therefore, he concluded, the presence of the backing only protected the back where the grain wasn't parallel and prevented the bow from breaking at full draw. Pope is to be commended for doing experiments but more needs to be done to understand what sinew does.

The Eskimos also made sinew-backed bows but in their frigid and damp climate it was impossible to do anything with glue so their sinew was applied in the form of twisted cordage tied on the back of the bow. The tension in the backing material was increased by twisting after it was bound to the back of the bow [see Callahan, BPT #1 & 2].

Reginald Laubin, in his book American Indian Archery described his experiences in replicating Indian bows from osage orange wood and sinew. He stated that as the sinew backing dried it tended to shrink and pull the bow into a deeper and deeper recurved position and contrary to the claims of Saxton Pope, it made the bow more powerful. Laubin's book is full of practical experience but nothing very quantitative.

Another article in Scientific American magazine on crossbows (January, 1985) stated that sinew has a tensile strength of 28,000 pounds per square inch. This is useful information but it is only 113 of what is needed to characterize sinew.

My own experience with the construction of sinew-backed bows started when I saw a backed bow made by a man living in Oakland. A beautiful job. The replies to my questions were that it was deer sinew applied with Elmer's Glue. Did it shoot well? I didn't ask. Several years later I made a short flat bow out of Santa Lucia fir (initially misidentified as California nutmeg), backed it with horse sinew applied with Elmer's carpenter's glue. It was a lesson in the fact that even a knotty, poor piece of wood will make an acceptable bow when backed with enough sinew. My next attempt was a very close replica of a 36 inch Yurok bow in the Wattis Hall of Man, Golden Gate Park, San Francisco. This was a yew wood plus sinew combination with very wide thin limbs. Some very elementary mechanical engineering theory says that the only way you can make an extremely short bow such as this and still shoot a reasonable length arrow is to make the limbs wide and

thin. Again I glued the horse sinew on the back with Elmer's carpenter's glue. What a disappointment! It looked very nice but didn't shoot worth a darn. After shooting a while and then unstringing the bow, I noticed that the bow followed the string (bent towards the archer) but after being unstrung a few hours it went back to its original shape. In general the bow was "flabby". My last experiment was a plains Indian style bow, made from a 48 inch black locust stave. This time I used hide glue to bond the horse sinew to the back. This bow was dynamite, powerful and fast. Did the hide glue make that much difference?

The engineer in me took over. What are the material properties which will yield a superior bow and how can I measure them? The things which matter are the elastic modulus (how much it stretches with a given tension), the tensile strength (how much tension is needed to break it), and how much it shrinks when it dries. In addition, it helps to define some other useful terms:

Potential energy: the ability to do work. When you pull the bowstring back you store potential energy in the bow limbs. The available potential energy is equal to the distance you pull the string back multiplied by the average force that it took to pull the string back to full draw. When you release the string the potential energy is transferred to the arrow, giving it.

Kinetic energy: the energy of motion. A perfectly efficient bow would transfer all of the available potential energy stored in the bow limbs into kinetic energy of the arrow.

Elastic modulus: a measure of how stiff a material is. Make a one inch cube out of the material and stretch it with a known force. The cube will get slightly longer. The elastic modulus is the force times the length of the block, divided by the area of the block times the distance the block stretched. Steel has an elastic modulus of 30 million psi (pounds per square inch), hickory has an elastic modulus of 2.2 million psi, black locust has 2.1 million psi, and the measurements I have made on yew wood give a figure of 1.2 million psi.

Tensile strength: keep pulling on that one inch cube of material and eventually you will pull it apart. The force per square inch that it takes to pull something apart is the tensile strength. For tempered steel the number is 400,000 psi, for hickory it is 20,000 psi.

For those of you who wonder: yes, it is very impractical to make these

measurements on a one inch cube of material. The one inch cube was cited to emphasize the force per unit area nature of the experiment. In actual practice a much skinnier specimen of the material would be tested.

My measurement of the elastic modulus of a dried, solid horse tendon gave a figure of 411,000 psi. Similar measurements on yew wood yielded 1.16 million psi. This said, much to my surprise, that under the best of circumstances sinew had only 21 to 35 percent of the elastic modulus of wood. Put in other words, and leaving out the mathematical formulas, if you make a yew wood bow of 50 pounds pull and add more yew wood on the back to make the limbs 5 percent thicker, the resultant bow will have a 15 percent stronger pull or 57.5 pounds. If, instead of adding more wood on the back of the bow, you make the bow limb 5 percent thicker by adding sinew, the increase in draw with would only be 2.2 percent or an additional 1.8 pounds. Why bother adding a material to the back of the bow which doesn't add much to its strength? The other 'secret' ingredient must be shrinkage.

I was pretty well convinced that sinew shrank while it dried and this put the sinew backing under great tension. Did the amount of shrinkage depend on the type of glue used? The experiment to find this out was to glue sinew on the backs of two identical strips of 1/8 inch balsa wood. On the first one the sinew was glued on with hide glue, on the second, the sinew was glued with Elmer's carpenter's glue. The two samples behaved identically. As the sinew dried and shrank it pulled the wood into a curved shape. This experiment showed little difference between the two types of glue, only that sinew shrank as it dried. Again I took two identical 1/8-inch strips of balsa wood and put a thick strip of hide glue on one and a similar strip of Elmer's on the other (no sinew on either). This time there was a pronounced difference between the two. The hide glue shrank and curved the wood just as much as the sinew, and the Elmer's glue did not shrink at all. Moral of the story: don't use anything but hide glue for applying the sinew. Furthermore hide glue is 'compatible' with sinew since on a molecular level they are identical. The last experiment with sinew was to see exactly how much it shrank when it dried. I pinned one end of a strip of wet sinew to a piece of plywood, and pinned the other end to the short end of a stick that pivoted at one end. Now, when the sinew shrank, the long end of the lever would move through a greater distance and make the shrinkage easier to see. The result was that the sinew shrank 3 percent upon drying.

In conclusion one can say that the benefits of sinew backing on wood bows come from a combination of several effects acting together. They are: 1. As the sinew dries and shrinks it puts the back of the bow under compression. As a consequence, the wood fibers on the back of the bow are not stressed as highly when the bow is drawn. 2. The sinew protects the back of the bow where it doesn't follow the grain. 3. The back of the bow, which is stretched a great deal at full draw, is now a material which can stretch 5 percent before breaking (wood can only stretch about 1 percent before breaking).

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The Miracle of Fire by Friction

By Dick Baugh

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Introduction

Starting a fire by rubbing two sticks together. Why do I always get a thrill out of doing it? Is it because there are probably less than 500 people in the United States who can consistently start a fire with a hand drill? Is it the entertainer in me? I don't know. I assure you that the thrill is not diminished by knowing more about the scientific events that go on during the process.

The objective of this article is to provide some scientific insight into the events which happen when two sticks are rubbed together to start a fire. In particular, why is it that some woods don't work at all, some work with great effort and others with relative ease. The principals discussed apply equally well to the fire saw, fire plow, hand spun drill or bow drill. Will it help you start a friction fire more easily or quickly? Probably not. Will it give you a deeper appreciation of the process? I hope so.

Basic Principals

You have to get the char, powder that is rubbed off the wood, heated up to about 800 degrees Fahrenheit before it will start glowing (ignite). I measured this by sprinkling char generated with a bow drill on a soldering iron heated up to a known temperature. Below 800 degrees the wood dust would give off a little smoke but that's all. Above 800 it would smoke and

then start to glow. Anything that prevents the char from reaching 800 degrees will interfere with fire making.

Composition and Structure

By this I mean what kind of molecules is the material composed of and how are the molecules arranged? If there is any volatile resin or tarry substance in the wood then as the friction heats the wood the tarry stuff will take heat away from the char (heat of evaporation) or will condense on the char and form it into a coarse gritty substance, preventing ignition. If the correct molecules are present and all the wrong molecules are absent there is still a problem if the molecules are not arranged properly. Imagine your best hearth board and hand spun spindle, which will twirl up an ember with very little effort. The wood will be very light, a very poor thermal conductor (a good insulator). Now put your hearth board and spindle in a vice and compress the wood to 1/2 its original thickness. It will be twice as dense and its thermal conductivity will be doubled. You can still twirl up an ember but you will have to work twice as hard because you have altered the structure of the wood. You have made it a poorer insulator and you have doubled the amount of muscle power needed to reach ignition. For a person with limited muscle power attempting to start a fire by friction the use of low-density wood is critical.

The simplest test for whether a particular piece of wood will twirl up an ember is the most obvious: try it and see if it works. A quicker test is to examine the char that is ground off as you twirl the spindle on the hearth board. The rule of thumb, literally, is to rub the char between thumb and forefinger. If it is coarse and gritty then reject that particular piece of wood. If it is very fine, like face powder, then you have a good chance of twirling up a fire. Both Kochansky and Graves mention this. What is the difference between these two classes of wood? Those that work and those that don't. We know that in the category of "good" woods there are softwoods, such as yucca, which can be easily dented with the thumbnail and hard woods such as sagebrush, which are much more resistant to the thumbnail test. Could it be that the "good" woods ignite at a lower temperature than the "bad" woods? That should be easy to measure. The straightforward way would be to measure the temperature of each tiny little particle of char as it is ground off the spindle or hearth board. Trouble is that it is very hard to measure the temperature of something that tiny without disturbing what is going on. The next best way is to measure the ignition temperature indirectly. Sprinkle some char on a piece of metal which has been heated to a known temperature. See what temperature the metal has to be heated to in order to ignite the char. As

a practical manner I used a thermostatically controlled soldering iron as a source of known temperature. Tips with two different temperatures, 700 deg.-F and 800 deg.-F were available. I had observed previously that the char ground into the notch in a "good" hearthboard would start glowing (ignite) if a pinch of it was placed on the 800 degree soldering iron tip but would not ignite if placed on the 700 degree tip. The conclusion from this was that if friction heats the char above 800 degrees it will ignite.

What about "bad" woods? I used a piece of local willow sapwood, a material on which I have wasted countless hours in the past trying to light a friction fire. Never any luck. Always produces a coarse gritty char. This time I did a different experiment. I charred some of the willow with a match and then ground it off with a file. It was now very fine, much finer than the results of a bow drill. This very fine willow char would ignite almost instantaneously at 700 degrees. Conclusion: the more finely the char is divided the lower the ignition temperature. This hypothesis was tested further by grinding off some un-charred mule fat wood with a fairly fine file. This material was slightly gritty feeling compared with the char that falls into the notch of a mule fat hearth board. The coarser mule fat char failed to ignite at 800 degrees. I did the same thing with char cloth, the favored tinder for flint and steel. Char cloth failed to ignite, even at 800 degrees.

Conclusion: the more finely the char is divided the lower the ignition temperature. This hypothesis was tested further by grinding off some un-charred mule fat wood with a fairly fine file. This material was slightly gritty feeling compared with the char that falls into the notch of a mule fat hearth board. The coarser mule fat char failed to ignite at 800 degrees. I did the same thing with char cloth, the favored tinder for flint and steel. Char cloth failed to ignite, even at 800 degrees.

Conclusions

The miracle of fire by friction is that you don't have to heat the char up to the temperature of a glowing ember to make it ignite. You only have to raise its temperature up to the point where it takes off of its own accord. When powdered charred wood is heated up to some critical temperature it begins to spontaneously oxidize. When it starts oxidizing its temperature rises, causing it to oxidize even faster. Eventually it reaches an equilibrium temperature limited by how much air is available and starts to glow, ignition. The critical temperature where this process begins depends on how finely the char is pulverized.

Fire by friction works only because these two events, pulverizing and heating, happen simultaneously. Woods that don't work disintegrate before they reach this critical condition.

Fire by Friction - The Spiritual Aspects

What is a cynical, agnostic engineer doing talking about the "spiritual" nature of something which can be fully explained by the laws of physics and chemistry? All I know is that there are some things that make me feel good and starting a fire the way my ancestors did 10,000 years ago is one of them. What makes me feel even better is getting a group of people to contribute towards the starting of a fire. I can think of no better way to bond a group of people. We all take turns at twirling the spindle, each according to his or her own ability, we all gently blow on the ember to bring out the flame and the smoke carries our thoughts and our hopes skyward. On the evaluation of a weekend course I gave a couple of years ago one of the students said, "Starting a fire is a sacrament." I guess it is.

Things that can cause problems:

- a. If you don't have enough muscle power then you won't be able to raise the temperature high enough. Remedy: teamwork. Have someone else help you. Even if the helper can only get the wood temperature elevated to 300 degrees then it will make the job easier. Remember that a bow drill is the easiest in that it uses your muscle power most effectively.
 - b. If the structure of the wood is such that it disintegrates before it reaches 800 degrees then it is a wood that should not be used. I strongly believe that some softwoods such as willow and aspen don't work because they fall apart before they reach the critical temperature.
 - c. Volatile substances such as water or resin in the wood. Evaporative cooling will prevent the char from reaching the critical temperature.
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Cordage fiber shredder made from bone

by Dick Baugh

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This little device arose from two situations. I had some left over bone pieces from a knife handle project and I use a lot of cattail leaves for cordage in grade school projects. Cattail leaf cordage is stronger and more flexible when it is finely shredded. In the past I have shown students how to shred the leaves by pulling them apart by hand while holding the base of the leaf with their feet. The ultimate way to shred the leaves is with a florists frog but that isn't very aboriginal. Why not make a small bone comb? I used a piece of cow cannon bone. I also cheated and used steel tools (hacksaw and small file) to shape it. The only critical feature is that the teeth should be sharp. The cattail leaves should ideally be picked late in the growing season, allowed to dry and then slightly dampened before shredding. Start the shredding process about a forearm's length from the tip of the leaf, and pull the shredder towards the tip. Next, start the shredder about 2 forearm's length from the tip and again pull towards the tip. By always pulling towards the tip you have less tangling. This process also tends to strip away the pithy interior part of the leaf. After the leaves have been shredded into fine fibers they can be made into cordage via any method that you choose.





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Ask Aboman...A continuing series of Q&A for gaining Primitive Living Skills Knowledge...in a somewhat different format.

Rumor has it that Joe Bigley of [Salmon Outdoor School](#) is a REAL GOOD FRIEND of Aboman. You can probably reach Aboman thru Joe.



Question:

Hello!

I am the mother of 3 children under the age of 2 1/2, and am preparing auto/home 72 hour kits for each of them, and would like any info on items that are necessary for survival. I would also like information on first aid kits.

Thank you,

Kristina

Aboman say back

Hi Kristina--I have lots of info on both first aid and 72-hour kits. Have done this sort of thing for 20 years or so. If you will email me your USPS address, I will send you copies of articles I've written on those topics, as well as any other info you would like. You (and anyone else in the group who is interested) may contact me via email at aboman@ida.net. take care--jab



Question:

Hello, I have a quick question for you to answer if you would please. Could you please tell me

what the two most important things to bring in the wilderness are? As in, if you were to be dropped off in the middle of the jungle and could only bring two items, what would they be? Why? Thank you.

—Matt B., Utah

Aboman say back

Matt, your question simple. Answer very simple, too. Last time Aboman be dropped off in jungle, two most important things be M-16 and lotsa, lotsa 5.56.

Aboman not like jungle too much anymore. It very hot and humid, and contain many other hazard that could ruin whole day—like land leech, cobra snake, and other snake name Mr. Two Step. Aboman like mountains better now. Much cooler, and no leech.

Aboman try to think of two most important things needed in wilderness now, and think best answer be :

1—survival knowledge

2—determination

With these two "things" Aboman make everything else he need.

Aboman's woman (Abowoman) tell him that be stupid answer. Matt asking about physical things, like knife, blanket, axe, etc. Aboman disagree. Knowledgeable primitive survivalist can make out OK under adverse conditions with good knowledge in head of how to use surrounding resources.

Aboman think too many people looking for guarantees today. "You buy this knife, you guaranteed to survive. You wear this boot, guarantee your feet not freeze." That all be advertising baloney.

There be no guarantees. No one be guaranteed to survive—not even in city. But working knowledge of fire making, shelter making, potable water, tool making, trap setting help even the odds. Aboman think everyone need to know these things. Also need to practice. Practice, practice! Too often student learn skills under ideal conditions, then never try again. But if skill needed, usually conditions be less than ideal, and then student be in deep Kim-chee! Practice friction fire when hands be frozen from cold, build shelter in downpour, skin deer with piece of stone, and make trap trigger with stone flake. Don't quit if unsuccessful at first. Keep trying til you do it.

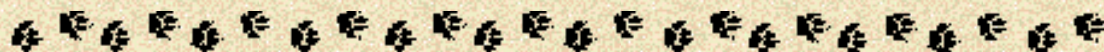
Aboman getting old now. Like too many comforts—(such as snuggle under elk robes with warm woman next to nice fire). If Aboman be "dropped off in the jungle" now, he like to bring more than two items to stay comfortable. Like hammock, double bit axe, small knife, poncho, trail blanket, possibles bag, and some trail food. Also bring pack. A few plastic bags, maybe .22 rifle with ammo. Many luxuries that Aboman have that maybe not available to primitive survival

student.

Knowledge still be more important than all luxuries. All the gimmicks in the world won't save your ignorant butt if you grab poisonous snake that you thought was vine, because you not familiar with surroundings.

Best place to get knowledge you want is from good instructor.

So find primitive skills instructor near you, and get to work. If you not know where to look for instructor, Aboman be happy to help out. Send email to aboman@ida.net, and Aboman give best recommendation.



Question

Dear Aboman—

I need an opinion. My friend and I are having a dispute over the optimum hunting knife. He says that a Kukri style 10"- 12" blade about ¼" thick is best. I say that a 9"- 10" Bowie blade is best, and the 12" blade is just extra weight. We both agree that an all around camp tool is best, and want a knife that can be used to hack weeds, chop wood, skin and butcher game, build shelters, and dig if necessary. We want to get as primitive as we can. What do you think?
Sincerely—L.T., Calif.

Aboman say back

You say you want hunting knife, but what you be hunting, dude? Aboman thought wooley mammoth be extinct! Knife that size best be used to stab critter to death! Believe Aboman when he say that you not really, really want to get that close to wooley mammoth. You make one mistake and mammoth quickly do something to ruin your whole day!

But Aboman just be joking with you. All seriousness aside, Aboman think you have good question, and he glad you ask.

People ask Aboman all the time what be best all around knife? What do Aboman use? Aboman think many, many people fall prey to advertising hype, especially when it come to knives. Advertising geeks be modern-day expert trappers, often catch unwary consumer with meaningless hype in order to sell product. Who really care whether knife can saw through cinderblock or hack down miniature Sequoia tree with one swipe, and then shave hair off forearm? These things mean nothing when it come to real use for knife. After all, you not need knife to double as climbing piton. Knife best be put to useful purpose like cut meat, hide, thongs, finger joint from dead enemy and such.

Aboman have many knives over the years. Some good, good, but most pretty mediocre. Aboman now think best knife have carbon steel blade 4"-6" long, handle of natural material like wood,

antler, or bone, with sheath that cover most of knife. Carbon steel be best, because it take good edge and stay sharp longer. Laminated carbon steel be even better. Give flexibility to blade. Sheath that cover knife be best, because it more difficult to lose that way. Natural handle material just look good.

Knife like this not hard to find. Good Scandinavian knife by Mora or Brusletto available from most knife source, as well as Puukko from Finland. Russell Harrington Green River knife be good also, and Henckel's 6" kitchen knife also be good good. Aboman have one of each. But favorite knife be 4" laminated blade from Brusletto with elk antler handle that Aboman make himself. Can be worn around neck or on belt. Get much use, but not cut many finger joint lately. Aboman's woman, Abowoman, take finger trophy necklace and hide it. Say it stink too much. Aboman try to sniff it out, but woman must have hid in bushes. Aboman think wolf-dog already find it and eat for lunch. Too bad.

For chopping, Aboman think best tool be 2 ½ lb double bit camp axe. Everyone should carry axe as well as knife. Sharpen one edge sharp sharp, other edge like wedge. Axe like this have lotsa lotsa uses—build shelter, split wood, cleave elk or bison ribcage and leg joint. Aboman use his one time to skin and butcher whole deer when woman lose knife. Two edges be extra advantage.

Always take care of knife, axe. Keep sharp. Don't throw, or try to bend blade in vise. Don't try Hollywood trick that make you look like Zorro wannabe. This be Aboman's best knife advice.

If you having trouble finding knife like Aboman describe, or if you want knife made by Aboman, send email and Aboman point you in right direction. Aboman always happy to help out.

If you want to get really primitive, make knife, axe from stone flake. They not too difficult to make, and you not out any dinero if you break or lose. Aboman always carry 2 or 3 obsidian flake in possibles bag for use as cutting blade. You can do same. Waugh!--Aboman



Question:

Hey Aboman! I have read a couple of things you've written to other people, and think your advice is pretty good. But I have a question. Just what is a Possibles Bag? You told Matt B. that you'd want to take yours with you into the wilderness, but I don't know what one is. Can you enlighten me?

Also, what do you think should be included in a good survival kit?

Thanks—Bill G., Bellview, WA

Aboman say back

Bill, your question be very good one, although Aboman not believe it possible that you not know what Possibles Bag be! Maybe you not receive proper education when youngster, and get head filled in school with useless baloney like how to use computer and such. But all that be OK; you come to right person for practical advice.

Possible bag be bag containing items that Aboman find useful on trail. Aboman's bag made of braintan buckskin, with shoulder strap and hair-on cover flap. Inside, bag contain several kits like fire kit, sewing kit, cutting tools, and miscellaneous minutiae.

Fire kit contain at least three means of making fire. Usually carry disposable Butane lighter, magnesium fire strike, and strike-anywhere matches in waterproof case. Also sometimes have traditional flint and steel kit in metal box with burning glass in lid. These items maybe not sound primitive, but they be there for emergency, like when Aboman need fire, and not have woman along to make it. Fire kit also have big big ball of dry tinder, pitch stick, and candle stub. These be useful in wet weather when fire maybe hard to light. Also, kit contain two, maybe three sections of hollow river cane. Aboman blow air through cane at smoldering coal or damp wood to help get fire going.

Sewing kit kept in buckskin bag contain bone awl, sinew, linen thread, and needle case with several different size needles. Need for this be obvious. If Aboman rip holes in seat of BVD's woman can easily repair.

Aboman also keep small knife in pouch for cutting tools, along with several flint or obsidian flakes with good sharp cutting edge. Pouch also contain antler tine used to re-touch dull stone blade, small hammerstone, and leather skin pad.

Miscellaneous bag contain items such as several ten-foot lengths of dogbane cordage, dried sinews, buckskin thongs, Army 550 cord. Also keep in it other items found on trail like bone splinters, lump of pitch, spare blow pipe, mullein plugs for fire drill spindle.

Inventory of bag always different, because it always in use. But these all be things generally found inside.

Possibles bag also be best survival kit available. With items inside, Aboman make almost anything he need.

Aboman think everyone should have possibles bag. Can be made of almost any material, but Aboman like braintan best. Make sure it be kept full of useful items, and not become repository for interesting junk you find out in the bush. Also, remember to take bag with you. Aboman always have his handy. Won't do any good if bag be back at cave and you be out in the sage.

If some reader already have possibles bag that be different form one described above, email Aboman. Aboman always interested in way other people do things, always like new ideas. But remember, if you have question, and not know where to look for answer, Ask Aboman. Waugh!--
Aboman



Question

Dear Aboman;

I've been having trouble getting fire by friction. I've tried making bow-drill fires using various types of well-dried woods (most notably cottonwood, willow, and cedar), but so far, all I can get is smoke. Not only that, but I often experience the spindle flipping out of the fireboard and travelling several feet away from my work area just as I am getting going with my bow. It's very frustrating, and I just can't figure out what I'm doing wrong. I really want to get fire by friction. What do you suggest?

---Frank B., Seattle, WA

Aboman say back

Answer to you problem very simple—your technique all be wrong. You want fire by friction, do like Aboman—tell woman, "Make fire!" If woman not move fast enough, club over head til she do. Make sure have all proper materials—if she usually good woman, use light club, like pine or willow. If she lazy, use big club. Sometimes elk or bison bone work good for this. To make sure woman successful, make sure she have four things—proper materials, proper component fabrication, proper technique, and much determination.

For materials, make sure she try cottonwood, sumac, cypress, poplar, willow, cedar, or juniper. These be best woods. Best also if she use same kind wood for spindle and fireboard, like cedar spindle, cedar fireboard. Don't use resin wood like pine, spruce, fir. Wood must be dry. To test. Press thumbnail into wood. If wood "dent in," then OK to use. If no dent, no use. If wood "crush in," then too soft—no use. Gather wood from dead dry tree. Then must fabricate fire set.

Must make fireboard, spindle, hand grip, bow, and string. Carve spindle to be as close to cylindrical as possible. Tell woman to use steel knife for this. Make sure spindle be proper size; 6" to 8" long, and about $\frac{1}{2}$ " to $\frac{3}{4}$ " diameter. Taper top end to long slender point. Other end may be more blunt. Then carve fireboard. Make plenty long, at least 6", and about $\frac{3}{4}$ " thick. Should look almost rectangular in cross section. Hand grip can be almost any material. Soapstone, hardwood, and bone work good. Must fit into hand comfortably. Then make bow. Very important component. Must be light, stiff, seasoned branch with substantial curve. Should be comfortable to hold. Use rawhide, buckskin, bootlace, or Army 550 cord (Aboman like this best) for bowstring.

Once materials gathered, must prepare fireboard. Must burn in notch for spindle. Lay spindle along long edge of fireboard, and "roll in" toward center of board for about $\frac{1}{4}$ ". Make small nick in fireboard directly underneath blunt point of drill. Then assemble firekit, and placing

blunt tip of drill into nick in board, "burn in" a hollow into fireboard. Once hollow is same diameter as spindle, stop. Then cut notch into fireboard. Notch must go from edge of board to center of hollow you just burned in. Notch will be about 1/8 of circle diameter wide. When this done, you now be ready to make fire.

Have plenty dry tinder, and be sure tinder prepared in right way: shape into 5" to 6" diameter bird's nest with plenty dry tinder dust and fluffy tinder in middle of nest. This be very common source of "no fire" problem. Dig small pit with same diameter as tinder bundle, and place tinder in pit. Then assemble fire kit with notch directly above center of tinder. Kneel on right knee, with left foot on fireboard next to notch. Brace spindle by resting left wrist against left shin. Right hand holds bow on right side of body, not out in front. Use shoulder, not arm, to "saw" back and forth to rotate spindle in fireboard. Start slow, and go slow until achieve good rhythm. Then saw faster til smoke appear. When see smoke, saw for at least 5 to 10 more full strokes. Gently remove spindle from fireboard, and place "coal" from notch into tinder bundle. "Coal" is brown powdery substance in fireboard notch that is smoking. Use knife point if necessary to remove coal from notch. Be careful and don't hurry, or you will destroy coal and have to start over. Carefully wrap tinder around coal, and hold in front of you and slightly above face. Then gently blow into tinder.

Smoke come. Smoke start to get thicker. Don't let coal fall out! When smoke turn thick yellowish color, tinder about to ignite. Be ready. Maybe good to place smoking tinder bundle into larger tinder bundle to lessen margin for error. Tinder bundle eventually burst into flame. Then is easy to place into firelay and have woman blow until fire going good.

Make sure woman have plenty determination. That be key to success. Lack of success indicate defect in either materials or technique. Check materials first. Is dry? What about tinder? Did bow flex? Does spindle turn freely without binding? Is bowstring loose? Is notch too narrow?

What about technique? Is spindle held perpendicular to fireboard? (That be why your spindle flip out sometimes—not held perpendicular. Remember to brace securely against shin). Did woman hurry too fast and destroy coal trying to get it to tinder? These be common mistakes. Remember to keep trying until successful.

If want good to read more on bow drill technique, read chapter on fire in Bart and Robin Blankenship book Earth Knack. Also chapter in Woodsmoke by Richard Jamison.

If you do these things and woman still not get fire, in spite of proper materials, book how-to, and bison bone club, maybe she need more help. Send to Aboman for personal one-on-one. Maybe if she smart, Aboman send her back in week or so with new skill. Maybe if she really good woman, but not too smart, Aboman keep her for himself.

If you no have woman of any type, dumb or smart, Aboman say you in deep kim-chee. Go out and find good bison bone club. Waugh!



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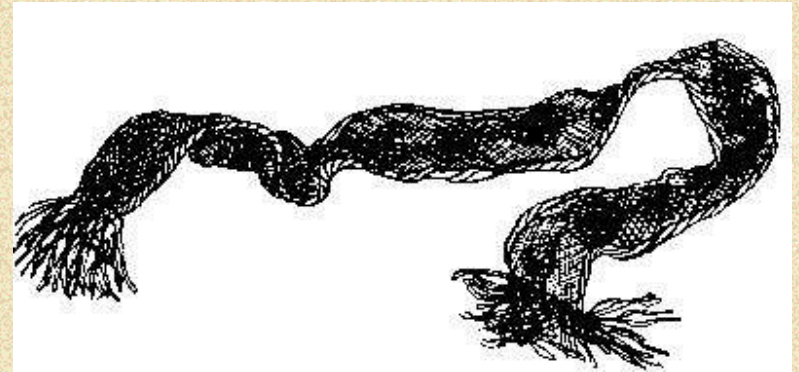
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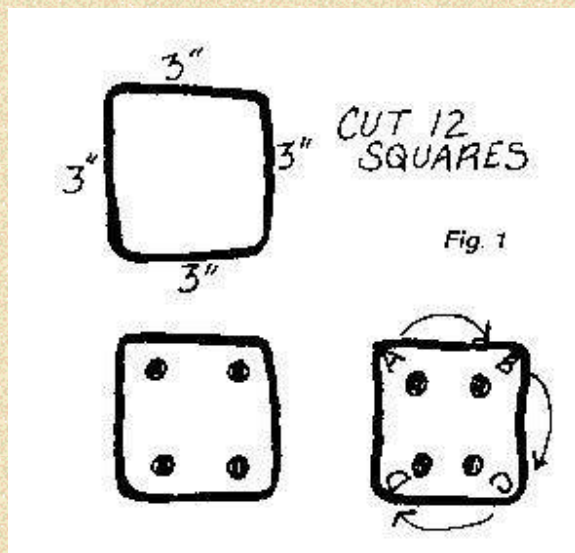
Text and Illustrations by Bart & Robin Blankenship

Card Weaving was adapted from their book, [Earth Knack: Stone Age Skills for the 21st Century](#), and published in the Bulletin of Primitive Technology, Issue #11, Spring 1996.

This is an ancient technique for making a strong strap quickly. A five foot strap can be woven in a couple of hours. You don't need a loom, only cards with holes in the corners, and about two hundred feet of cord. If you're cording it yourself, you need to get busy! The cards can be made of cardboard, leather, rawhide, bark, wood, fired clay, or even stone. Although not necessary, it can be very helpful to have a shuttle to hold the weft (the cord woven back and forth). You can use any type of netting shuttle. A very quick and easy shuttle to make is the spilt stick shuttle. Take a green stick that is about 8" long and 1 1/2" thick. Gently split each end about two to three inches. Wrap cord through the splits until they are full.

We are going to give you directions to weave a strap that is strong enough for pack straps, basket handles, tumplines, and saddle cinches. If you do a pattern like the one we are giving directions for, than it will be lovely enough for curtain ties, belts and other uses too. We will give you a pattern that takes 12 cards and 2 colors of cord. If you don't want a pattern in the strap, just use all one color cord. This strap will be five feet long, but you can make it any length you want.





First make the cards (Figure 1)

Cut three inch squares out of your chosen card material. The thinner the cards are, the easier they are to rotate in the weaving. Make a hole in each of the four corners of all 12 cards. Don't do this too close to the corner so you have room to label the cards in a manner that you can see the label as you work with the cards.

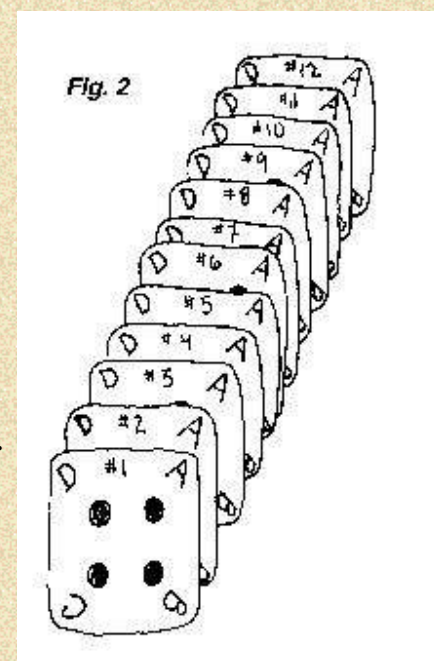
Labeling the cards is very important. Do it just this way. Lay all the cards in front of you and write the letter A in the top left-hand corner of each card. Now write B through D clockwise in each corner. When the letters are on the cards then number them 1 through 12 along the edge of the card between the letters D and A. Place all the labeled cards in a stack so the numbers are on the top, facing you, and so all the letters are aligned. Card #1 will be on top of the stack, closest to you, and Card #12 will be on the bottom (Figure 2).

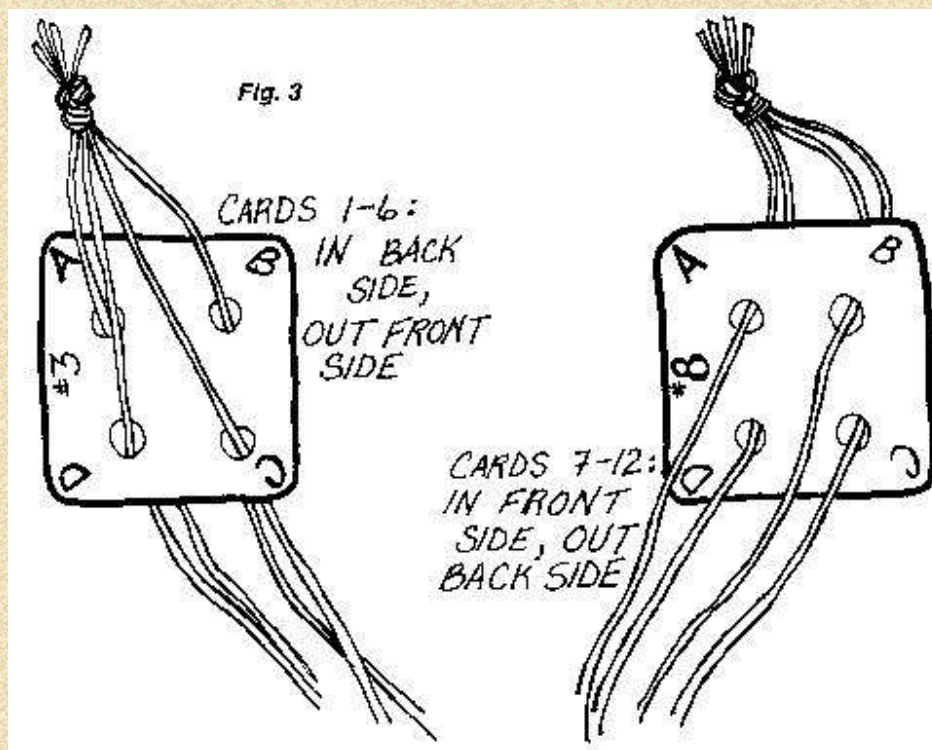
For this example, you will need 48, six foot long, warp cords, the cords that go through the cards. Twenty-two cords will be of a lighter color and twenty-six cords will be of a darker color. We will use "lighter" and "darker" in our threading for a pattern description, so it will be helpful if you cut them this way. Lay the cords on the

floor.

You are now ready to thread the cards

For clarity, in explaining how to thread the cards, the side with the letters and numbers is called the front side. The blank side is called the back. Hold the stack of cards in your hand with all the numbers on top. Turn the fronts of the cards to the left, numbers still on top, so you are holding the stack sideways. Cards 1 through 6 will be threaded from their back side and out their front. Cards 7 through 12 will be threaded from their front side and out their back (Figure 3). Having half of the cords threaded from back to front and the other half of the cards threaded from front to back gives a balanced strap, one that will not want to twist when it is finished.





- Card 7: B light, A, C and D dark.
- Card 8: A, B, and C dark, D light.
- Card 9: A and B dark, C and D light.
- Card 10: A dark, B, C, and D light.
- Card 11: All light.
- Card 12: All dark.

After you thread each card, tie the ends of the four cords together in a knot. Push the card almost up to this knot. You should have almost six feet of cord between you and the card.

We have cut cords of lighter and darker color to make our favorite pattern that will give diamonds, arrowheads, X's, and other symmetric shapes depending on how you turn the cards. To get this pattern you need to thread lighter and darker cords through the cards in the particular order described below. If you don't care about the pattern, you can thread these lighter and darker cords any way you want to through the holes of each card to get a random pattern. If you have all the same color cord, thread the cards as described above and skip the threading directions for making the pattern. Remember, whatever you decide about pattern, each card must be threaded with all four cords going from the front to the back or from the back to the front, in order for that card to be able to rotate properly.

The Threading Pattern

Remember to thread 1 through 6 from back to front Figure 4.

- Card 1: All holes are threaded with a dark color.
- Card 2: All holes threaded with light color.
- Card 3: A with dark, the rest light.
- Card 4: A and B dark, C and D light.
- Card 5: A, B, and C dark, D light.
- Card 6: B light, A, C and D dark.

Remember from now on you are threading from front to back.

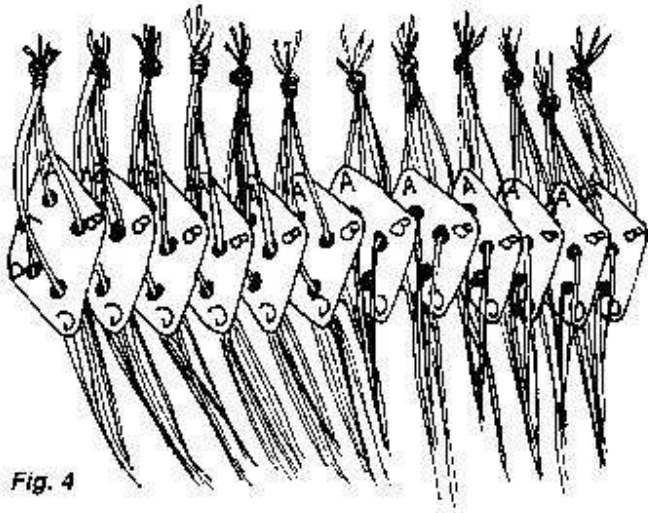


Fig. 4

Take the knotted ends of all the cords and tie them all together with a strong piece of string around the bottom of all the knots. Tie this strong string to something solid at about eye level. Check your cards. Make sure they are all turned up the same way. This will insure the least amount of tangle. All the cards must be positioned with holes A and D on top, D in the left corner, and A in the right corner and the numbers center. Gently pull all the cards away from their knotted ends, toward you, to untangle the warp threads. It helps to have another pair of hands to untangle the cords as you pull the cards toward you. Pull the cards until they are one foot from the end of the cords. Comb this last foot with your fingers.

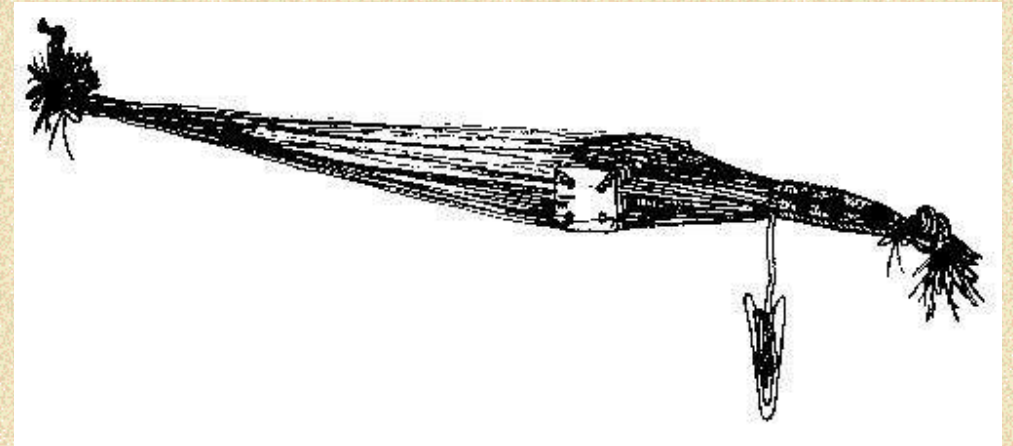
Pull the ends of all the cords together, under equal tension and tie the ends in an overhand knot. You can get the tension really equal if you slide the cards up and down a few times while pulling back on the ends before you tie the knot. Tie a strong string around the top of this knot and tie this end to another heavy object, a chair will work, or your belt. Whatever you choose, make sure it holds the warp cords under good tension. This makes it easier to weave.

You're ready to start.

Check your cards. Have the cards positioned with D in the left top corner, the number, center top, and A in the right top corner. This is the starting position for our pattern. Are they all the same? Good. Take all of the cards in your hands and turn them, all at once, one quarter turn away from you so holes A and B are on top. Slide the cards back and forth until the warp splits into two sets of cords. This split is where you will run the shuttle through the warp. When the split opens, use your hands to firmly pull the separating warps apart. Now pass the shuttle through this opening. Leave a foot of the end of the shuttle cord hanging out to the side. Turn the cards another quarter turn away from you. Holes B and C will be on top. Remember to slide the cards back and forth after rotating them in order to open up the split in the warp. Again, firmly pull this opening apart and pass the shuttle through. From now on, pull the weft tightly across the warp after each pass of the shuttle. If the weft is too loose you'll have big floppy loops on the edges of your strap. Turn the cards another quarter turn away. Holes C and D will be on top. Slide the cards, split the warp, and pass the shuttle through. Turn the cards another quarter turn away. Holes D and A will be on top again, with the numbers in the center. You have done a full rotation. You should begin to see an arrowhead with a light center pointing away from you.

Turn the cards toward you. If you always turn the cards away from you, the warp cords will get so twisted, that you can't rotate the cards. With the cord we have used, we can do about sixteen quarter turns, or four full card rotations in one direction or the other before we have to turn the other way.

The next four quarter turns toward you will give you another arrow head pointing in the opposite direction of the one you just completed. Together they will actually look like a large X. In this pattern this is the way you get X's. If you want two arrowheads pointing the same direction, then turn the cards eight quarter turns away from you when you start. If you want diamonds, begin the weave with four quarter turns toward you, and then do four quarter turns away from you. (This is two arrowheads with their base ends connected). These aren't your only choices with this pattern. You can rotate the cards 5 or 6 or however many times you want in any one direction, and then reverse as many times in the opposite direction as you want. If you don't care about a sequential pattern, then you don't need to keep track of your turns forward or



back. You can randomly turn the cards and do all the experimenting you want. Just remember to reverse them once in a while so the warps don't tangle.

The other side of the strap is also forming a pattern, sometimes more intriguing than the one you are watching develop. Remember, if the warp knot is tied to your belt, you will have to take up the new weave and retie it to your belt as you work up the strap. As you near the far end of the warp, you will run out of room to rotate the cards. When this happens, you are finished. Untie the upper knot, and remove the cards. Your strap is ready to use. You can braid or sew the ends to keep them from unraveling.

Bart & Robin Blankenship teach their [Earth Knack classes](#) in Crestone, Colorado.



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ROBIN BLANKENSHIP have been working in the outdoor field since 1978. Her years with the National Outdoor Leadership School (N.O.L.S.) and Colorado Outward Bound have given her a strong expertise in technical mountain, water, and desert expedition skills and a lot of experience working with adults and youth of all backgrounds.



Her studying and sharing of Stone Age skills began in 1984; an outgrowth of instructing wilderness courses for Larry Olsen's School of Urban and Wilderness Survival. Her past 20 years of experience culminates in the operation of EARTH KNACK, founded in 1990. EARTH KNACK offers expeditions, workshops, and gatherings that teach Stone Age living skills. All courses are skills intensive with emphasis on proficiency. She also share these skills through numerous periodicals and her book: [EARTH KNACK Stone Age Skills for the 21st Century](#) (published by Gibbs Smith in 1996), which focuses on incorporating ancient skills into modern lifestyles. She lives with her three children in Crestone, Colorado, while she and others are constructing EARTH KNACK's Stone Age village.

She is among some of the favorite instructors at Rabbitstick in Rexburg, ID and Wintercount near Maricopa, AZ. She is also a guest instructor at Rivercane Rendezvous and Falling Leaves Rendezvous in Western North Carolina.

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EK01.jpg (32293 bytes)

Who Are These People?

ROBIN & BART BLANKENSHIP have been working in the outdoor field since 1978. Their years with the National Outdoor Leadership School (N.O.L.S.) and Colorado Outward Bound have given them a strong expertise in technical mountain, water, and desert expedition skills and a lot of experience working with adults and youth of all backgrounds. Their studying and sharing of Stone Age skills began in 1984; an outgrowth of instructing wilderness courses for Larry Olsen's School of Urban and Wilderness Survival. Their past 20 years of experience culminates in the operation of **EARTH KNACK**, founded in 1990. **EARTH KNACK** offers expeditions, workshops, and gatherings that teach Stone Age living skills. All courses are skills intensive with emphasis on proficiency. They also share these skills through numerous periodicals and their book: **EARTH KNACK Stone Age Skills for the 21st Century** (published by Gibbs Smith in 1996), which focuses on incorporating ancient skills into modern lifestyles. They live with their three children in Crestone, Colorado, while they are constructing **EARTH KNACK's** Stone Age village.



COLLEGE CREDIT FOR EARTH KNACK PARTICIPANTS

Many colleges and universities have been awarding credit for EARTH KNACK courses in a wide range of disciplines. Recertification credit has been awarded to Colorado certified teachers. Speak to your advisor or department head before participating in your next EARTH KNACK course.

Courses for 1999



Winter Clothing Class

Learn traditional fur tanning tech-pattern making and skin sewing to create a coon skin cap and a coyote fur vest. Turn raw wool into durable, warm felt boots and mittens. After this great week of learning you'll have a stylish winter outfit. Evening meals are prepared by the group, using primitive cooking methods and incorporating wild foods.

Jan. 17- 23 or Nov. 14- 20 \$485

WINTER SKILLS INTENSIVE



This course combines primitive skills such as friction fire, primitive food preparation and cooking methods, and wooden snow shoe making with traditional winter skills like snow cave and igloo building, snow travel, tracking and snaring techniques. Participants will stay in teepee or wall tent accommodations at the village site and move into snow shelters when they are built. Dinners are prepared by the group incorporating primitive cooking methods.

Jan. 24- 30 or Feb. 1- 7 \$485

ONE WEEK SKILLS INTENSIVES



Spend the week learning all skills needed to begin re-creating the "Hunter-Gatherer" lifestyle! You have the opportunity to make and take home atlatl and dart, rabbit stick (a throwing stick for hunting), tanned hide, stone knife, friction fire sets, pottery and baskets. What an incredible week of learning! This course is held at the Stone Age village site. Tuition includes lodging, materials and group dinners incorporating wild foods.

April 18- 24 7 days \$465

June 3- 9 7 days \$465

July 26- 31 6 days \$445

Sept. 26- Oct 2. 7 days \$465

Nov. 7- 13 7 days \$465

RETURN TO THE EVERGLADES

"We came to expect something new around each bend in this prehistoric oasis that doesn't just teem-- it leaps, slides, thrashes and swirls with life." from travel section of **Seattle Times** by Steve wainwright. 1993 Everglades trip.

Earth Knack ventures in the primal, watery wilderness of Everglades National Park once again. Canoe through the Ten Thousand Islands, along the Wilderness Waterway, and to the sandy beaches of Cape Sable. Primitive fishing and netting techniques, stone and shell tool & implement making, climbing for coconuts and plant fiber weaving techniques round out the primitive skills curriculum. Unique plant, animal and bird life abound. Don't miss this rare adventure.

Dec. 5- 18	14 days	\$965
Dec. 5- 11	1st 7 days	\$535
Dec. 12- 18	2nd 7 days	\$535

INSTRUCTOR'S COURSE

THE MOST COMPREHENSIVE SKILLS TRAINING FOR PRIMITIVE SKILLS INSTRUCTORS ANYWHERE!

Choose from a Spring or Summer 14 day course in 7 day sections. Participants will make a large variety of Stone Age items and receive instruction with emphasis on teaching techniques and tips for sharing this knowledge with students. All levels are welcome. Experienced outdoor instructors find this course opens up completely new horizons, offering a learning experience that compliments and expands the traditional outdoor curriculum. Folks not interested in teaching often choose this course for highest quality Stone Age skills training. This course focuses on skills proficiency. This year we have formulated the course in two parts. The subjects of the first section include primitive cooking methods, wild food preparations, medicinals, basic fiber work, atlatl, darts, hide-tanning, pitch and hide glues, stone tools, hafting, flintknapping basics, four methods of friction fire and pottery. The second section will focus on bow and arrow making and advanced fiber work such as drop spinning, felting, netting, dyeing and basketry. EARTH KNACK'S commitment to quality instruction and lots of hands on learning means you go home with many beautiful finished items and a wellspring of knowledge to share.

SPRING INSTRUCTOR'S COURSE

May 17- 31	14 days	\$900*
Nay17- 23	1st 7days	\$485*
May25- 31	2nd 7days	\$495*

SUMMER INSTRUCTOR'S COURSE

Aug. 7- 11	14 days	\$900*
Aug. 7- 13	1st 7 days	\$485*

Aug. 15- 21 2nd 7days \$485*

***includes lodging, materials and group dinners incorporating wild foods**

PRIMITIVE BOW CLASS



Make a primitive bow to your personal draw length and weight specifications. Choose to work with steel or stone tools. (Or, perhaps with a chain saw as EARTH KNACK instructor Wolf Brooks did this summer! No kidding.) Stave selection, design and performance, archery physics, tillering, finishing and care and maintenance of your bow will be covered.

July 28- 31 or August 29- September 3, 1999

ADVANCED ARROW CLASS

Quality arrow making is the most overlooked aspect of primitive archery. As Ishi, last of the Yahi said, "Any one can make a bow, but it's the arrow that kills the deer!" Learn to choose arrow stock. Shaft straightening, spining, balancing and matching will make your arrow fly true. Both stone and metal point instruction is given as well as quality feather fletching and nocking techniques. Make a sure shot set of beautiful primitive arrows.

August 1- 5 \$395

THE GATHERING

June 18- 24 or June 19 & 20(Sat & Sun only)



Join us for the 6th Annual Symposium of Stone Age living skills in Colorado. Top instructors provide a fact-filled week of instruction in: Atlatl, Hunting Tools, Moccasins, Friction Fires, Edibles, Medicinals, Quill Work, Stone Age Tools, Flintknapping, Spears, Traps, Netting, Making String and Rope From Plant Fiber, Traditional Cooking Methods, Ancient Weaving Techniques, Natural Dyes, Paints and more! You choose classes in your interest areas. A tribal camp setting with evening fires that include music, drumming, dancing and storytelling make this a unique event where you can immerse yourself in an ancient emotional dimension. High quality instruction is geared to all levels of ability and interest.

June 18- 24 One week June 19 & 20

\$225 Weekend Only \$100
(\$7 per night camping fee and material fees separate)

Includes instruction & Tuesday Family Rates evening traditional steam pit feast

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Jack Cresson **Primitive Industries**

40 E. 2nd St.,

Moorestown, NJ 08057

Phone 609-234-3286

E-mail: jackcresson@juno.com

I have been a practicing archaeologist for the past 30 years, and presently employed as a Field Supervisor with the firm of R. Alan Mounier, Archaeologist in Vineland, NJ

My affiliations span National, Regional and State Archaeological Societies. I have contributed numerous articles and given scholarly papers on various aspects of archaeology and its related disciplines. Currently I am on the Executive Board of the Archaeological Society of NJ and the Chairman of its Research Grants Committee for the past 21 years.

I have fostered and been an advocate for the use of experimental archaeology and lithic technology as a means to help better understand and interpret the archaeology of past human behavior. To this end I was a principal organizer of the Middle Atlantic Lithic Workshop and Symposium. This research group, whose purpose was focused toward problem solving in lithic studies has been held annually since 1981.

More recently I have been enlisted as a founding Board Member & Treasurer of the Society of Primitive Technology; an international organization whose aims are recording, preserving and teaching all facets of primitive technology, skills, crafts and life ways.

I have consulted and provided demonstrations and workshops to Native American organizations; schools, colleges and universities; as well as nature and environmental centers, museums and living history organizations. Also,

I have provided technical advice and craft skills used in several films about NJ archaeology.

One of my unique specialties (based on archaeological data and inference) is demonstrating & teaching the methods and lithic technologies used in Eastern U.S. primitive cultures; and their materials of choice i.e., meta-sediments, meta-volcanic's (quartzite, argillites, rhyolite, felsite) and other non-crypto crystalline materials.

Most of what drives my interest today is the challenge of learning something new from ancient technologies long since labeled primitive.... The more we look, compare, analyze and experiment with archaeological evidence of the past, the more complex, efficient and miraculous these technologies and the cultures who developed them become. I use my knowledge of primitive technology, experimental archaeology and flintknapping to solve ancient mysteries in archaeology.

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"PRIMITIVE INDUSTRIES" Workshop Opportunities for 1999

[Jack Cresson](#) is again offering special and private workshops in
Prehistoric Lithic Technology & Flintknapping

(a data sheet on "Organizational Programs, Demos and Replication
Services" is available
upon request)

COBBLE TECHNOLOGIES & INTRODUCTION TO META- ROCKS IN LITHIC TECHNOLOGY FOR THE SEASONED FLINTKNAPPER.

Want a Challenge! Tired of the same old skill levels and abilities just 'noodling' high grade flinty rocks! Enter the arena of Cobbles and Meta-Rocks. Get Back to Meaningful Stone! This course covers cobbles and what to do with them (taught with reduction and processing techniques derived from years of archaeological and experimental data & experience) as well as, an introduction to meta-rock flintknapping. Learn how to approach quartz, quartzite, rhyolite, felsite, argillite and diabase and other like lithic "undesirables".

Remember, once mastered, you will never want for knappable lithic material again. Use Gravels & Mega-Meta Sources!

COURSE #990 - April 17 & 18

COURSE #991 - June 12 & 13

COURSE #992 - Sept 11 & 12

COURSE #993 - Oct 2 & 3

INTRODUCTION TO FLINTKNAPPING

The art of shaping stones through flaking techniques. This course covers the necessary tools & protective coverings and aids; the suitable materials used to make flintknapping tools and resulting products - as well as instruction & demonstration in a variety of stone processing techniques. Topics will include obtaining usable materials, core & flake preparation; along with more refined & specialized biface and uniface production and finishing techniques.

COURSE # 994 - April 10 & 11

COURSE # 995 - June 5 & 6

COURSE # 996 - July 10 & 11

COURSE # 997 - Sept 4 & 5

COURSE # 998 - Sept 25 & 26

INTERMEDIATE TO ADVANCED FLINTKNAPPING: "MASTERING BIFACIAL THINNING"

The advanced art of shaping stones through flaking techniques with a focus on creating or designing platforms and biface core preparation - maximize force wave trajectories by core geometry; core manipulation & application of force. Specialized percussion techniques with an emphasis on material grades & suitability, the use of a variety of percussors and in depth discussion & demonstration will be presented.

COURSE # 999 - May 22 & 23

COURSE # 999a - June 26 & 27

COURSE # 999b - Oct 23 & 24

COURSE # 999c - Nov. 6 & 7

Workshops are occasionally conducted for small groups & individuals (3 to 6) and range from basic instruction in Lithic Technology; Introductory, Intermediate and Advanced Flintknapping; Introduction to Hafting Technology; Introduction to Shafted Projectiles and Tools (arrows, spears, javelins etc.) Cobble Technologies and an Introduction to Meta-Rocks in Lithic Technology as well as New Jersey Prehistoric Technology.

Workshops are conducted outdoors, in backyard settings, usually in manageable blocks of time (2 to 4 hours at a clip) to complete a full workshop of two (2) 8 hr sessions. [An "Organizational Program & Demo" sheet is available upon request]. Unless unusually extenuating circumstances preclude the arrangement for weekend (daily) instruction, evenings may be considered as an alternate option. Workshops will be arranged by participant interest. A minimum of 3 students is required to initiate a workshop. Changes may be necessary to accommodate participant interest and availability.

Basic cost per session is still \$60.00/day (\$120 for each 2-day Course) which includes the \$10 material fee. Total cost can be affected by certain conditions and extenuating circumstances.

(OPTIONAL home-cooked lunch & "snack & beverage breaks" add \$6.00/day)

IF YOU ARE OVER 18 and INTERESTED IN ANY WORKSHOPS or COURSES

PLEASE LET ME KNOW AS SOON AS POSSIBLE so we can schedule the necessary arrangements. (We have limited enrollment due to space considerations)

To expedite your placement in any of these programs you may call (609-234-3286) or e-mail: jackcresson@juno.com to register ; however, a small deposit of \$30 (25% of course cost) is required to secure your place in any workshop.

THE DEPOSIT IS NON-REFUNDABLE IF YOU CANCEL LESS THAN 5 BUSINESS DAYS OF WORK SHOP !!

Name(s) of Participant(s):

1.

2.

Mailing Address:

Telephone:

Fax:

E-mail:

Course Number:

Date of Course:

Please enclose your \$30 Deposit (per person enrolling) \$_____

(Payable to Jack Cresson)

Mail registration form to: Jack Cresson 40 E. 2nd St., Moorestown, New Jersey 08057

E-mail: jackcresson@juno.com Phone 609-234-3286

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Note: We are in the process of updating all class listings and dates

Why do we learn and practice these skills?

"The learning and practice of aboriginal skills can help its all get in touch with our own roots, no matter what our particular heritage may be (Asian, Native American, European, African, etc.). Here in North America, we look to the Indian Peoples and the ancestors of these people to teach us the skills that are 'native' to this place. Yet, if we go back far enough into our own pasts, we discover that we are all aboriginal peoples at some time in someplace. The 'stone age' is the great common denominator of humanness.

'Primitive' (first) skills are our shared inheritance."

Steve Watts, 1985

Choosing A Good Instructor

With the dawning of the new millennium, we've noticed an increase in "survival instructors" on the Internet, in print and elsewhere. Most probably have good intentions, others see an opportunity for extra income due to the increasing popularity of self-sufficiency. If you're choosing to learn skills simply for the fun of it, the following ideas will be less relevant.

Choose your instructors wisely. Remember, you're learning skills that could save your life; you're not buying a toaster oven.

The following are tips to help you choose a good instructor. Remember that any school is only as good as its instructors.

1) Ask to see the instructor's resume. Have they been teaching for ten years or ten months? 2) Train from someone who teaches survival skills full-time if possible. Would you feel comfortable seeing a doctor who practiced medicine three months out of the year?

3) If your primary interest is primitive skills, train from someone who lives in your geographic area. They'll be the most familiar with your local flora and fauna. You don't learn to harvest cactus fruit from an Eskimo.

4) Ask around about the instructor's background. Are they known and respected by their peers?

5) Beware the "expert". Nature is too full of variables to support this type of personality.

6) If your interest in survival is for survival's sake, study with someone who knows primitive skills and modern survival skills. Knowing both gives you much greater potential for dealing with the survival scenario. When the chips are down, a bowdrill is no substitute for matches.

7) You get what you pay for. If you ever really need to use your skills, you'll find them to be priceless.

California Indian Skills

AT KULE LOKLO, PT. REYES NATIONAL SEASHORE
Schedule for 1999 Classes
Miwok Archeological Preserve of Marin

Skills Alive!!

17720 Laurel Hill Church Rd
Laurel Hill, NC 28351
910-276-2256
mac@abotech.com

Offering Primitive Living Workshops in the Southeast (Boone, NC) covering all areas of Primitive Daily living Skills. We offer braintanning classes, both wet-scrape and dry-scrape methods year round. Contact us for details.

We have been in this "enterprise" in '92 and have operating full time professionally since 1996.

Earth Knack- 2002

Robin Blankenship
P.O. Box 508,
Crestone, CO 81131
Phone: (719)256-4909

[Salmon Outdoor School](#)

**Joe has promised to send new schedule...
Aboman will do it!!**

2002 SCHEDULE

Joe Bigley

RR 1 BOX 48 B-1 SALMON ID 83467

(208) 756-8240

Web address: www.aboman.com

[Aboriginal Living Skills School, LLC](#)

2002 Class Schedule

[Cody Lundin](#)

PO Box 3064

Prescott, AZ 86302

(520) 636-8384 - New Number!

<mailto:abodude@aztec.asu.edu>

[Hollowtop Outdoor Primitive School, LLC](#)

[2002 Class Schedule](#)

Thomas & Renee Elpel

12 Quartz - PO Box 691

Pony, MT 59747-0691

406-685-3222

tomelpel@hollowtop.com

<http://www.hollowtop.com>

Primitive Industries

Jack Cresson
40 E. 2nd St
Moorestown, NJ 08057
(609) 234-3286
JACKCRESSON@JUNO.Com

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CALIFORNIA INDIAN SKILLS

AT KULE LOKLO, PT. REYES NATIONAL SEASHORE

for more info call Sylvia Thalman 415-479-3281 or Don Thieler at 415-883-4310
e-mail mapom@aol.com

Miwok Archeological Preserve of Marin



[PRINTABLE REGISTRATION FORM](#)

SPRING 1999

◁ARROW MAKING April 3, Saturday, 10 - 4 In the old days, survival was dependent on well-made hunting tools. California-type arrows will be made in this class. You will straighten, scrape and polish arrow shafts, prepare feathers and use sinew to secure the point and feathers to the shaft. The instructor will supply an arrow point for each student. INSTRUCTOR: Joe Dabill \$45.

◁ CALIFORNIA FLUTE MAKING April 3, Saturday, 10 - 4 Students will learn flute making from a master, beginning with a description of types and materials, gathering plants ethically and respectfully and the difference between traditional and modern tools. Construction will include cutting and cleaning, tapering and pith removal, placing and sizing holes, and designs. The greatest challenge to ability and patience will be playing the flute. Instructor: Ben Cunningham-Summerfield, Mountain Maidu and Turtle

Mountain Chippewa. \$55.

◁SELF BOW AND ARCHERY April 10 & 11 Saturday & Sunday.10 - 4 This class is designed for beginning bowmakers, but will also be geared to people who may have already made traditional bows. The self bow is larger than the sinew-backed bow, and will be finished during the class. The goal is to help students become competent in bow design and enable them to make fast and efficient bows of any type of wood. Bay laurel, oak or cedar staves will be used, and staves of other woods will be available. Students will steam-bend wood for reflex and recurve, Sunday afternoon will be devoted to archery practice with your new bow. INSTRUCTOR: Joe Dabill. \$95

◁FIRE MAKING April 10, Saturday, 10 - 4 In this class, you will make your own hand drill firemaking kit from buckeye, incense cedar and other materials. Both hand drill and bow drill techniques will be explored and you will have an opportunity to practice making fire. Time permitting, we may also try other firemaking techniques. Limit: 15 people INSTRUCTORS: [Steve Edholm and Tamara Wilder](#). \$45.

◁FLINTKNAPPING: ARROWHEADS, BLADES & SPEAR POINTS OF STONE April 17, Saturday, 10 - 4 Arrow, spear and drill points and knife blades of obsidian (volcanic glass) and chert have been made in California for thousands of years. In this introductory course, you will learn about styles of points and blades, and how they were made and used. Your own flintknapping kit will be provided and used to make obsidian points. A copy of Hellwig's Flintknapping: The Art of Making Stone Tools is included in your class fee. INSTRUCTOR: Bill Mulloy \$45

◁MAKING A COILED BASKETRY MEDALLION April 17 & 18, Saturday & Sunday 10 - 4 Students will make a flat Sierra Mewuk/ Paiute style medallion, suitable to be worn around the neck. Materials are sedge root with a redbud design on a base of bear grass (Muhlenbergia). Students will trim the sedge and make string from dogbane (Indian hemp) to suspend the medallion. INSTRUCTOR: Lucy Parker, Sierra Mewuk/ Kashia Pomo/ Coast Miwok. \$110

◁TULE DUCK HUNTER'S BASKET May 1, Saturday 10 - 4 In this new class, participants will make a twined container out of whole shoot tule which is like those used by the Pomo in the Clear Lake area. Such baskets were used to hold mud balls which were thrown with a sling for the taking of waterfowl. "White clay mud found in a few places" was used for the

baked mud balls. Examples are in the Hall collection in the Carnegie Museum and are shown in Barrett's Pomo Material Culture. INSTRUCTOR: Sheila Deeg \$50

◁MAKING A MINIATURE POMO BABY CRADLE BASKET May 8, Saturday 10 - 4 Students will construct a miniature (about 4 inches) Pomo baby cradle basket. The finished piece will be about 4 inches long. Materials will be willow, dogwood for the hoop, and string. Twined baby baskets of this type were made for Pomo babies in their earliest years and are still in use in traditional households. Limit of 12 students. INSTRUCTOR: Ed Willie, Pomo/ Paiute/ Wailaki. \$50

◁MAKING CORDAGE May 16, Sunday, 10 - 4 The knowledge of making string is one of the most basic human skills. Cordage (string and rope) has been used by humans for ages as a tool in fishing and hunting, for carrying burdens, making shelters, in textiles, for tying bundles together, and so on. Plants which yield good fiber will be identified and participants will learn about extraction and processing methods. Techniques of plying the fibers into cord will then be explored. Time permitting, we will also cover knotted and knotless netting and plying cords into ropes. INSTRUCTORS: [Steven Edholm & Tamara Wilder](#). Limit: 15 people. \$45

◁ MAKING A COILED WORK BASKET. May 15 and 16, Saturday and Sunday 10 - 4 Participants will make a Yosemite-style Sierra Mewuk work basket. This pretty basket will be about 6 inches in diameter and 4 inches high. Materials are Muhlenbergia (bear grass), string and colored yarn. The coiling technique will be used. INSTRUCTOR: Julia Parker, Kashia Pomo/Coast Miwok. \$100

◁PAINTS AND DECORATIONS May 15 Saturday, 10 - 4 In this class, the instructors will talk about and explore the preparation and use of natural mineral pigments, other paints and modes of decoration. Participants will make and decorate digging sticks and paint containers of elderberry wood, and practice etching bone. They will also take home mineral pigments and a simple buckskin paint pouch. Limit of 15 people. INSTRUCTORS: [Stephen Edholm and Tamara Wilder](#). \$50

◁TRACKING: READING ANIMAL SIGNS & MAKING A TRACK MOLD May 22 Saturday, 10 - 4 This workshop will cover the fundamentals of tracking wildlife. Participants will make and use a tracking stick to help measure and locate tracks. Track aging and weathering, identification of sex, compression shapes and introductory pressure release will be covered.

Learning how to "read" the ground to recognize individual animal characteristics will be an integral part of this class. Students will also make a plaster cast of a wild animal track. INSTRUCTOR: John Lebourgeois. \$45

ABOUT OUR INSTRUCTORS: JOE DABILL, a survival specialist, has taught classes for the Santa Cruz Mountains Natural History Assoc. and Santa Barbara Museum of Natural History, and Rabbitstick gatherings in Arizona. BEN CUNNINGHAM- SUMMERFIELD has played his flute and taught in college and museum settings, at traditional gatherings, parks, and at births and weddings. He works in Resource Management at Yosemite National Park, and volunteers there in the Indian Cultural Program. He was featured in News from Native California in the Summer 1998 issue. [STEVEN EDHOLM and TAMARA WILDER](#) Steven and Tamara have taught in California, Oregon, Arizona and Idaho. Their work has been published in the [Bulletin of Primitive Technology](#), and in [Woodsmoke: Collected Writings on Ancient Living Skills](#). Their new book [Wet-scrape Braintanned Bucskin](#) is now available. BILL MULLOY is an anthropologist and lithic specialist, as well as a regular demonstrator at Kule Loklo. LUCY PARKER is an instructor and a well known demonstrator in the Bay Area, Yosemite National Park and Nevada. SHEILA DEEG is a student of Mrs. Mabel McKay and Mrs. Laura Somersol, and a basketry demonstrator at Kule Loklo. ED WILLIE- In addition to being a weaver, Ed is an artist in pen and ink and acrylics, as well as a sculptor. Ed is a teacher in the Ross School District. He illustrated The Coast Miwok Indians of the Point Reyes Area. JULIA PARKER is a renowned basket weaver and cultural demonstrator at Yosemite National Park and is co- author of It Will Live Forever: Traditional Yosemite Acorn Preparation.



MAPOM's classes are designed to give students a concentrated look at one aspect of California Indian culture. Some of our instructors are California Native Americans with a special interest in their tribal traditions. Others are non-Indians who have actively studied traditional skills for many years. Classes are held in the reconstructed Coast Miwok village, Kule Loklo, at beautiful Pt. Reyes National Seashore, near Olema in western Marin County. The subjects of all classes are adult skills taught on an adult level and usually involve hands-on participation by students. Traditional materials are used in our classes. ◊FEE POLICY: Pre-registration with payment is necessary unless special arrangements are made. Tuition is returned in full if you cancel one week or more before the class. Materials

fees usually cannot be returned. Minimum class size is 6. Most classes have a maximum limit. <>SPECIAL RATES: California Indians wishing to learn or improve these old ways skills should inquire about special rates. Fee reductions are also available for people working with groups of Indian children. <>FOR MORE INFORMATION: Call Sylvia Thalman 415-479-3281 or Don Thieler 415-883-4310, or e-mail



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**CALIFORNIA INDIAN SKILLS
AT KULE LOKLO, PT. REYES NATIONAL SEASHORE
Miwok Archeological Preserve of Marin**

Send enrollment information and check or money order to:
MIWOK ARCHEOLOGICAL PRESERVE OF MARIN (or MAPOM)
2255 Las Gallinas,
San Rafael CA 94903.

Please enroll me in the following classes (tuition includes materials fee).

- ARROW MAKING. Saturday, April 3 [\$45]
- FLUTE MAKING. Saturday, April 3 [\$55]
- SELF BOW AND ARCHERY. Saturday & Sunday, April 10 & 11 (\$95)
- FIRE MAKING. Saturday April 10, [\$45]
- FLINTKNAPPING. Saturday, April 17 [\$45]
- COILED BASKETRY MEDALLION. Saturday & Sunday, April 17 & 18 {\$110}
- DUCK HUNTER'S BASKET. Saturday, May 1 [\$50]
- BABY CRADLE BASKET. Saturday May 8 [\$50]
- COILED WORK BASKET. Saturday & Sunday May 15 & 16 [\$100]
- PAINTS AND DECORATIONS. Saturday May 15 [\$50]
- TRACKING. Saturday, May 22 [\$45]

NOTE: TUITION FEES ABOVE ARE FOR MEMBERS OF THE MIWOK ARCHEOLOGICAL PRESERVE OF MARIN. If you are not already a member of MAPOM please add \$5.00 to cover your initial annual membership at our one-time-only class participant rate.

REGULAR MAPOM DUES SCHEDULE:

Family \$12.00, Individual \$8.00, Senior \$5.00, and Full-time Student \$4.00.

NAME _____ PHONE _____

ADDRESS _____

TOWN _____ ST _____ ZIP _____

Enclosed is \$ _____ for class fees. I am _____, am not _____ already a MAPOM member.

I can provide a ride for class participants from my area. You may give out my phone number for this purpose.

I can't take classes this time, but put me on your FALL Mailing List.

2-22-99

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Steven Edholm and Tamara Wilder Paleotechnics



Steven Edholm and Tamara Wilder have been practicing various primitive living skills as a major part of their lives for the past ten years. In addition to demonstrating and teaching seminars in a variety of ancient arts, they also produce a variety of objects for personal use and sale. This constant experimentation and replication gives them insights into details of traditional craft, which they then pass on to others through writings and seminars. One of their focuses is braintanning deerskins and in 1997 they published a complete how-to book entitled [Wet- Scrape Braintanned...A Practical Guide to Home Tanning and Use](#). They are also contributors to the Bulletin of Primitive Technology.

They are regular instructors at the [Rabbitstick Rendezvous](#) in Rexburg, ID and have held seminars in a variety of topics ranging from whole shoot willow basketry to painted parfleche and antler working with stone tools.

Their company is called PALEOTECHNICS : Arts & Technologies of Early Peoples through which they have a mail order catalog of recommended reading which can sometimes be hard to find.

PALEOTECHNICS

PO Box 876

Boonville, CA 95415

(707)793-2287

They also teach a variety of adult oriented seminars through an organization called MAPOM (**Miwok Archaeological Preservation Society of Marin**) which holds a spring and a fall seminar series in Old Ways Living Skills located at Kule Lohklo in Point Reyes National Seashore just north of San Francisco, CA.



Firemaking
April 10, (10am-4pm)



Cordage & Netmaking
May 16, (10am- 4pm)



Paints and Decoration
May 15, (10am- 4pm)

In the fall (probably October):

**Wet- Scrape Braitanning
Uses of The Deer**

Information about these classes and others contact:

MAPOM@AOL.COM

Mailing address:

MAPOM

2255 Las Gallinas,

San Raphael, CA 94903

Sylvia Thalman 415- 479- 3281

Don Theiler 415- 883- 4310

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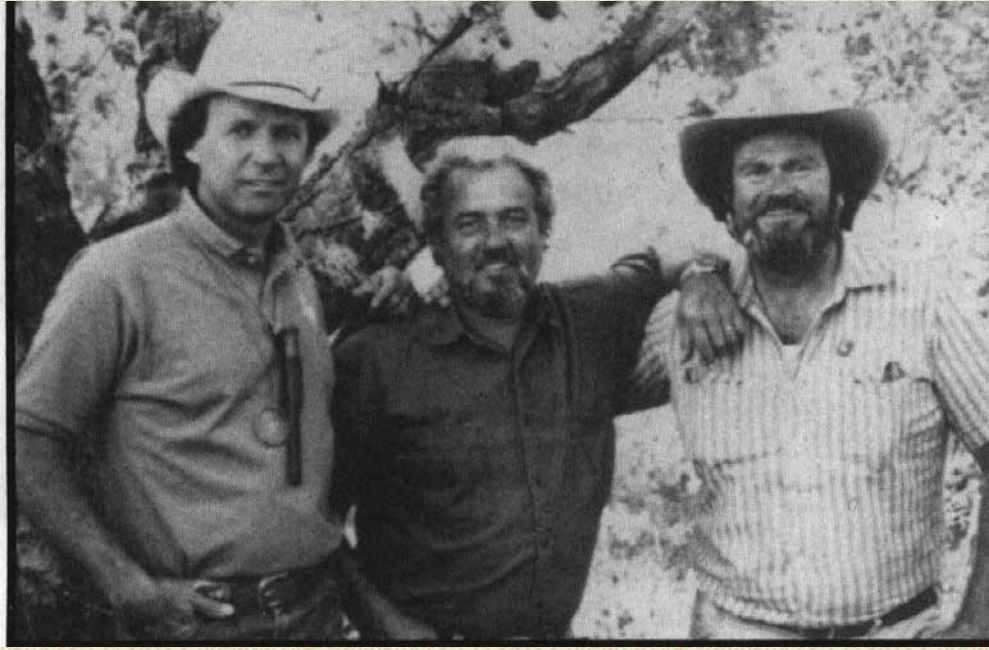
[Events](#)

What Is Rabbit Stick?

THE FIRST ANNUAL RABBIT STICK JUNE 21- 24, 1978

This is it! The cum-lauda convention of the cactus set; a "sneaky Indian" week, 'specially for under-snuck desert trekers; for blanket-pack packin' packrat eaters and biscuitroot gourmets; for all rabbit stick throwin', and atlatl flingin' troubadours of the wilds - and any other good guys or gals brave enough to chance it!

It's not exactly a rendezvous or a conference, nor is it a get-together. It is an intensive, week long, memorable experience with the stone-age. Within its' circle are the foremost names in OUTDOOR SURVIVAL, PRIMITIVE LIVING, and TOTAL SELF-SUFFICIENT LIVING OFF THE LAND. Each person attending will literally be steeped in the aroma of the occasion with a drum-beat agenda of seminars, workshops, firesides, Indian dancing, trading, contests and skill awards. It's an unforgettable experience within the circle of an ancient Paiute camp. This 4-day 'Rabbit Stick' has been created to provide those members of LDOSA (Larry Dean Olsen Survival Association), a unique opportunity to learn how to do the things that make living in the outdoors a rich and rewarding experience. Rabbit Stick is designed to convey the excitement, warmth and fellowship afforded through the primitive lifestyle of being one with nature and with others. From WOODSMOKE #3, Spring 1978.



David Wescott, Richard Jamison, and Larry Dean Olsen. Larry started the first Rabbit Stick in 1978, Dick took it over as the Woodsmoke Rendezvous in 1979 (which became the Woodsmoke Primitive Skills Conference in 1983), and with Larry's permission, Dave reintroduced the original name 10 years later, in 1988.

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The Cyber-Shelter for Primitive Living Skills



[The Society of Primitive Technology](#)

What is it and how did it come about?

[Statement of Ethics and Purpose](#)

Why do we do what we do?

[Board of Directors and Staff- 1999](#)

Who are these people?



[Printable Application Form](#)



"Trust thyself. Every heart vibrates to that iron string.
Accept the place
that devine providence has found for you; the society of
your contemporaries, the connection of events."

R.W. Emerson

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The Origin of The Society of Primitive Technology

P.O. Box 905, Rexburg, ID 83440

or call/FAX (208)359- 2400



THE SOCIETY IS FOUNDED

During the weekend of November 11-12,1989, ten leaders in the field of experiential primitive skills gathered around the fire at the Schiele Museum's Center for Southeastern Native American Studies in Gastonia, North Carolina to organize a new national organization -

The Society of Primitive Technology.

Conceived by Dr. Errett Callahan, pioneering reconstructive archaeologist and director of Piltdown Productions in Lynchburg, Virginia; the society seeks to promote the practice and teaching of aboriginal skills, foster communication between teachers and practitioners and set standards for authenticity, ethics and quality.

Memberships now include the **Bulletin of Primitive Technology** which comes out twice a year (May & November). Membership shows that you support one of the most unique movements in the field. Make checks payable in U.S. funds to the **Society of Primitive Technology (SPT)**. New members please complete the membership information on the application form (make a copy, don't cut up your Bulletin). Current members are sent a subscription renewal card automatically with your last issue. **Renew your membership immediately! Remember, a membership year is two issues of the Bulletin.**

The Society of Primitive Technology networks with others working towards the preservation of our prehistoric and world culture. This is your organization. If you are interested in what the Bulletin and Society stand for, don't just sit back, get active!

Letters, articles, questions, announcements, news, etc., should be sent "Attention Editor". Memberships should be sent to the SPT Subscription Secretary at the Rexburg, ID office. Current members, please forward address change information immediately. Lost issues due to incorrect address can only be replaced with additional charge. The Post Office does not forward magazines.

The Bulletin is a vehicle to support networking, problem solving and education in the primitive! prehistoric arts and technologies. Do you have a specialty that you want help perfecting, a discovery you want to share, or a question you wish to explore? Get those communications flying and join us.

Membership in the Society is now \$25 for US members and \$35 International/Canada.

All membership fees must be paid in U.S. funds.

New Primitive Skills Book from SPT

[Printable Membership Application](#)



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Society of Primitive Technology

P.O. Box 905, Rexburg, ID 83440

or call/FAX (208)359-2400

e-mail dwescot@aol.com and apply via MC/Visa

Name - _____ -

Address - _____ -

City - _____ State _____ Zip Code _____

Country - _____ -

Main Interest Area -

_____ -

Free NOTICE IN BULLETIN BOARD (20 WORDS OR LESS) IN ONE ISSUE PER YEAR
(CHECK WHICH ISSUE) Spring _____ Fall _____

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Ethics and Purpose Statement of The Society of Primitive Technology



ETHICS STATEMENT- The following Statement of Ethics was drafted to be our guiding statement regarding memberships, advertising, and endorsement of events and projects by the Society of Primitive Technology.

STATEMENT OF ETHICS

Through the stated goals of the Society of Primitive Technology as defined by the Society of Primitive Technology mission statement, the Society will not condone, encourage, or sanction any of the following activities as they may be attempted by any individual, group, business or organization:

1. The sale of prehistoric artifacts, and/or any intentional alteration of aboriginal items. This includes the sale of modern replicas as authentic

aboriginal artifacts.

2. The sale of any modern replica, in any medium, which does not clearly display a distinctive and permanent "maker's mark" which could be used to distinguish said item as a modern replica.

3. The sale or trade of products which, all or in part, contain remains of any endangered animal or plant species, where the maker does not possess a proper permit or license.

4. Any activity which as a primary intent or result, conflicts with the stated goals of The Society of Primitive Technology

Conflicts with the above statement will be considered by the Board of Directors, who may or may not decide to take action.

STATEMENT OF PURPOSE

The primary activity of the organization is to promote the practice and teaching of primitive technology. Promotion entails both educating and informing any and all interested parties on a wide range of primitive/aboriginal life skills (*) as well as setting standards for authenticity, ethics, and quality. Aboriginal life skills are defined here as those traditional technological skills which primitive peoples of any location, equator to arctics, East to West, and of any time period, Paleolithic to post-contact, practiced or are still practicing in order to perpetuate or to improve the quality of their lives. Generally this definition embraces pre-literate, pre-industrial lifeways, although some such traditional life skills may occasionally be found interwoven with advanced technological societies.

Because of the rapidly rising interest in primitive technology, among technologically advanced peoples, as a means of improving the quality of life on earth today, both avocatioally and vocationally, the time came for an organization to be created to help mobilize this interest and promote the above activity. Accordingly, in Nov. of 1988, a proposal for an organization to be formed me following year was distributed to national leaders in the field. In Nov. of 1989 a meeting of these leaders was held (at the Schiele Museum of Natural History in Gastonia, NC), a Board of Directors was created, and a society was formed. A statement of purpose was drafted and a means proposed for implementation of the society's goals. Since then, annual hoard meetings have been held each

November at varying locations around the country (KS in 1990, VA in 1991, TX in 1992, ID in 1993, NY in 1994, NC in 1995, CA in 1996, NC in 1998) to facilitate the creation and maintenance of the society. To date, this has included incorporating with non-profit status and the creation of two publications. The Board of Directors and its appointees are the ones responsible for implementing all of the above.

The principle purpose of the organization, therefore, is to try and help improve the quality of life of its members by providing access to the knowledge embraced by the field of primitive technology.

*** These skills include, but are not limited to the following:**

Edible and Useful Wild Plants, Adhesives and Finishes, Copper Working, Preservation of Historical and World Culture, Atlatls and projectiles, Rabbit Sticks and Boomerangs, Tracking and Trapping, Scientific Experimentation, Navigation, Birchbark and dugout Canoes, String games, Musical Instruments, Wooden Tools, Clothing and Adornments, Environmental and Bioregional Issues, Flintknapping, Primitive Archery, Hide Tanning, Fire making, Pottery, Basketry, Archaeology/Ethnography, Weaving and textiles, Cord Making, Shelter Construction, Hafting Technologies, Open Hearth Cooking, Primitive Lifestyles, Stone Axe Making, Bone, Antler/Horn, Tooth and Shell Technologies, and many others.

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SOCIETY BOARD OF DIRECTORS- 1998- 1999

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Scooter Cheatham, Vice President

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Staff

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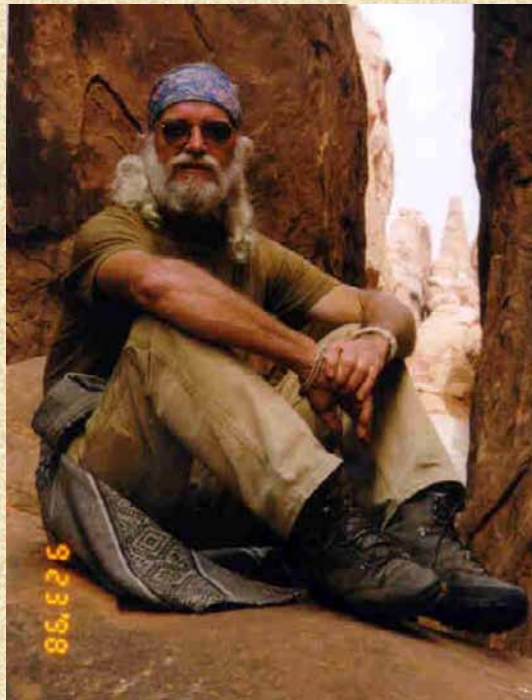
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Skills Alive!!

Mac Maness



Mac Maness is the founder of **Skills Alive!!**, an organization of Primitive Living Skills instructors, based in the mountains (Boone) of North Carolina. He offers classes and workshops in all areas of primitive living skills. When people think of "primitive living", their immediate response, is one of survival. The concept behind **Skills Alive!!** is to educate these people and re-direct their thoughts to daily living...not "survive or die".

Mac is a professional primitive living skills instructor on the instructional staff at Rivercane Rendezvous and Falling Leaves Rendezvous in Georgia, Rabbitstick in Idaho and Wintercount in Arizona. He is a member of The Society of Primitive Technology and on the Board of Trustees for the Indian Museum of the Carolinas. He teaches Primitive Living Skills classes at various annual events and festivals throughout the Southeast including the **Skills Alive!!** camp. He creates museum reproductions and has consulted with various organizations in the area of Ancient Man.

Skills Alive!! works to organize and promote instructors and demonstrators in the area of Primitive Living Skills at festivals through out the Southeast. If you are planning a festival or pow-wow and would like their help or advice (advice is free!), give us a call.

Skills Alive!!

e- mail mac@abotech.com

**103 Briarpatch Lane
Boone, NC 28607**

828- 265- 0677

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[Classes & Workshops](#)



Skills

Alive!!

103 Briarpatch
Lane
Boone, NC 28607
828-262-9629
mac@abotech.com



Offering courses and workshops in **Primitive Living Skills** since 1992. The participant learns to re-create the skills practiced all over the world thousands and thousands of years ago.

« **Hide Tanning** « **Bow Making** « **Friction Fires** « **Bone Working** «
Basketry

« **Pottery** « **Shelter** « **Flint Knapping** « **Edible Plants** « **Cordage**

LOCATION:

Most of the workshops and courses are taught in the area around Boone, NC., located on the NC/TN border. Some of the classes are located at the associate instructors camps and areas in the Western part of North Carolina or other areas which are more conducive to the particular subject. Final site location will be included with a registration packet which is mailed after registration and confirmation of class scheduling. Call or write for more information if necessary.

ACCOMMODATIONS:

SKILLS ALIVE !! SKILLS ALIVE !! workshops and classes are usually taught at our Primitive Camp location. The camp is located near motels/restaurants, etc. for those who are not comfortable with primitive living conditions. We feel that we are recreating the daily living skills of our ancestors and that is easier to do when we work and learn by experiencing the same conditions that they lived with. It is a very comfortable and enjoyable experience, but other accommodations are possible for those who prefer not to live at the camp during your course.

MEALS:

An evening meal is provided for classes longer than one day in length. You will be responsible for breakfast and a noon meal if you are so inclined. Primitive facilities are available for cooking, but a light lunch is suggested.

SKILLS ALIVE !! SKILLS ALIVE !! workshops run from 9:00 am - 5:00 pm. If additional time is required to complete projects, it will be provided within reason. The courses have the same hours scheduled, but are operated on "Abo-time" which is very flexible. We are re-creating skills that were practiced before clocks so the sun and moon are our schedulers. Each evening will include a campfire so bring any drums, rattles or musical instruments for participating.

CLASS SIZE:

All classes are small to achieve an optimum student/instructor ratio, usually 5:1. However, some workshops will exceed that ratio when the size does not deter the ability of the student to achieve the maximum learning experience. Classes which do not meet minimum enrollment may be canceled or rescheduled at the discretion of the instructor. Refunds of deposit will be made or applied to another course or scheduled class, based on your preference.

AGE REQUIREMENT:

All classes are adult oriented, except when noted, and limited to 18 years and older. Those 16 - 18 may contact us for specific admission with parent or guardian statement. If you have younger children, check about alternative courses for them, otherwise the time is best spent

concentrating on the class.

Skills Alive!! "On The Road" Programs.

Call or e-mail for information about bringing our "dog and pony" show to you. As host, you get some terrific deals!

2003 Class Schedule

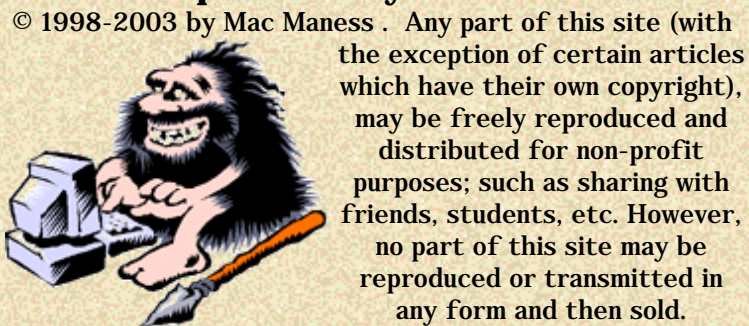
The Skills Alive!! Summer and Fall programs will be posted soon.

We are in the process of lining up classes and locations...

The following are mainly demonstrations and events we have scheduled)

Skills Alive!! "On The Road"

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The Cyber-Shelter for Primitive Living Skills

Aboriginal Living Skills School, LLC

[Cody Lundin](#)

PO Box 3064

Prescott, AZ 86302

(520) 636-8384 - New Number!

<mailto:abodude@aztec.asu.edu>

ALSS, LLC 1999 Calendar

The Essential Abo

May 22-23 \$230

Introduce yourself to living comfortably in the outdoors without relying on modern gear. A must for those who walk upright! Discover Fire- bow- drill fire making from sticks, tinder bundles and nature's fire starters; Shelter- quickie homes from leaves and limbs, where to build, why and how; Tools- simple stone knives and hand- axes, using stone tools; Cordage- creating string and rope from dogbane, yucca and deer sinew; Containers- cottonwood eating bowls and bark spoons. Take home lots of handmade gear that really works!

The Provident Primitive

June 26- 27 \$230

A complement to the 'essential Abo' providing you with greater success in creating more from less. Discover Fire- hand- drill fire making from sticks, fire as a tool and fire carriers; Dead- fall traps and snares- sticks and strings that feed you, recognizing wildlife signs; Hunting Tools- oak throwing sticks for food and fun; Containers- gourd canteens with netted bag; Edible Plants- eating your lawn and loving it. You'll never look at nature the same way again!

"This program is no ordinary wilderness experience!" Mountain Living magazine

Brain Tan Buckskin

October 23- 24 \$225

(Non- overnight)

Transform a deer or elk hide into soft, beautiful, functional leather using the ancient art of brain tanning. You'll take home enough leather to make all sorts of goodies! We provide everything but the elbow grease.

The Ultimate Abo

August 7- 15 \$830

Find out what it's like to be truly self- sufficient! Experience nine full days of life- sustaining wisdom including all the fun of the "Essential" & "Provident" adventures plus: willow pack- frames, primitive cooking and fishing methods, cat- tail sleeping mats, finger weaving pack straps and belts, pine- pitch glue,

natural crafting and much more! For the last three days, this course will have you living like a hunter-gatherer with gear you've made yourself, allowing you to live what you've learned! Two meals a day are included for the first six days; we'll hunt and gather the last three. This is not just another outdoor course; it's a new outlook on life!

"Cody Lundin teaches aboriginal living for people who want to survive in the modern world."

Phoenix New Times

Winter Wonderland

January 29- 30, 2000 \$230

Challenge yourself by adapting to nature's other season. Exposure to cold can kill within hours. Knowing what to do and how to do it quickly can be a lifesaver for those "unplanned" situations. Discover what works to keep you warm and dry. Learn about choosing your clothing for fit and function, shelters from snow and sticks, fire lighting when everything's wet, doubling your fire's heat, making water and avoiding dehydration, improvising light for the night, winter survival kit components and more. Establish wintertime as your new comfort zone!

"ALSS students learn to become independent in the wilds with gear they've made from the most basic materials."

Summit Magazine

**Staying Alive:
Wilderness Survival Skills Using Modern
Technology**

July 10- 11 \$230

(Non- overnight)

A Bee- Gee favorite. Highly recommended if you value self-reliance and confidence in your life. Discover Fire- making flame from bics to rocks, boiling water with corn chips, techno-tinder, fire safety and more; Shelter- sleeping warm and dry, space blankets and clothing choices; Water- creating water through stills, desert gear, nature's indicators, making it fit to drink; Signaling for Rescue- getting attention using mirrors, ground to air, sound and smoke, home-made signal mirrors and whistles. Learn dozens of skills that can save your life or that of someone you love!

"All ALSS courses enhance your staying power in the wilderness."

**American Survival Guide
magazine**

**Surviving In Style
October 2- 3 \$195**

Few keep a survival kit on hand; fewer still have practiced using one. Create a survival kit no bigger than a coffee tin, and then put it to the test for a night outdoors under safe supervision. You keep the kit! Discover precious possessions for desert and mountain regions, survival vs. primitive living, mini-survival kits, conserving calories, safe knife use, product comparisons, trip planning and more. Get acquainted with yourself and your survival kit.. before you might need it.

"Cody's students make fire using hand-made friction tools, catch fish with their hands, and make water carriers, cord, glue, shelter; tools, and bug repellent with materials found on-site."

ICON magazine

Abo- Art

June 12 \$85

Renew your view of nature! Transform plants & stones into beautiful gifts for your family & friends. Using mostly stone tools, create your own peyote gourd rattle, grass dolls, pipestone necklace & willow deer figurines from models dating back over 4,000 years.

"I highly recommend an excursion like this, especially for the whole family. It will give you something to ponder and talk about for a long time." Back Home magazine

**Out Go The Lights: Preparing Your
Home For Greater Self-Reliance**

May 8 \$35

(Lecture/Demonstration)

A few generations ago, having a self-reliant home was the norm. Today, with our ever-increasing dependence on technology, self-sufficiency has become a lost art. Don't become a victim of circumstances. Explore what's necessary to keep your home safer during emergencies including: water and food storage, alternate heating and cooling, cooking and lighting, sanitation and refuse, survival psychology and more.

**"Like Tony Manero, Lundin's bottom line is stay in' alive."
Esquire magazine**

"I highly recommend an excursion like this, especially for the whole family. It will give you something to ponder and talk about for a long time." Back Home magazine

Please note: While every effort is made to cover the skills outlined, nature is not predictable. Some skills may be deleted or added depending on material availability; weather conditions or any other reason. Your patience and understanding are appreciated.

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Cody Lundin

Aboriginal Living Skills School... adventure you can bet your life on!



Cody Lundin grew up with the outdoors; from the Pacific Coastline and the hills of Europe, to the plains of the Rocky Mountains and desert canyons of the Southwest. His passion for freedom led him to a life-style of resourcefulness and simplicity through the exploration of self-reliance. He teaches with rare intensity and humor to individuals, schools, colleges, universities and various organizations throughout the United States. Cody holds a B.A. in Depth Psychology and Holistic Health. He founded the Aboriginal Living Skills School, LLC (ALSS, LLC during the winter of 1991 in Prescott, Arizona.

Arizona offers you an incredible landscape with elevations ranging from 70 to nearly 13,000 feet. It is home to 10 plant communities, 3 geographic provinces and 4 deserts providing you with the ultimate in outdoor training and adventure! For those with extra time, one of the seven natural wonders of the world, the spectacular

Grand Canyon, awaits less than two hours away.

About The School (ALSS, LLC)

Our Focus

Since 1991, we have been dedicated to teaching you simple, effective skills allowing you to do more with less. Blending primitive with modern skills empower you with wisdom from both worlds. You become exceptional at improvising and adapting to change. The only constant in your future is change...not just in the wilderness but in towns and cities as well. The benefits of your new-found self-reliance expand into all areas of your life. You'll discover yourself feeling happier, safer and filled with confidence.

Our Courses

Arizona allows us to teach courses as varied as desert survival and winter camping, ensuring flexibility to meet your needs. ALSS adventures are not "Rambo-style" courses. Skills are taught with a passion for life and a responsibility to self, others and the natural world. Being locally owned and operated, our courses retain a flavor and intimacy long vanished from larger schools. At ALSS, our focus remains on getting better, not getting bigger. Although most courses are not endurance tests, it's important that you be in reasonable physical condition.

Our Instruction

ALSS teaches you hands-on skills supplemented with lecture and demonstration. Instruction is intense yet taught in a non-intimidating manner. Courses are packed full of information without sacrificing attention to detail. Typically, one day of instruction in an ALSS course is worth two days at most other schools. Time tested programs are continually updated with new and exciting skills providing you with some of the best instruction you'll find anywhere. Limited enrollment ensures you personalized learning, maximum adventure and fun!

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Hollowtop Outdoor Primitive School, LLC

Thomas & Renee Elpel
12 Quartz - PO Box 691
Pony, MT 59747-0691
406-685-3222



Hollowtop Outdoor Primitive School, LLC (HOPS) is a school of Primitive Living Skills and Contemporary Lifestyles. Humankind has had the same basic needs since the beginning of time for such things as mental and physical well-being, shelter, fire, water, and food. These were our basic needs when we lived as hunter-gatherers in the stone age, and these will continue to be our basic needs even into the future of the space age. Our needs are always the same; it is only our means of meeting those needs that changes.

The purpose of our Primitive Living Skills programs is to provide an opportunity for the individual to step back from this complex culture and get a sense of grounding and perspective. Primitive living is life on a model scale. Living with stone-age knowledge and technologies is a sort of metaphor of living that people can participate in and act out. In primitive living we go on an expedition to meet our basic needs with little more than our bare hands. In our quest we learn to observe, to think, and to reach inside ourselves for new resources for dealing with challenging and unfamiliar situations. The lessons we learn in primitive living helps us to live more resourcefully in contemporary society.

The purpose of our Contemporary Skills programs is to help people discover resourceful new ways of meeting their needs in contemporary society. Our programs are born, in part, from the necessity of meeting our own living needs, and in a larger part, from the necessity for ourselves and others to meet those needs by means which are environmentally sound.

What we have learned for ourselves and what we now teach is that living in an environmentally sensitive way pays off. Working with and through nature is the path to economic prosperity. We want to help other people to come closer to nature and find their own prosperity and abundance.

Classes at HOPS are taught by Thomas and Renee Elpel in subjects ranging from the very primitive, such as ancient tools and skills, to the contemporary, including resource-efficient construction techniques, financial planning, and goal setting. In all of our classes we seek to offer a solutions-oriented mind-set, enabling the individual to define and achieve their own goals. Tom is the author of four books:

1. Participating in Nature: Thomas J. Elpel's Field Guide to Primitive Living Skills
2. [Botany in a Day](#): Thomas J. Elpel's Herbal Field Guide to Plant Families
3. Direct Pointing to Real Wealth: Thomas J. Elpel's Field Guide to Money
4. Living Homes: Thomas J. Elpel's Field Guide to Integrated Design and Construction

For more information about Hollowtop Outdoor Primitive School, be sure to check out the web site or call or send for a free catalog:

Thomas & Renee Elpel
Hollowtop Outdoor Primitive School, LLC
12 Quartz - PO Box 691
Pony, MT 59747-0691
406-685-3222
tomelpel@hollowtop.com
<http://www.hollowtop.com>

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Mel DeWeese

Our objective is a basic and simple one: To teach modern and selected primitive survival skills that are required to maintain life. Our motto is: "Learn to Return."



Mel Deweese, "Mountain Mel," has more than 25 years of worldwide experience teaching survival skills. He is an internationally known and respected expert in nature awareness and survival techniques.

As a military Survival Evasion Resistance Escape (SERE) Instructor (RET.), he has created, developed, written, attended and taught courses from the Arctic Circle to the Canadian Wilderness, from the Philippine Jungles to the California desert. He has trained more than 100,000 students - civilians, Naval aviators and the elite SEAL teams.

Mel is always looking to improve his instruction techniques and subject matter by communicating and trading tips with other renown experts. In 1995 Mel was requested by the Swedish government to represent the United States at the First International Survival Instructor Conference in Sweden.

A year later, Mel traveled to Brisbane, Australia to visit local museums and attend the annual Aboriginal Peoples Gathering. Just last year, Mel returned to the Philippines - 20 years after he had taught at the United States Navy Jungle School - to visit his friends in the Negrito Village.



Check out the November, 1997 issue of [American Survival Guide!](#)
Mel was featured on the cover
and the interview inside is great!

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Possum Productions Presents

Doug Elliott

Naturalist...Herbalist...Storyteller

3831 Painter Gap Rd
Union Mills, NC 28167
(828) 287-2960

Email: delliott@blueridge.net

Whether he's spouting woodlore, singing about catfish, pontificating on possums, pointing out the virtues of dandelions or wailing out a jivey harmonica tune -- either on the trail or in a concert hall -- storyteller, Doug Elliott, will take you on an unforgettable, multifaceted cultural tour of North America's back country. He performs a lively collection of traditional tales, ancient legends, inspiring stories, and outrageous personal narratives. He flavors them with regional dialects, lively harmonica riffs, a sentimental song or two, and more than a few belly laughs.

Elliott is a naturalist, herbalist, storyteller and author. He has performed and done programs at festivals, museums and schools from Canada to the Caribbean. He has been a featured storyteller at the National Storytelling Festival in Jonesboro, Tennessee. He has lectured and performed at the American Museum of Natural History in New York and the Royal Ontario Museum in Toronto and led workshops for the Smithsonian Institution. He has conducted ranger training sessions for the National Park Service and guided people on wilderness experiences from down-east Maine to the Florida Everglades. He was named harmonica champion at

Fiddler's Grove Festival in Union Grove, NC. He is the author of four books about the natural world and a number of award winning recordings of stories and songs.



BASKETRY & FIBER ART WORKSHOPS

Doug Elliott's interest in useful plants has intertwined with his art training to spawn an active involvement in basketry and natural fibers. As a basketmaker, he was artist in residence at Art Park in Lewiston, NY and was featured in a special basketry issue of Fiberarts Magazine. His work has been shown in galleries, and he has taught natural basketry and fiber workshops around the country for such organizations as the Cleveland Art Museum, Augusta Heritage Arts Workshops, and the Smithsonian Institution. His articles on basketry and natural fibers have been featured in The Mother Earth News and Shuttle, Spindle and Dyepot.

Doug's basketry workshops and programs include:

Stalking the Wild Fibers. How to identify, extract and prepare textile and cordage fibers from the stems, barks, leaves and seeds of various wild and cultivated plants. Also, how to spin lustrous silk from native Cecropia Moth cocoons.

Traditional Natural Basketry - How to make various baskets from native materials. Depending on the region, this may include folded bark baskets, cattail hats and mats, egg baskets of woodsplints, vines and bark; coconut palm hats, cabbage palm stem baskets, and coil baskets of grasses or pine needles.

Contemporary Basket Design from Native Materials - How to combine traditional basketry materials, weaves, structures and forms to produce personalized, original designs.

Weaving Tales As a celebration of basketry and the textile arts, Elliott weaves together an enriching tapestry of magical stories, traditional tales, ancient legends, lively demonstrations and hilarious personal anecdotes all about the art, the process, the marketing and concepts involved in basketry and other textile arts.



CONCERTS, LECTURES AND WILDWOODS WORKSHOPS

Storytelling and education go hand-in-hand. For millennia, storytelling has been an invaluable tool for passing information, values, and wisdom from one generation to the next.

Doug's storytelling performances are peppered with educational material and his educational programs are packed with stories, anecdotes, and lore.

Here they are listed in order from the "storytellingest" to the most "lecturely". These presentations can be

tailored for young, mixed-age, and adult audiences.

Looking for America: A Twentieth Century Hero's Journey - A modern mythic adventure featuring true hitchhiking stories and freight-hopping tales from Doug's own experience, with songs by Jimmy Rogers, Hank Snow, Country Joe McDonald and others.

Stories, Songs, Jokes and Tales. In this program Elliott will take you on a multifaceted tour of America's back country. Retells a mix of traditional tales, inspiring stories, epic ballads and engaging personal narratives. He flavors it all with regional dialects, lively harmonica riffs, a sentimental song or two and more than a few belly laughs. He might take you to the coast of Maine, or wandering through the Southern Appalachians, down into Louisiana's Cajun country, and who knows where else!

Woodlore and Wildwoods Wisdom: A Storytelling Concert About Animals, Plants and People - This is a lively concert of stories, songs, tales and lore about animals, plants and people which highlights the human relationship with nature. This program is laced with natural history facts and amazing first-person narratives. It is textured with regional dialects, lively harmonica tunes and lots of good woody humor.

Fishing, Wishing, And Tales of the Deep Blue Sea: Wrestling Sea Serpents, Tickling Trout, Grabbing Catfish by the Snout! This program of stories and songs explores and celebrates fish, fisherpersons and other creatures that inhabit watery domains from tumbling mountain streams to the storm-tossed ocean. From quaking bogs to blackwater cypress swamps, from the frigid North Atlantic to the sunny Caribbean, this concert features maritime ballads, jivey harmonica tunes, true adventures, Indian legends and more than a few outrageous fish stories.

Wildwoods Wisdom: Our Mythic Connection with Nature - The natural world is our source, not only of food, clothing and shelter, but also of eternal wisdom, mythic lessons, and universal truths. We connect with this source through an intricate web of interrelationships. Many strands in this web are stories, myths, legends and lore. In this program, Elliott weaves together an animated tapestry of tales including traditional stories, Native American teachings, epic ballads, lively tunes and engaging personal narratives that explore, illuminate and celebrate a mythic relationship with the natural world.

Possunology and Groundhogabilia -An outrageous collection of poems, songs, stories, folklore, mythology, jokes and tales, as well as stranger-than-fiction fact about two of America's favorite folk animals.

The Bog as an Environment - From the peat and cranberry bogs of the North to the Okefenokee Swamp in the Deep South, bogs are specialized ecosystems. This slide talk explores bogs as the realm of some of the world's most remarkably adapted plants and animals, from the insectivorous pitcher plants and Venus fly traps to bog-prowling animals such as moose, alligators, snakes, and birds.

Jungle Adventure: Inside the Rain Forest - This slide talk is a photo journal made during a number of trips to the rain forest areas in Latin America, featuring a medicinal plant collecting expedition into the Lacandon Jungle, one of the last virgin rain forests in Mexico. Included are photos of life both up in and under the trees, from monkeys and parrots to the multitudes of strange insects and treetop orchids. There is a series of photos on pioneer settlers making a dugout canoe as well as jungle-shrouded Mayan ruins.

Plants and People - A slide presentation on wild plants with the most human interest. Plants with unusual stories, songs and lore, as well as obscure wild plant industries such as dulce (seaweed) harvesting in coastal New Brunswick, Appalachian ginseng digging, and the Spanish moss industry of the Deep South.

Creepy Crawly Critters - A slide talk on bugs, frogs, snakes and other small animals that youngsters are likely to encounter in their daily lives.

Possums, Greens, and Fresh Sardines: Traditional Foodways and Country

Cooking from Canada to the Caribbean - Illustrated with slides, poems, songs and stories including dulse (seaweed) harvest in New Brunswick, cranberry harvests in South Jersey, ramp (wild leek) festivals in the Appalachians, gatherings of the Possum Growers and Breeders Association of America in Alabama, and conch culture in the Bahamas.

Weeds for Your Needs TM - How traditional people in various parts of the country use wild plants for food, medicine, and for other purposes, and how wild plants can enrich our lives as well. This can be presented as an evening slide lecture; it can be expanded into an herbal "tea party" complete with wild snacks, or into a day- or week-long workshop.

Workshops

Woodlore and Storytelling Hike - Stories, songs, legends, lore, and scientific facts about the plants, the earth, and creatures we encounter on an excursion through a natural area.

The Weed Tromp - This is a workshop/hike into a nearby green area. It can be into the mountains, a swamp, or a vacant lot in the city. The many medicinal herbs and edible or otherwise useful wild plants will be pointed out, identified, and their uses discussed. If facilities are available, some of the plants can be brought back to sample or prepare into a meal.

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Hawk Hurst

[Silver Water Retreat](#)

Hawk Hurst, is the co-founder and director of E.A.R.T.H. Camp Programs @ Silver Water Retreat. He and his partner, Ayal Hurst, created Silver Water Retreat in 1993 as a non-profit summer camp and educational retreat center. Each summer they offer young people and abo-instructors the chance to live in a tribe-like community at their summer camp. Here campers are able to re-learn and practice the ancient skills and lifeways that our ancestors once lived daily. Each August they offer a family and adult gathering, the [Silver Water Rendezvous](#), which they co-direct with Fuz Sanderson and Herbert Dancing Horse Walters.

Hawk has been actively involved in camp counseling, outdoor living, primitive technology, and the cultural arts since 1988. Hawk's educational background includes an MS degree in Environmental Education from Lesley College and the Audubon Expedition Institute, as well as Bachelor of Science degrees in Political Science and in Psychology, from the University of Oklahoma. Regionally recognized as a Cultural Folk Artist and a Primitive Living Skills Educator, Hawk specializes in: storytelling, gourd crafting, teaching ancient living skills, Native American-style drum making, and Southeastern rivercane flute making. He plays African and Native American drums, various percussion, as well as Native American Flute. He was featured on the Grammy nominated SAPIEN album, "Gathering", with fellow Abo 's, Snowbear Taylor and Frank Chambless. He offers artist-in-residency programs to schools throughout the Southeast, offering an impressive traveling, primitive musical instrument collection. He has had the honor of teaching at two Rabbit Stick Rendezvous events, as well as attending and

teaching at the Rivercane Rendezvous and Falling Leaves Rendezvous since 1989. Hawk has had the honor to have studied with many folks he considers to be true Abo heroes and would like to honor them here: In no particular order, they are: Snowbear Taylor (Master Drummer & Ceremonial Instructor), Darry Wood (Master Woodsman & Life Instructor) Steve Watts (Master Abo-Tech Educator), Eustace Conway (Master Marketing & Program Director), Preston Roberts (Friend & Master Abo Artist), Jim Hickey (Master Drum-Maker) Frank Chambless (Master Flute Player and Sapien founder), Herbert Dancing Horse Walters (Master Dancer & Earth-Loving fun guy), Walker Calhoun (Cherokee Legend and Blowgun maker), Robert Johnson (Master Storyteller and Jungian Psychologist), Bob Slack Jr. (Rivercane Rendezvous co-Founder), and the late Bob Slack Sr. (Master Dowser).

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Silver Water Rendezvous

**5:00pm Wed, August 16th -
Noon Sun, August 20th, 2000**

[Printable Application Form](#)

E. A. R. T. H. Camp Programs at Silver Water Retreat will host this annual gathering as an adventure in living communally, as our ancestors once did, close to the wonders of the natural world. By embracing the diversity of our unique backgrounds, we will relearn how to live as members of a tribal village.

Come join us this summer as we gather, as individuals and families, in the majestic Appalachian mountains of North Carolina to practice ancient living skills, to explore primitive technologies, to learn unique arts & crafts, and to experience healing lifeways and sacred ceremonies. It will be a time to gain knowledge, have fun, and renew our spirits.



About Silver Water Retreat

E.A.R.T.H. Camp Programs at Silver Water Retreat were established by Ayal and Hawk Hurst in 1993 as a non-profit educational center and healing retreat, offering youth summer camps, adult retreats, and educational school programs.

Located amidst the splendor of the Blue Ridge Mountains, near Boone, North Carolina, the retreat lies in the middle of 217 acres of land, abundant with forests, ancient peat bogs, old growth trees, organic gardens, high mountain vistas, waterfalls, natural springs, caves, and rock strewn creeks and streams. Surrounded by several 5,000 foot mountain peaks, the power of the land here speaks for itself. Numerous hiking trails running throughout the 217 acre retreat allow the rich diversity of plant and animal life to be easily discovered, explored, and appreciated.

"Silver Water Retreat radiates all the love and attention that you have put into it. Thanks so much for sharing it with others!" Anna, program participant

What will I Experience?

While attending the Silver Water Rendezvous you will experience a variety of workshops taught by some of the most highly skilled and energetic earth skills educators and primitive technology experts from across the country. There will, as well, be several well-trained holistic healers and ceremonialists on hand to guide those interested in exploring their spiritual paths through ritual and sacred ceremony. While these experts are here to share and to teach, they are also here to learn - from you and all the other participants. Together, we will all be teachers and we will all be students.



As we live on the land together, practicing the skills that were first discovered and then honed by our earliest ancestors, we may gain a deeper understanding about the life of ancient people. As we work with stone, flaking off pieces to create a spear point, we may connect with the Earth Mother and her precious gifts. As we work with wood, make fire, share in ceremony, weave plant fibers to make a basket, visit with an elder about healing methods & ceremony, as we drum, dance and share stories around the glow of an evening fire, we will re-experience the ancient traditions that were passed down from generation to generation. We will partake in a lifestyle that is interdependent, vibrant, creative, and alive.





Applied Living Skills for Adults

The Walkabout Programs are lead and co-directed by Herbie Walters. Herbie has served at Silver Water Retreat as a vital E.A.R.T.H. Camp Program Counselor and Walkabout Guide for many years. His home is located in the Black Mountains, near Celo, NC. He loves to dance, sing, ride horses, forage for wild foods and grow organic food in his garden. He has worked as a counselor and a resident director of a home for "at risk" youth. He has served as a teaching instructor at Green River Preserve and Turtle Island Preserve. Herbie continues to serve as a conflict management consultant and trainer for the non-profit organization, "Listening and Diversity Project"- This work has enabled him to travel all over the United States and to many other countries, including Croatia, Uzbekistan, Guatemala, Libya, Russia, Palau, and Lithuania.



Arrival Information

Come prepared with food for lunches, clothing, and all necessities - it is a long, 35 minute drive back to town. Vehicle traffic in and out during the Rendezvous will cause all of us some amount of inconvenience. Arrangements will be made, upon your arrival, for you to drop off gear near your camp. Then vehicles will be parked some distance from your campsite. Your tent campsites will be primitive areas tucked into the natural beauty of Silver Water Retreat. Vehicles can get fairly near Tipi sites to unload gear.

You are welcome to arrive anytime on the first day. We will officially gather after dinner on the first night, which will be served between 5:00pm and 6:00pm, for the opening campfire, set to start around 6:30 P.M.. That dinner will be the first meal provided at the Rendezvous.

Sunday's breakfast will be the last meal provided at the Rendezvous. We will provide all breakfasts and dinners during the week,. You will need to provide all lunches and snacks - pot lucking with others is encouraged!

Both vegetarian and meatarian dishes will be available. Any special food needs (allergies, etc) should be provided and handled by you & your family. This will be a small, intimate gathering, with about 65

participants, including instructors. It is highly recommended that you reregister early. This will secure you a good camping spot and allow us to plan your meals and accommodations well in advance.

At the time of your arrival, please check in and receive your meal pass and an orientation to the land. This will offer all participants the necessary information to help keep this land and nature preserve clean, protected, and as undisturbed as possible.

Equipment needed

- * A tent or shelter that will provide a dry space for your bedding and gear during rainy/windy conditions. A limited number of tipis are available for rent - you may reserve one, in advance, for you &/or your family. See [registration form](#) for details.
- * You will need to be able to set up no impact camping. This means fires only in preestablished fire-pits, urinating well away from water sources, and defecating only in the established toilet facilities. If unsure, please ask for clarification.
- * Clothing for warm and/or cold temperatures. (i.e. Hiking boots, wool socks, jacket, rain gear, hat, bathing suit, etc.)
- * Eating utensils, food and other equipment to make your own lunches each day. (Food storage items, coolers, propane burner, pots, forks, spoons, plates, cups, etc).
- * Water containers - water hydrants are located in the camp kitchen. Please don't drink from the creeks or pond!
- * Pocketknife and other appropriate tools. (Lock blade knives are advised for youngsters and beginners).
- * Flashlights and batteries, candles.
- * Biodegradable toiletry and cleaning items.

To register, please see the [printable registration form](#) for dates and costs. Tuition covers camp site use, all instruction, the first evening meal, the morning and evening meals throughout the week and most class materials. Some instruction, such as drum making, may have an additional materials fee assessed by the instructor.

We Hope To See You at the Silver Water Rendezvous!

Silver Water Retreat
2511 Bald Fork Road / Todd, North Carolina 28684
(336) 385-1401 / Email address: silverwater@skybest.com
web page @ www.camppage.com/silverwater

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Printable Registration Form

Printed Name & Age of Each Person in Your Party Attending:

Name

_____	_____
_____	_____
_____	_____
_____	_____

Address: _____
City _____ State _____ Zip _____
Home Phone _____ Work Phone _____
Email _____

Release

By signing below, I agree that I will in no way hold anyone associated with this event, including, but not limited to: Silver Water Retreat, the Board of Directors, the property owners, instructors, or any one else, personally responsible for injury, illness, or property damage. I accept full responsibility and liability for any injury, illness, or property damage that may occur to me or to my family members while attending this event.

Signature(s):

Each person attending must sign the release. Parent/guardian must sign for minors.

With this form, please enclose a minimum 50% of the total tuition due, as a non-refundable deposit, that will ensure your space/s. Any cancellations before July 1st will receive a refund, minus a \$50.00 processing fee. Deposits are encouraged to arrive no later than July 1st, 1999. The remainder of your tuition is due by August 1st, 1999. When we receive your deposit, we will send you directions and any other pertinent or necessary information. If you would like to rent a tipi for this event, please include \$125.00, per tipi. (Most tipis will hold 4-8 people.)

Fees for Event

(Families registering three or more persons qualify for a 10% discount)

Adults	\$195.00	Children (6-12 years)	\$90.00
Youth (13-18 years)	\$145.00	Under 6 (Free)	Free

Family Rate Discounts? (give us a call.)

Make checks payable to **Silver Water Rendezvous**

Mail to:

**Silver Water Retreat
2511 Bald Fork Road
Todd, North Carolina 28684**

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Scott Jones Hofunee Programs

Long ago, before European explorers set foot in America, there existed a way of life that had developed apart from the rest of the world for over 10,000 years. What we now call the "New World" was to these native peoples an old world, the misty beginnings of which were recounted in legends full of mythical beings and magical powers. When the first European explorers entered the Southeast bringing tools and weapons of iron, dreadful diseases, and a strange new religion, this ancient way of life was forever disrupted. The civilization that unfolded here over thousands of years would all but vanish in the space of less than 300 years. Borrowed from the language of the Creek Indians, "Hofunee" is a word which means "long ago". Scott Jones, a teacher of applied primitive skills, uses this word to describe the prehistory of the Southeast. Scott's expert knowledge of prehistoric lifeways and outdoor skills provide a fascinating look into this bygone era.

1999 Wild Plants Extravaganza

A course for Spring (almost summer!) 1999

Saturday, 19 June 1999

Back by popular demand after a two-year hiatus, Scott "Primitive Man" Jones is once again offering this class. Formerly titled "Plants for Food, Utility, and Medicine," this updated version will focus on the multitude of useful plants of the area. Starting in the garden, we'll examine the relationships between some familiar plants and their kin, and, using this family-based approach to plant classification, we'll go afield to highlight specific plants and their uses, gathering a few along the way. We will also spend some time at the beaver pond for a discussion of beaver pond ecology in relationship to Piedmont ecosystems. During lunch we'll brew a few herbal teas for sampling, and cook rice in the "original" bamboo steamer...NOT "as seen on TV.!" The afternoon session will be spent learning to make traditional Appalachian poplar bark baskets using poplar bark (no surprise there), hickory bark, and white oak splints.

Registration and General Info: Course cost is \$42/person. Children under 16 must be accompanied by a supervising adult.

Preregistration is required, but no deposit necessary. Course will be held at Scott's home in Oglethorpe County, GA. Map, info sheet, and liability release will be sent upon registration. Please provide name, mailing address, phone, fax, and email address to Scott Jones, The Woods, 2550 Elberton Road, Carlton, GA 30627, ph/fax (706) 743-5144, email scottj@arches.uga.edu.

Scott Jones operates his enterprise Hofunee Programs for Prehistoric Living, an education-oriented entity dedicated to the teaching of prehistory and early technologies. Scott has taught primitive skills continuously since 1987, and is available for classes, workshops, school programs, and other events. He is a member of the board of directors of the Society of Primitive Technology, and is an affiliate of the University of Georgia Department of Anthropology.

Join the Society of Primitive Technology! Learn more about the fascinating world of ancient living skills through your membership in the SPT. Your \$25 annual membership (\$35 Int'l./Canada) includes a subscription to the twice-yearly published Bulletin of Primitive

Technology that contains not only informative how-to articles, but the popular Bulletin Board section and classified ads so you can locate teaching events, materials, others in your area interested in primitive skills, and other items of interest.

Send membership to SPT, P.O. Box 905,
Rexburg, ID. 83440.

And "Primitive Technology: A Book of Earthskills" is now in publication (David Wescott, ed., published by Gibbs Smith, Salt Lake City, UT). This compilation of the "best of" the first 10 issues of the Bulletin of Primitive Technology and much hitherto unpublished material is available for \$25 plus shipping. Save postage by getting your copy at the Spring 1999 Plants Extravaganza!

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John N. Kallas, Ph.D.

Wild Food Adventures
5036 SE Mitchell St,
Portland, OR 97206-4814
Phone: (503) 775-3828
e- mail: wildfood@teleport.com

This abotech page was adapted from the biography page of the [Wild Food Adventures](#) website

<http://www.teleport.com/~wildfood> . Check that site for information on workshops, publications, and other wild food related services.



Authority on Edible Wild Plants. Instructor, Researcher and Director of Wild Food Adventures. Publisher, Editor, and Feature Writer of the Wild Food Adventurer Newsletter.

Biography

— John has a Doctorate in nutrition, a Masters in education, and degrees in biology and zoology. He's a trained botanist, nature photographer, writer, researcher, and teacher. Dr. Kallas has researched edible wild plants since 1970 and taught in colleges, universities, and to the general public since 1978. He has taught and trained hundreds of people in wild foods from all over the country, given hundreds of wild food presentations to a variety of groups, amassed one of the largest personal wild food libraries in the country, and continues to build on his wild food/nature slide collection. Dr. Kallas started Wild Food Adventures in 1993 and the Wild Food Adventurer newsletter in April of 1996. He's its publisher and editor.

■ John was born in Dearborn Heights, Michigan. In 1970 an interest in wilderness survival began his quest to know wild foods. Fed initially

by Bradford Angier's 1956 book *How to Survive in the Woods* and shortly thereafter by Allen Hall's 1973 book, *The Wild Food Trailguide*, John seriously began studying and gathering edible wild plants. In 1974, he took his first 30 hours of study in wilderness survival, an introductory nutrition class and an independent study in edible wild plants. These academic pursuits were all in preparation for a 6 month vagabonding trip through Europe. By the end of that adventure, John was getting all of his vegetables from wild plants. Following that learning experience and encouragement from Michigan State University administrators and professors, John began teaching senior-level university classes in edible wild plants. He taught at MSU for 7 years.

While teaching and working on his Masters and Ph.D. degrees, John studied botany under Dr. John Beaman, Curator of the MSU herbarium. He also took conventional botany and taxonomy courses. Over the years, many wild food research expeditions were conducted, including ones to Washington D.C., North Carolina, West Virginia, Michigan, Indiana, Illinois, North Dakota, Montana, Idaho, Utah, Oregon, Washington State, California, British Columbia, and Alberta. The reason John pursued a Ph.D. in nutrition was to learn about nutrients, human physiology and biochemistry, cultural foodways, anthropology, food preparation, and nutritional toxicology in the context of wild foods -- to advance the field of wild foods.

John moved to Oregon in 1989 where he continues his research and teaching. Since moving to Portland, he has taught wild food classes at Portland State University, Clackamas Community College, and Wild Food Adventures. As of January, 1994, Dr. Kallas has been running Wild Food Adventures as full time occupation.

Published Articles Written by Dr. Kallas...

Feature articles published in the Wild Food Adventurer Newsletter: ■

Amaranth - Staple Food Source for Modern Foragers. 3(2): 1, 1998.

Bull Thistle. 2(4): 1, 1997.

Cattails... Easy to Harvest, Fun to Eat. 1(1): 1, 1996.

Cattail Spikes: Pollen Means Protein. 1(2): 1, 1996.

Cattails Store Food For Winter. 1(3): 1, 1996.

Chickweed - It's the Tops . 2(4): 1, 1997.

Clamming for Cockles. 3(3): 1, 1998.

Cockles in Captivity. **3(4): 1, 1998.**
Dandelions: The Good, The Bad, And the Ugly. **1(1): 1, 1996.**
Death Camas Toxicity. **3(2): 10, 1998.**
Douglas Fir Chewing Gum: A Sappy Experience. **3(2): 11, 1998.**
Edible Blue Camas: History and Identification. **3(1): 1, 1998.**
Edible Blue Camas: Preparation Old and New. **3(2): 1, 1998.**
Edible Wild Plants Defined... This May Save Your Life. **1(2): 3, 1996.**
Euell Gibbons - The Father of Modern Wild Foods. **3(4): 1, 1998.**
Fiddleheads from Lady Fern. **2(1): 1, 1997**
Field Death Camas: History and Identification. **3(1): 1, 1998.**
Modern Gathering Etiquette: Don't be a Wild Food Marauder. **1(2): 3, 1996.**
Oregon Grape: Not for the Faint of Taste. **2(2): 1, 1997.**
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Christopher Maness, Braintanner

Chris is a wonderful resource for brain tanning information. During the past two years, Chris has established his reputation as a brain tanning instructor by teaching courses at Rabbit Stick, Falling Leaves, Rivercane Rendevous, and Silver Water Retreat. He is an affiliate instructor with Skills Alive!! (a network of skills instructors and demonstrators). Chris recently demonstrated braintanning techniques at the 1999 Southeastern Heritage Festival as part of the grand opening of the Funk Heritage Center at Reinhardt College in Waleska, GA. Chris has demonstrated at the Indian Museum in Laurinburg, N. C. and various festivals around the Southeast.

Chris decided to take a break from undergraduate school (Warren Wilson

College/NC) and pursue his education through travel in the United States and Belize. In Belize, his travels allowed him to study and practice primitive living skills among native cultures, including drum making and jungle survival. During the summer of 1999, he held the position of caretaker over a sled dog team kennel in rural Idaho.

Chris' 2000 schedule (tentative):

April 28-30, 2000 Riverfest 2000, Columbus, Ga.

May 2-7, 2000 Rivercane Rendevous, Unicoi St. Park, Helen Ga.

September 2000 Rabbit Stick, Idaho

October 17-22, 2000 Falling Leaves, Unicoi St. Park, Helen Ga.

If you need a braintanning demonstration, buckskin/hides, buckskin crafts, tee pee poles, or repair of a vintage VW, don't hesitate to contact Chris Maness (voice mail #: 888-714-7759; E-mail: deerleg@hotmail.com).

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Skills Alive!!

Michael Maness

Brain Tanner and Skills Instructor



Mike has established his reputation as a brain tanning instructor by teaching courses at Rabbit Stick (Idaho), Winter Count (Arizona), Falling Leaves and Rivercane Rendevous (Georgia), and Silver Water Retreat (North Carolina). Mike is an affiliate instructor with Skills Alive!! (a network of skills instructors and demonstrators). Mike has demonstrated aboriginal skills at the Carolina's Indian Museum in Laurinburg, N. C. and various festivals around the Southeast, including hammock-making techniques from Belize at RiverFest 2000 in Columbus, Georgia. During the summer of 2000, Mike taught children's aboriginal skills programs for the Asheville Recreation Department.

As a teen, Mike's scouting involvement lead to an interest in Native American cultures and pow wow dancing. He learned to build regalia and tan hides. While becoming an Eagle Scout, Mike focused his Native American interest on the Order of the Arrow and received his Vigil Honor in the organization. Fueled by a lifetime interest in primitive arts, Michael and his brother, Christopher, have studied primitive technology with indigenous people in the states and in Belize. Mike received extensive instruction in field skills and living skills at the Boulder Outdoor Survival School (BOSS) and is certified as a Wilderness First Responder.

Since the fall of 1997, Mike and Chris have been in the process of developing ROOTS, a primitive living school. Mike and Chris are now pleased to bring their combined knowledge in a variety of aboriginal skills to the Asheville area of Western North Carolina. A series of workshops are planned.

Contact Mike for more information

e- mail: braintan@hotmail.com

voice mail: 888- 762- 0520

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George Michard

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awally@cyberhighway.net

Trapper and Tanner

Started trapping and practicing winter survival in 1961. In 1965 I became a professional trapper, and winter survivalist. Spent 2 winters in the Colorado High country living in a tipi 7 miles from the top of the continental divide at an altitude of 8.600 feet. During this time I lived off the land by hunting, fishing and trapping. After this I spent the next 10 years as a caretaker of a hunting lodge in the same area, trapping, hunting, fishing and driving dogs. We were snowed in from mid November to late May. It was 12 miles by snowshoe or dogsled to the nearest plowed road and neighbor. So I guess I have about 38 years experience at winter survival, trapping and snaring.

Started fur brain tanning in 1978. Like everything else I am mostly self taught. So I guess I have about 21 years experience in this field. How time flies when you are having fun.

I will offer a one on one class, but no more then 2 students at one time. Get in touch with me as the schedule changes according to the season and weather conditions.

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Tony Nester

Ancient Pathways offers one to five day courses on primitive & modern wilderness skills.

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Atlatl Bob Perkins

William Robert Perkins (1956-Present)

"Atlatl" Bob Perkins was born on May 3, 1956 in Astoria, Oregon. The son of a Coast Guard commander, Bob spent his youth in various parts of the United States. At the age of six, Bob proclaimed to his mother that he desired to be an orchestra conductor. However, an incident occurred leaving the family piano a smoldering heap of ashes in the corner of the living room, causing an outright ban on musical instruments in the Perkin's household. Bob claimed no involvement.

With music no longer a viable option, Bob turned to his local library as a source of succor during trying times. He slowly became obsessed with the works of Nathaniel Hawthorne and began to roam the streets of Pensacola, Florida garbed as his favorite Hawthorne character, Young Goodman Brown. After suggesting that his high school do a musical production of the classic tale of temptation in the face of piety, Bob was cast in the lead role. Tragically, following a tumultuous response on opening night, the school auditorium was reduced to cinders in a four-alarm fire. Bob claimed no involvement.

With intensive study in mathematics, Bob Perkins graduated high school in three years and quickly enlisted in the Marine Corps. Although puzzled by his first assignment, teaching recruits impressionist art, he worked diligently with the troops until their work with greens and blues

was on par with the masters. His career was progressing brilliantly when, suddenly, an ugly incident involving the trade of rifles for party favors was uncovered by a local reporter. Unfairly, Bob was implicated and transferred to a different a unit. He completed his tour of duty in 1979.

With almost no job opportunities available due to a stagnant economy, Bob decided to enroll at Montana State University. His love of math and science brought him to the College of Engineering. On a whim, he registered for an anthropology course, and his life was changed. Here, in the humble classrooms, of a small, western university, Bob was introduced to the atlatl, also known as a spear thrower. After studying its structure and enigmatic components, Bob quickly began his research of the ancient weapon system. Not settling for the traditional explanation of the rock affixed to the back of the atlatl, which was at that time assumed to be ceremonial, Bob used the weapons of the Engineer, math and physics to discern the rock's purpose. Bob Perkins discovered that the attached stone made the atlatl flex. Combine this with a "spear" that flexes also, and the projectile can travel over a hundred yards. This discovery was unprecedented; the atlatl was not designed to throw a rigid spear, but a flexible dart!

After his discovery, Bob put his new atlatl into use at various competitions across the nation. Although at first people questioned Bob's theory, the results were too overwhelming to ignore. This was the way the atlatl worked, and soon the flexible dart was in wide use amongst sportsmen and archeology enthusiasts. Bob went on to study at the Smithsonian Institute and the Field Museum in Chicago, Illinois. In recent years, he has completed research for The Museum of the Rockies in Bozeman, Montana and become a traveling lecturer on the atlatl. He replicates and sells atatl and dart systems and supports [World Atlatl Magazine](#). (He doesn't even mind if a lowly staff writer has fun with his biography.) Bob Perkins dynamic personality and legendary charm have made him an almost mythical figure in the world of primitive technology. Bob Perkins, described by ladies around the world as a Cassanova for the nineties and a spokesman for pre-history. As Bob would say, he's at the top of the food chain.

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The Fire Plow © 1997

Text and Illustrations by Bart & Robin Blankenship

The Fire Plow was adapted from their book, [Earth Knack: Stone Age Skills for the 21st Century](#), and published in the Bulletin of Primitive Technology, Issue #13, Spring 1997.

There is magic in creating fire. Imagine taking your energy and focusing it enough to make something burn! The results of this effort are inspiring; the warmth of the fire, renewed feelings of capableness, and pure delight. By performing a task that your ancestors did daily, the simple movements, the honest effort, you also earn passage into that "deja vu" of a million years, that-connection in genetic memory to ages past. Creating fire is a powerful experience.

This journey of rediscovering fire, through which we have watched over a thousand people go, and have experienced ourselves, is more than enough reason to write an article on fire making, and to encourage you to go through the effort required to make your first fire. Fire may seem obsolete in our modern, urban lifestyles. After all, we have the thermostat, the oven, the electric blanket, the dishwasher, the hot water tank and the Bic. But don't fool yourself. No matter how we change the packaging, from electricity to propane, from coal to the Porsche pancake engine, from a diesel generator to nuclear fusion, we are still a fire based culture. There is that spark behind most everything we do.

There are many great projects and ideas in this Bulletin to enrich your modern lifestyle and broaden your possibilities on many fronts. There may be some ideas that change your life. But none of these projects are quite as ground shaking as creating fire! So pocket that Bic and give it a try. If nothing else-it's a tremendous ice breaker at your next party or a real show stopper when you go to light the Saturday barbecue.

This article focuses on the fire plow method, but whatever way you choose to make your Friction fire, you will need tinder and kindling. The coal you make with your fire set needs to be put into a tinder nest and blown into a flame. So gather your tinder and kindling first.



Here's how to make the tinder nest:

You can use dry grass, fuzzed up bark like juniper, sage, and cliff rose, inner bark of aspen and cottonwood, or in a pinch, tiny wood shavings. Generally, you want to fuzz up the tinder so it will ignite easily. You want it to be soft and pliable. When you fuzz up the tinder, little bits will fall down from your hands as fine dust. You will need to save this dust so work over a bandanna or something similar.

The best way we have found to work the tinder is to grab a length of it in both hands and move your fists round and round like pedaling a bike. This will soften the tinder that is between your hands. Move up and down the full length of your tinder. Then take some of this prepared tinder and tie a loose over hand knot in it. The diameter of this should be about four inches. Then stuff some tinder in this knot. It should look like a bird nest. The original knot of prepared tinder will hold the nest together. Keep stuffing the nest until it is dense. You don't want the coal to fall through the fibers and out of the nest, or have so little to burn it fizzles out before the flame begins.

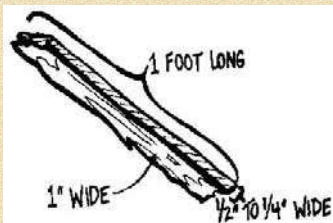
Collect the dust that has fallen into your bandanna and place it in the center of the nest. It will help if you first make a small hollow or depression in the center of the nest to contain the dust. As you pick up the dust you will notice that the finest particles fall back down onto the bandanna. This is what you want because you'll be packing finer and finer dust into the depression until the finest dust will be on the top, just where you'll place the eventual coal. Now make a small indentation in this dust for the coal and set the nest in a safe place where the wind won't blow it and you won't knock it around while making your coal.



One more thing before you start: check your kindling pile and make sure you have enough wood to get your fire established once you put your coal in the tinder nest and blow it to a flame. That tinder nest won't burn forever, you know. And in the aftermath of effort and the euphoria and exhilaration that comes once that tinder nest starts blazing, it's hard to make yourself jump up and dash around looking for scattered kindling. So do it now, before you start making your coal.

The Fire Plow

It doesn't get any more basic than this, unless you are chasing lightning around! Three hundred pound Polynesians have contests doing the fire plow method, but you don't have to be a Sumo wrestler to do this. However it does take intense effort. The first time we ever got this simple fire starting method to work, we had twenty 3rd graders and six adults to provide the muscle. Since then we have refined our techniques so that we can get it with two or three of us in damp weather, and solo, in under seven seconds if conditions are bone dry. It is the most primitive of methods, literally rubbing two sticks together. The beauty of it is that you don't need any tools to carve the wood. If you can break off a branch or a large splinter of wood and rub it against a log, you can be sitting around a warm fire while others are still whittling their more advanced fire sets.



Our favorite woods for this method are cottonwood and sotol. (a type of big yucca). Both of these woods work well as plows, (the stick you hold and push) and bases, (the log you rub the plow on). Just remember the density of these woods varies greatly and it is best to have the base wood be harder than the plow so the groove doesn't get too deep.

To make the plow, take a stick that is a foot long and comes to a point. Make the first inch of the stick between half and a quarter of an inch wide. Some sticks will already be this shape, otherwise you can get the point like this with a knife or by rubbing it against an abrasive rock. The narrower the tip the more concentrated the heat, but the deeper it will dig into the log or base. And the deeper the plow digs into the base, the harder it will be to quickly push back and forth to get a coal.

The plow is used to make a groove in the base log of the fire plow set. The base can also be a stick, so long as it is at least two inches wide. Start off with the plow stick at right angles with the base. Push back and forth to indent the groove. If the base is a stick and not a log, you may have to flatten the base or indent this groove with a knife to keep the plow from slipping out. If it is a big log, just start plowing slowly. Have one hand an inch from the tip of the plow and the other with the palm over the butt end. Work the plow back and forth making a groove in the base six inches long. Once you have this groove made you are ready to lower the butt end of the plow and get to work. You need to lower the end of the plow so that the contact area between the plow and the base is greater. This dries out the woods and builds up heat without gouging too deeply into the base. Once the wood is really smoking and black dust is forming, raise the butt end of the plow to focus the heat on the tip. Go back and forth touching the accumulating dust at the far end of the groove every other time or so without obliterating this dust pile. Getting this subtle touch and retreat technique takes practice. Keep at it! You'll get the rhythm.

As you work the plow back and forth, sometimes a lip will form in the groove just before the place where the dust pile is accumulating. Each time you hit this lip you can be extinguishing a potential coal with the plow. Hitting the lip also hinders your momentum and decreases dust accumulation. If a lip forms in the groove, either move the stroke of the plow forward a little to break through this lip or move the stroke back so you don't touch it at all.

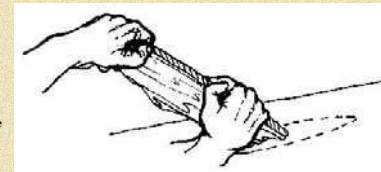
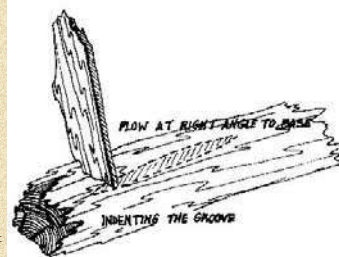
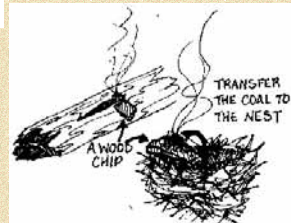
Speed and pressure are both important. If you find the accumulating dust is big and flaky, or if the plow is really deepening the groove too quickly, use more speed and less pressure, or drop the butt end of the plow down to increase the contact area between the plow tip and the groove. This will fire harden the groove some so that it will wear more slowly, and get sufficiently hot without wearing too deeply. On the other hand, if you don't apply enough downward pressure, a shiny black glaze will form, impeding friction. Your plow will slide easily in the base groove without making smoke. Stop and clean the glaze off of the plow stick and out of the base groove with a rough rock or put sand in the groove and plow through the glaze.

You will find that as you plow and work at touching and retreating from the forming dust pile, the groove will shorten up and you will be primarily using the half of the groove closest to you. If you allow the groove to get too short you will be spending all your time plowing tiny strokes back and forth and you will not be able to get enough speed. Keep the groove at least three inches long even if you have to extend the groove toward you as you plow. The Fire Plow method is a sprint. If you start to slow down then switch and let someone else go at it. When you stop plowing and get ready to switch, always keep the tip of the plow buried in the dust so you don't lose heat.

If the groove gets so deep that it is hard to move the plow, you may shift your pressure forty-five degrees out to the side of the groove. This widens the groove instead of continuing to make it deeper. You can still get a coal this way without having to start a new groove.

Once you get a coal with your fire plow set, you'll transfer it to your tinder bundle and blow it to a flame. Do this carefully enough to keep the coal intact. Fold the nest around the coal to keep the coal from falling out and lift the tinder to mouth level, inverting the nest somewhat. This inversion allows the heat from the coal to rise into the dense mass of the tinder nest.

Blow gently on the coal, allowing it to consume the dust. As you blow, keep pinching the nest around the coal just enough to keep the coal in the nest while you tip the nest over and blow up into it. Don't pinch so hard that you put out the coal! As you're blowing, if sparks are flying all over, pinch the nest to surround and contain the burning tinder. If you don't close up the nest at this point the burning tinder may fall out of the nest.



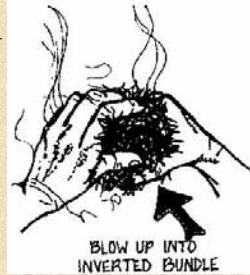
Fire Plow

Once the smoke increases, blow with more force. Turn your back to the wind so the wind will blow into the nest and keep the smoke out of your face. Keep blowing until the bundle bursts into flames. Sometimes, if the tinder is damp, it may have to dry out before it can flame. So hold off blowing a minute to let the tinder dry out and then resume blowing. If the nest is too small or not dense enough and falling apart, you may need to add more dry material around the smoldering nest.

If your fingers get too hot, grab the nest between two sticks. Holding a hot tinder nest in your fingers will make your fingers yellow and you'll look like a chain smoker. Be sides, it hurts! The sticks or a tough piece of folded bark with the nest jammed into the fold are both good solutions. The burning tinder soon becomes a roaring fire. That is if you collected that kindling!

The fire plow lets you get your weight right over the area you are working and uses large muscle groups that were made for power. Its drawback is that the heat is dispersed along a groove and it usually takes power to get a fire. Still, this is a time tested method as well as a great work out. So rub sticks together in this fire plow method and enjoy the process of recreating a body that the human race has not known since Neanderthal!

Bart & Robin Blankenship teach their [Earth Knack classes](#) in Crestone, Colorado.



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Sugar and Salt

by Paul Campbell, copyright 1998

Reprinted from the SPT Bulletin of Primitive Technology, Fall, 1998

They did not possess the commercial honeybee and they could not buy oversalted supermarket foods, but aboriginal California Indians knew the delights of sweet and salty. Flavoring substances were there for the taking in the natural world.

Honeydew Cane

Having left the Colorado River and Mohave Indians who provisioned them with corn and beans, Jedediah S. Smith and his party made their way across the desert toward Mission San Gabriel in November of 1826. During a hard week's travel, men accustomed to meat quickly exhausted the vegetables they had been given. When they reached the area known today as Afton Canyon, one of the Indian guides told Smith he knew where his people had cached some other food. The De Anza Expedition had traveled along the Mojave River in 1776 and Francisco Garces had described the Vanyume Indians (related to the Serrano) living along the river not far from Afton Canyon. Two of Smith's guides were Vanyume, along with a Mohave; likely it was a Vanyume who went off in the day and returned that night with a strange substance formed into bread-like loaves weighing eight or ten pounds each, "so hard that an ax was required to break it" wrote Smith, but in taste resembling "Sugar Candy." On inquiry, he found that the strange sugary food came from cane grass which grew along the river, the same cane grass from which the Mohave

Indians made arrows.

Lieutenant Robert S. Williamson reported cane growing in Afton Canyon in his surveying work for the railroad during November of 1853. He wrote that large quantities of it had been cut by the Indians and that it was like the cane found in Walker's Pass of the Southern Sierras. The Indians collected it during August for the sugar-take substance on the leaves, an important food for the indigenous people. The cane was cut, spread in the sun to dry and threshed to separate the sugar from the leaf, he wrote.

Other early authors noted this sweet among the Tubatulabal, Chemehuevi, Surprise Valley Paiute, Yavapai and Papago, who obtained it also from willow; the Owens Valley Paiute, in addition to reed, harvested it from juncus rush. Many insects remained in the sugar which the Paiute made into balls and later warmed and softened by the fire to eat like candy. Sometimes after winnowing, the loose sugar was stored in shallow tule baskets thought to preserve the sugar but not change its taste or color. Using their hands, the Panamint Shoshoni molded honeydew into balls. These were later set near a fire to roast brown and swell like taffy before they were eaten. The Northern Paiute gathered honeydew from tule (*Scirpus*); they made it into fist-sized balls, which, according to one observer, contained more insects than honey.

What exactly is "honeydew"? Mark Sutton explained that honeydew comes from insects. It is the crystallized excretion of insects of the Homoptera order. Various plants are colonized and the dew is left on them. The mealy plum aphid prefers reeds (*Phragmites*) as the summer host, but will also deposit the sweet on the stems and leaves of cattails (*Typha*).

Erminie Voegelin described the harvest process in detail among the Tubatulabal of the Walker Pass region. She conducted ethnographic work there in the early 1930s, almost one hundred years after its mention by Lieutenant Williamson. The sweet was produced on the leaves and stalks of cane (*Phragmites communis*) by aphids in summer. The Tubatulabal cut the cane in July or August, spread them to dry in the sun, then heaped them on a bear skin which was thick enough to take the vigorous blows of the hardwood stick beaters used for flaying the dried cane. The saccharine crystals, which fell and clung to the bearskin, were scraped off, winnowed on a flat tray and collected in a small cooking basket. Cold water was added and the mixture made into a stiff dough. They removed the mass from the basket by hand,

spread it on a twined tule tray and folded the end of the tray over the dough. After putting this aside to dry for six or seven days, the food was ready.

Lumps broken off the hard brown loaf with a rock were eaten dry accompanied by chia gruel. Sometimes sections of the freshly cut cane were simply sucked untreated for the sweetness, according to Steban Miranda (a Tubatulabal Indian in his late eighties when Voegelin gathered her information). Tragically, cane (*Phragmites communis*), called carrizo by the Spaniards and an extremely useful plant for the Indian (besides honeydew; arrows, darts, fibers, thatching, balsas, cigarettes, flutes and who knows how many other useful items were made from it) has almost disappeared from California. I found healthy forests of carrizo cane on a small tributary of the sometimes flowing Amargoza River, on moist areas near the shore of dry Soda Lake, in parts of the Sacramento Delta, around the Pyramid Lake reservoir and in canyons of the Anza Borrego desert. But in Afton Canyon where Williamson found it harvested nearly 150 years ago I could not find a trace. Bob Powers, rancher and Kern County historian, believes that carrizo grass which was once common in Kern County, especially along Canebrake Creek near Walker's Pass, has been nearly exterminated by overgrazing. Given the inaccessible corners where one still finds carrizo in California, I am sure he is right. Powers knows of only one stand-near Woofer Heights.

Rock Salt and Salt Grass

The Tubatulabal made salt during the summer in much the same way they made sugar. Saline crystals formed on salt grass (*Distichlis spicata*) during dry hot weather in saline areas found on valley floors or at the base of the foothills. If it rained, Steban Miranda told Erminie Voegelin, they would have to wait for a month for the crystals to form again. But when they found the crystals, the grass was cut, laid on mats to dry in the sun and beaten on a bearskin as with the cane for sugar. Unlike the sugar, however, the collected salt crystals were formed into balls or flat cakes instead of being spread as a loaf on a tule tray.

The Tubatulabal did not use salt from salt grass to season meat or mushes; rather, chunks were broken from a ball (equal to two or three tablespoons), dissolved in a cup of water and drunk for refreshment or taken as a laxative and to rinse the stomach. A quicker manner of using fresh salt grass was to soak it in water and sprinkle the water over raw chopped clover. Or a few sprigs of

salt grass and clover were simply rolled between the hands and eaten. Children took a willow switch and ran it through salt grass on a summer morning and when enough crystals had adhered to the stick, repaired to the shade to lick them off.

Rock salt was gathered from a dry salt lake in Coso territory on the northern edge of the Mojave desert. For a man with a basketry water bottle it was a day's round trip. They brought back large lumps in deerskin sacks. Pounded on a mortar or pulverized on a slab, they sprinkled the salt sparingly on cooked meat or used it for drying meat and fish but not to season any plant food such as acorn or pinon mush. Many California tribes obtained rock salt in trade and because it was valued, they used it sparingly.

The Chukchansi Yokuts of the Northern Foothills in the Western Sierra Nevada gave baskets and shell money for salt crystals (they were about 1/2 to 3/4 of an inch in diameter) which the Mono Lake Paiute had carried to them in burden baskets from the eastern side of the mountain. The Yokuts ground the rock salt to various degrees of fineness, recorded Anne H. Gayton, and ate it with meat, nuts or seeds. For use with acorns, the salt was covered with hot ashes, then pounded in a mortar hole, mixed with a grass from the edge of the river, and everything mashed into six inch diameter balls (with a little water, if necessary, to make it stick). Finally, three to five of these, wrapped in a thick covering of grass, were baked in a hole with very hot ashes overnight. In the morning, the balls were dug out, the grass having burned away, and whisked hard with a soaproot brush. The dark balls were struck and broken into pieces.

Salt grass was pounded in a mortar and winnowed by the Chukchansi Yokuts; they dampened the crystals and pressed them into balls, broken when needed for clover or sour berries.

The Southern Valley Yokuts, in a manner similar to that of the Tubatulabal extracted much salt from species of salt grass. The leaves seemed to exude salt as tiny globules which on a warm day dried and hardened by mid-afternoon. F.F. Latta described the late July or early August harvest: the process was precise and timing everything. Grass was first broken off close to the ground and laid in shallow wicker baskets. Next, it was stacked carefully, stems on the ground and leaves upward, and exposed to the sun so the salt would dry faster than the grass which had to remain tough for the threshing. Otherwise, the leaves would become brittle and pulverized during the threshing, thus mixing with the salt. On the other hand, if threshing were begun too early, the

salt would stick to the grass. By two o'clock the salt was dry and easily dislodged and the threshing began. Under the light flailing of peeled willow poles, wielded by three to four Indians sitting around a deer or elk skin on which a small amount of grass had been placed, the salt broke free. They took the grass in their hands and shook it thoroughly over the hide before discarding it. Bunch after bunch of grass was threshed this way until a layer of salt about an inch thick had accumulated on the hide. The salt was then poured into a basket and more grass threshed. Back at the rancheria, they sifted and winnowed the salt. Many large sacks could be obtained by a single family. It was not used directly for cooking but a pinch might be placed in the mouth or under the tongue while eating or anytime. Lumps, formed by wetting and drying it, were licked by the children. Latta described the flavor as sour and salty like dill pickles.

Gayton characterized the taste of a "red" salt obtained from marsh grass by the Yokuts living in the Central Foothills as mild vinegar. Molly Lawrence, a 70 year old Wukchumni Yokuts, still possessed some of the prized, grayish pink substance, which had the texture of course sugar, in 1925. Years before, she had seen her Gawia Yokuts stepmother make it. Grass was dug up and put on the coals of a fire at sundown. Lawrence, who was a little girl at the time, was not allowed to look closely at the fire. After the grass burned to ashes, her stepmother rested for a while. Then, all the next day she gathered grass and continued the process; she ate nothing until sundown of that day, and very little when she did finally eat, and did not drink, believing if she ate much or drank, the undertaking would fail and she would find nothing in the fire when she finished. At last, the ashes were brushed aside and in the bottom of the fire could be seen lumps of salt. She shook and cleaned them in an open-twined basket.

On the rocky coasts of the Northwest of California edible seaweed (*Porphyra perforate*) was gathered, dried and eaten as a food, but it was also used for salt. Not dissolvable in the manner of seasoning, flakes of dried leaves were eaten between or with spoonfuls of acorn mush. Dried surf fish presented on a small openwork tray laid across the top of an individual serving basket of mush had a similar purpose.

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The Chumash Sling

by Paul Campbell, copyright 1996

Reprinted from the SPT Bulletin of Primitive Technology, Fall, 1996

It has been questioned whether Californians possessed the sling before European contact. Stephen Powers, however, reported it among the remote Mountain Winton during his travels in the early 1870s and wrote that miners before that knew its sting from these Indians. It was reputed more deadly than an arrow and its missile said to have gone farther. The Western Mono mountaineers employed the sling for war. Among the Yokuts, boys hurled the sling as well.

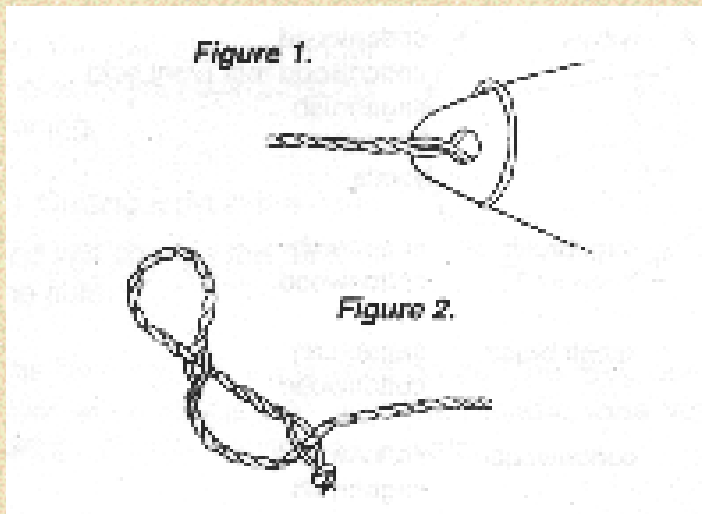
Gerardo Aldama and his son Gerardo, Kumeyaay of La Huerta in the Sierra Juarez of Northern Lower California recently told me they have made and used the sling which they always considered Indian, not Spanish. They twirled it against small game and birds. They felt it had more stopping power than an arrow. An arrow often only wounds or passes through a bird while a stone from a sling stuns or kills it. Of the Indians of Lower California in general the explorer Jose' Longinos Martinez wrote in 1792, they are very expert with the arrow, a curved club for rabbits and the sling.

The Pomo made a sling for hunting or war. E.M. Loeb described the technology: A strip of deerhide about 4- 1/2 inches long and between 2 and 2- 1/2 inches wide formed the pocket. At either end, they attached sinew or nettle fiber strings, approximately 2- 1/2 feet long each. A knot was tied at the

far end of one string and the end of the other had a loop for the middle finger. A ball or stone was placed in the pocket and the pocket then folded over it. With the middle finger inserted in the loop, the thumb and forefinger of the same hand grasped the knot at the end of the other string and the hunter or warrior twirled the sling twice around his head and released the knot. Thus was the missile hurled.

Sling throwers stood a little to the rear of the front battle line. Boys brought them stones in baskets. For geese, hunters hurled a round stone 1-1/2 to 2 inches in diameter. But for ducks or mud hens balls of clay 1-1/2 to 1-3/4 inches in diameter were used. The clay or adobe had been rolled in the hands while moist, then dried over a fire or in the sun. Clay balls were preferred to stones for ducks or mud hens because their lighter weight allowed them to skip along the water, sometimes taking more than one mud hen at a shot. Fernando Librado Kitsepawit, John Peabody Harrington's famous Chumash informant, gave important detail on the manufacture of the sling. The center strap or pocket to hold the stone he cut from elkskin: **he trimmed the corners and made it broad in the center and narrow at the ends- he doubled it transversely and trimmed the entire edge- then made a hole in each end for the string.** (He also spoke of a strap with a 3-inch slit in the center to grasp the stone though he had never seen one of these.)

He made two tok (Indian hemp) stings, about 33 inches long each. He opened or untwisted one closed end of a string enough to insert an end of the elkskin strap. This done, the other end of the string he inserted and pulled through the hole in the end of the strap, firmly fixing it to the strap. It weaves or ties itself said Librado (see Fig. 1). He did the same with the other string on the other side.



He also made the finger loop "without tying." About 3 inches from the end or tip, he untwisted a small opening in the string. He put the end of the string through the opening. He then untwisted the string just below the tip and inserted the other end of the string all the way

through this second opening (see Fig. 2). He pulled snug the finger loop that this procedure created.

As an alternative and to the same effect, instead of the other end of the string, the loop itself was inserted through the opening just below the tip after the tip had passed through the first opening around 3 inches beneath it.

A knot was tied in the end of the other string, even with the loop of the first string. Some string beyond the knot was left dangling. A completed sling measured about 3 feet long. You swung the sling three times around, then let go of the knot and the stone would fly said Librado Kitsepawit.

There were other Chumash ways and sometimes well worked bark of the "curly" willow was made into a sling pocket. Indian hemp string also could be woven into a pocket. There were undoubtedly many Indian ways of making the sling.

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Missouri's Mississippian Legacy

by Judith Deel

from **Preservation Issues** 6(4):1, 4[July/August 1996]

The Mississippian culture flourished along the Mississippi River and its tributaries from approximately A.D. 800 to A.D. 1700, overlapping the protohistoric period of the beginnings of European explorations and settlement. The culture was distinguished by a chiefdom level of social organization and a ranked society with a complex religion; a range of settlements from large walled towns and centers with civic-ceremonial mounds, to hamlets, farmsteads and small, special-purpose camps; far-flung trade and exchange networks; and a subsistence base that relied largely on agriculture.

The earliest evidence of Mississippian Culture, as it is called by archaeologists, dates from roughly A.D. 800 to A.D. 1000. During this phase, referred to as the Emergent Mississippian period, evidence appears of long-range trade in exotic goods passed from culture to culture in a

widespread economic network. Village sites associated with saline springs suggest that salt had become an important exchange commodity, possibly due to changes in subsistence and diet. Indications are that agriculture was becoming an increasingly important aspect of life, with maize becoming common for the first time, and with tools being produced for intensive cultivation. Ceramics exhibited a change in manufacturing techniques, which may have resulted from contact with other cultures.

The Mississippian period, dating from A.D. 1000 to A.D. 1700, is differentiated largely by ceramics and architectural differences. Changes in lifestyle continued as society became more highly complex. The smallest units--isolated farmsteads and small hamlets--were generally located near river bottoms, convenient to the agricultural fields where crops were tended. Several new varieties of maize were raised as well as squash. Plants that had been staples of the earlier horticulturalists continued to be raised and included knotweed, sunflower, goosefoot, and maygrass. Although intensively agricultural, the people continued to harvest wild seeds, fruits, and nuts to supplement their diet. Streams and rivers yielded fish and shellfish; and hunting with the newly introduced bow and arrow added to the food supply.

Other evidence of an expanding economy and well-maintained communications networks includes the ever increasing number of exotic goods at even the small farmsteads. Home crafts may have been a common economic supplement to farming, as is indicated by evidence of specialized, highly skilled craftsmen producing goods specifically for trade at even the small and remote sites. Excavations have uncovered sites where a house

might yield quantities of mica, shell, or other exotic materials that were crafted into trade goods or ceremonial or decorative objects by local artists.

A lively economic network demanded a setting for exchange to take place. Market centers developed at key locations near the source of valuable commodities and along major travel routes. The present St. Louis metropolitan area was one such center. The site of Cahokia, across the Mississippi River in Illinois, was at its peak the dominant political, economic, and religious center. Monks Mound at Cahokia is the largest earthen mound in the United States. The city of St. Louis and the St. Charles area were also the location of satellite communities that included groups mounds. Unfortunately, all of these mounds have been destroyed by the expanding modern city except for a remnant of Sugar Loaf Mound in South St. Louis.

These prehistoric urban centers, and especially Cahokia, reached the height of their influence from around A.D. 1050 to A.D. 1150. The trade network had reached its greatest extent; the stratification of society was reflected in the smaller satellite communities. It is during this time period as well that evidence indicates a growing social instability. A stockade wall was constructed around the inner portion of Cahokia; perhaps to distance the elite leadership from the general population? The placement of bastions at regular intervals along the wall may also indicate an increasing fear of raids, possibly by competing urban centers to the south or due to increasing tension between the large centers as they became more independent.

Society was apparently no longer monolithic. The growing numbers of high status religious and civic leaders may have led to internal instability as each attempted to establish a power base. Further destabilization may have been caused by intense competition from the urban centers to the south for dominance of the trade networks.

Environmental degradation due to overpopulation may have further weakened the economy. The intensive agriculture necessary to support the estimated 40,000 people living at Cahokia, as well as the thousands in smaller towns, may have escalated erosion and the depletion of nutrients in the soil. The erosion in turn would have increased sedimentation in the riverine environments, resulting in a decrease of the fish and shellfish which were an important component on the Mississippian diet. Although the causes are at best only speculative, the large Mississippian centers were diminishing in population and influence by A.D. 1300 to A.D. 1400. The trade networks were greatly reduced or abandoned entirely. The urban populations shifted to decentralized small villages and hamlets that continued to rely largely upon agriculture. Others returned to a simpler, more mobile lifestyle of hunting and gathering. By the time Europeans arrived, the great centers were abandoned, leaving a legacy of earthen mounds.

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from Cordage

by Steven Edholm & Tamara Wilder

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MATERIALS & PREPARATION

The following is a partial listing of natural materials which yield good fiber for complete and other cordage materials may await rediscovery.

Information given on when to harvest plants is intended only as a guideline. Species, climate, environment, genetics and intended use may all effect when plants can or should be harvested.

Fibers may be cleaned and separated by many methods. Here are some which will be mentioned later or which you may want to try:

RUBBING BETWEEN THE PALMS - This is efficiently accomplished by holding one end of the fiber in the teeth as the hands move down the length of the fiber This allows one to keep the fibers taut and prevents them becoming tangled, Alternatively the fiber may be rolled back and forth on the thigh with one hand while being pulled taut with the other.

SCRAPING - Aside from the pre-scraping of dogbane, which may be applicable to other species, this refers to scraping with a duller tool after the fiber is removed from the stalk. We usually use our thumbnails but semi-sharp bone, shell or metal tools can

also be used. If you do use the thumbnail beware of getting splinters of material under your nails. Scraping removes non-fiber chaff and makes the fibers more flexible and workable.

HACKLING - This consists of using a pointed spike-like tool to comb, clean and separate the fibers. We haven't used it much but plan to try it more in the future. Ethnographies from California mention running a bone awl repeatedly through a bundle of fiber.

POUNDING & WASHING - Pulpy things like yucca and agave can be pounded and washed to good advantage. Select younger leaves as they clean much easier. Some tree barks and fiber yielding roots can also be pounded and washed, Use a smooth peeled branch to pound with and a smoothed peeled log as an anvil.

POUNDING DRY - Twist the hank of fiber into a loose rope twist and pound it lightly with a smooth mallet on a smooth surface, We've had this work well on milkweed and nettle.

RETTING - This is the rotting of the fiber-yielding plant to weaken all materials except the fiber itself. This allows for easy cleaning by washing or other methods. The plants are usually soaked in plain water. If the retting is carried on too far the fiber begins to weaken and eventually becomes worthless. Plants will ret faster in warm weather. After five days check progress every couple of days. Retting plant fibers can smell absolutely putrid so don't do this in your house. After retting use the above methods to clean your fiber.

Dogbane, Indian Hemp - *Apocynum cannabinum*

An excellent native perennial fiber plant, Widespread throughout U.S. but uncommon. Prefers wet areas.

Harvest dry stalks autumn/early winter after plant dies back completely. There are usually several years worth of old stalks in a dogbane patch. Try to collect the previous season's growth. They are usually the reddest. In arid areas, stalks from even several years ago may be found to have sound fiber. Crack or snip the small stems and thin tips from each stalk. Store in a dry place. The outer layer of each stem is a thin bark. It has no tensile

strength and should be removed. Given a set diameter, cordage made from well cleaned fiber will, theoretically, be stronger than that made from fiber which contains non-fiber materials. We prefer to remove most of the outer bark by gently scraping with a sharp knife or stone flake at a ninety degree angle. Only the very outer layer should be removed. If fibers are seen under the knife you have scraped far enough or maybe even too far. Be especially careful around the leaf and stem nodes, Scrape less rather than more until you learn some boundaries. Most of what's left can be removed later by rubbing or scraping with the thumbnail.

Crack the stem into 4 equal parts by squeezing it up and down its length. Crack the woody part into many small pieces and remove carefully leaving as much fiber in tact as possible. There is a much more specific way to remove the woody portion which retains the maximum amount of fibers but it is too complex for inclusion in this article. If possible ask someone who uses dogbane how they remove the fiber from the stalks. Rub between hands and scrape with fingernails to clean further.

Milkweeds - *Asclepias* species

Excellent white fiber,

Harvest late summer through winter. Remove fiber from stalks as with dogbane. Clean by rubbing between hands scraping, and dry pounding.

Nettles - *Urtica* species

Some species are very good, others are nearly worthless. It tends to rot quickly. Used in wartime as a linen (flax) substitute.

Harvest at peak height or dead but not rotten. If harvested green, it may need to be retted. Remove fiber from stalks as with dogbane. Clean by rubbing, scraping, and dry pounding.

Yucca - *Yucca* species, esp. *mohavensis* (best); *bacatta*

Widely used in desert areas for nets, ropes, sandals, and fiber skirts.

Harvest green. Pound and wash or ret and wash.

Sinew - (preferably from large animals)

Achilles tendons from deer, elk, moose etc... and also sinew which overlays the sirloin muscle on either side of the backbone.

Very strong but gets slimy when wet. Sinew is an excellent material for bowstrings. Also glued to backs of bows for strength and power. Fine threads moistened in mouth and used for attaching arrowheads and feathers to arrowshafts. Dry and shred. Leg tendons may be easier to shred if pounded lightly first.

Other materials are: agave (sisal), coconut fibers, Iris macrosiphon/tenax, basswood bark, fireweed, New Zealand flax, flax, hemp (Cannibus sativa), mulberry bark, willow bark, primrose, sagebrush, ribbonwood, mountain mahogany, cottonwood, Fremontia californica, mesquite bark, western red cedar, redwood, beach lupine root, elm bark, leatherroot, cattail, tule, maple bark, and many more.

Experiment !!

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The Atlatl and Dart

An Ancient Hunting Weapon

by Thomas J. Elpel

Through the eons of prehistory, primitive peoples from all over the world developed hundreds of unique weapons for hunting game. Among all the technologies invented the atlatl and dart was the first true weapons system, consisting of both a projectile and a launching device. The atlatl, essentially a spear-thrower, was developed in Europe more than 30,000 years ago, and in North America about 12,000 years ago. By comparison, the bow and arrow first appeared here only 2,000 years ago.

Today there is a resurging interest in atlatls for sport and hunting. There is even a World Atlatl Association with national and international competitions. I met in the metropolis of Manhattan, Montana (population 800+) with modern day atlatl guru William "Bob" Perkins. Perkins has an engineering background. He has devoted his life and skills to uncovering the secrets of the atlatl, studying why mathematically it works so well, and theorizing how it evolved over the years to become more efficient. He manufactures these ancient weapons for sale at his home. His fascination with the atlatl earned him the nick-name "Atlatl Bob".



The atlatl throwing board consists of a stick about two feet long, with a handgrip at one end and a "spur" at the other end. The spur is a point that fits into a cavity at the back of a four to six foot long dart. The dart is suspended parallel to the board, held by the tips of the fingers at the handgrip. It is then launched through a sweeping arm and wrist motion, similar to a tennis serve. A fine-tuned atlatl can be

used to throw a dart 120 to 150 yards, with accuracy at 30 to 40 yards. The atlatl is the tool ancient peoples used to "bring home the bacon", said Perkins.

Perkins started researching the atlatl in 1984 as an engineering student at Montana State University in Bozeman. He made and tested his first atlatl as part of an archeology course in replicative study. He became fascinated with the mathematics of the system and made it his life's work to discover and replicate the secrets of this age-old technology.

Eighty percent of the technology lies in the dart alone, according to Perkins. "The dart is like a long, loose spring," he explained "and when accelerated by the atlatl it compresses and stores energy. That energy is then used to push itself away from the atlatl, enabling the dart to launch smoothly and effectively."

The mass of the stone point, according to Perkins, is an integral part of the mechanics, resisting acceleration, causing the back of the dart to travel faster than the front, thereby compressing it like a spring. To Perkins, the stone point is more essential for the mechanics of the system than it is for tearing through the flesh of the animals it is meant to kill.



The other 20 percent of the technology of the system lies in the atlatl board used for launching the dart. The first atlatls were just rigid platforms, Perkins noted. Over time the atlatl underwent a technological evolution much as rifles evolved from muzzleloaders to breach loaders, to lever actions, to automatics, he said. The first major improvement in the technology is what Perkins describes as "launch geometry".

Archaeologists found pictographs and artifacts of throwing boards of different lengths, long boards for long distances, and short boards for short distances. Changing the length of the throwing board changes the point in the swing when the dart is launched.

The dart lays almost flat on the throwing board before it is launched, but lifts away as the board is swung in an arc. The nock at the back of the dart remains engaged on the spur of the throwing board until the dart is tangent to the arc of the swing (perpendicular to the board). A long throwing board causes the dart to become tangent to the arc much sooner in the swing than with a short board, so the dart launches high into the air at a long-range target (and right over the top of any close targets). A short throwing board allows for more follow-through so the dart is pointing downward when it launches; this enables the hunter to aim at short-range targets.

Later in the evolution of the atlatl it was discovered that flexible, rather than stiff, atlatl boards could store and release energy much like darts do. This led to the development of the atlatl weight. The purpose of atlatl weights was controversial among archaeologists, who speculated that it was either a

counterbalance to steady the board or a "magic charm." Perkins has demonstrated mathematically that it was neither.

The weight has an effect similar to the mass of the projectile point on the dart. It resists acceleration, forcing the spring of the atlatl to store an equal and opposite amount of energy to that stored in the spring of the dart. "The technology employed here is impressive even by today's standards," Perkins noted.

If the flexibility of both atlatl and dart are in a functioning relationship to one another, the result will be similar to that of a diver diving from a spring board. In this system, the diver's legs are bent, like the dart, and store energy to be used in pushing away from the board. The diving board, like a flexible atlatl, is bent back, storing energy to be used to push the diver away from board. With the diver and diving board pushing each other away at same time, the launch of the diver is considerably higher, smoother, and more powerful than if the diver had used a fixed rigid form. The weight in the atlatl system therefore serves as a timing device to bring the flexibility of the dart and the board in tune with each other, much as one might adjust the timing of a car engine.

Perkins is continuing to reveal the secrets of atlatl technology. He discovered that ancient people applied "stealth-like" technologies "mathematically analogous to the B-2 bombers in use today". One style of atlatl weight, used by people living in what is now the eastern U.S. was demonstrated to serve as a type of "silencer" for canceling the zip-like sound of the atlatls' swing!

Laws vary from state to state governing the use of atlatls for hunting. In Montana legislation was introduced into the House and Senate a few years ago to create a special two-day atlatl season that would immediately precede the normal archery season. The first version of the bill passed the House, but the bill died before it could be reconciled between both the House and Senate versions. Nevertheless, it is legal to hunt with the atlatl in Montana during the general rifle season as long as you stick to the basic hunting rules- wear hunter's orange, have a valid license, and shoot only during daylight hours. Be sure to check the laws in your own state before hunting with an atlatl.

Visit Tom's Site www.hollowtop.com

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Making Pitch Sticks

By Evard H. Gibby

(Bulletin of Primitive Technology, Fall 1993)

Collect a batch of pitch from conifer trees and heat it near a fire in a small can or pot. As it is melting add up to 1/2 its volume of finely ground wood ash and stir until the mixture is melted and well mixed.

Take several small twigs (3 - 4 inches long) and begin dipping them in the hot mixture, and setting them aside to cool. Re-dip them several times like dipping candles, until a small hot dog shaped blob of pitch is on each stick. As each stick is dipped it can be dipped into cold water to help cool it faster if desired. When sufficient pitch coats each stick and it has partially cooled it can be rolled back and forth in the palms to help shape the pitch stick.

Store a few of these sticks in your possibles bag or pack for ready use in the field. To use the pitch stick, in hafting for example, heat the end of the pitch stick over a small flame and either let the melted pitch drip into the notch of the handle or

daub it in with the pitch stick. When the desired amount of pitch lines the notch (reheat the pitch in notch over the flame if needed) insert the blade and wrap with cordage or sinew.

Another method described by Charles Robbins of the Anasazi Post is to melt the pitch, mix in the ground charcoal, and let the mixture begin to cool. When it begins to firm up, pour it onto a flat surface and roll it into a long coil about the diameter of a pencil. After it has completely cooled break it into pieces several inches long for convenient storage and use.

Jim Woods of the Herrett Museum, Twin Falls, Idaho describes the Australian aboriginal method of making pitch sticks as follows:

Collect pitch (in our case use conifer pitch) and heat in a container until it melts. While it is heating take some charcoal out of the fire and grind into a fine powder and place this in a small cone shaped depression in the ground. When the pitch is melted pour it in the depression with the charcoal. When it begins to cool, start mixing the pitch and charcoal together by hand. Pull out small blobs and mix it similar to pulling taffy. Then roll between hands to make small cigar shaped pitch sticks, set aside and make another until all the pitch is used. The ratio is roughly 1/2 charcoal to 1/2 pitch. The pitch sticks are used as described above.

Mr. Woods suggests that primitive Americans may have added ground up dried grass fibers to their

pitch to give it strength. He also suggests that there are several unanswered questions regarding the preparation of pitch adhesives. How long should the material be heated for best results? Should it be boiled or just heated up? Can it be overcooked and become too brittle? Can the pitch be reheated several times and still be effective? What were the additives, and how much were used by the primitives?

Trying to find the answers to these and other questions about pitch adhesive would be a beneficial research project says Woods. Any takers?

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A Brief History of Gourds

by: Scott Jones

from Handbook of Primitive Gourdcraft

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In spite of the wide variety of shapes and sizes, all hard-shelled gourds are members of the same species, *Lagenaria siceraria* (also synonymous with *L. vulgaris* and *L. leucantha*). They belong to the family of plants known collectively as Cucurbits; as the name suggests, this is the same family to which belong cucumbers, as well as all squash, pumpkins/ melons, luffas, and ornamental gourds.

The origin of cultivated *Lagenarias* remains something of a mystery; they are unquestionably one of the earliest cultigens, and it is quite interesting that the nature of early agriculture focused not on food production, but utility (Flannery, 1986). With truly wild relatives occurring only in Africa, bottle gourds (as they are often called) do not occur as convincing "wild" populations elsewhere in their domestic range. Although inconclusive, Africa provides the most probable genesis for the domesticated gourd. Donald Lathrap (1977) provides an interesting hypothetical scenario for the dispersal of gourds from Africa, which may be paraphrased as follows:

About 10,000 years ago, as post-Pleistocene human population increased, subsistence activities began to focus upon rich riverine environments where small wild gourds were possibly first used as floats for fishing nets. The semi-sedentary lifestyle of these west African hunter-fisher-gatherers provides a plausible setting for early experimental cultivation of *Lagenarias*; downstream transport and subsequent trans-Atlantic drift of intact gourd floats (possibly entangled with net fragments as visual instructions for these strange fruits) could easily place gourds on the

eastern coast of South America at a date contemporaneous with Archaic peoples of the area (about 9,000 B.C). Lathrap also proposes the possibility of direct transpiration by sea-faring Africans, but this must be regarded cautiously since sound anthropology is scarcely dependent upon single unverifiable events of otherwise insignificant impact. He continues, though, by suggesting that Archaic populations in South America had begun to exploit the abundant riverine resources at an early date for reasons similar to those of their African contemporaries, and the resulting semi-sedentary subsistence pattern was equally favorable for agricultural experimentation. The remarkable ability of a gourd to float for at least 347 days in sea water and still contain viable seeds (Heiser, 1979) adds the necessary credibility to the notion of trans-oceanic dispersion while eliminating the need for direct human transportation.

In any event, gourds had not only arrived in the New World by the Archaic, but had spread by cultivation into Peru and as far north as central Mexico by 7000 BC (Flannery, 1986). By the time they had reached these areas (and probably long before), their use as net floats had presumably been augmented by other, more obvious functions such as water bottles and eating utensils. In the southeastern United States, Lagenarias can be comfortably dated to at least 1000 BC (Hudson, 1976). With the less problematic introduction of gourds into Asia by overland transportation, they became a mainstay of traditional life throughout the temperate and tropical world for thousands of years.

Although there exists today considerable trade in gourds between growers and craft people, their presence among most of us in North America is mostly in the form of folksy curiosities. Yet their role as standard items of utilitarian, recreational, and ritual significance among prehistoric peoples should spark our curiosity: why, even after the invention of ceramic pottery, did the humble gourd remain such an integral part of many cultures? This is not a difficult question since, as with most primitive skills, part of the answer is reflected in our modern behavior. A peek into our kitchen cupboards will reveal numerous coffee cans, margarine tubs, glass jars and milk jugs-proof that we, like our prehistoric forbears, still appreciate an economical container!

Yet containers aren't the only use for gourds. In such a brief text I can't hope to present all facets of gourdcraft, but be aware that gourds can be used for rattles, drums, and resonators for stringed instruments, as well as masks, water bottles, ladles, dippers, funnels, and of course, bird houses.

The methods presented here are based upon my experiences working with gourds and observations from teaching this craft, as well as data from ethnographic and archaeological sources. If you keep your mind and eyes open, you will begin to notice gourds-or at least uses for them-in unlikely places; your ears will prick u p at the slightest whisper of "Lagenaria"; and as you "gourd awareness" grows, you will doubtless develop a insights and craft techniques uniquely your own!

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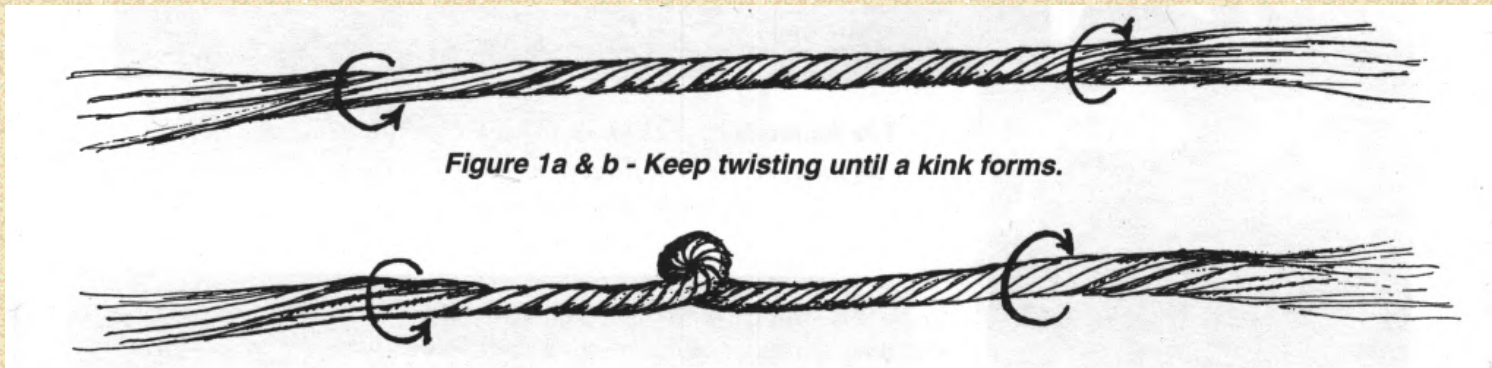
Making Cordage By Hand

Text and Illustrations by Norm Kidder

Reprinted from the SPT Bulletin of Primitive Technology, Fall, 1996

Cordage (rope and string) can be made from many different fibers including (Bast) Dogbane, Milkweed, Nettles, Hemp, Flax; (Leaves) Cattail, Yucca, Agave, Douglas Iris; (Bark) Willow, Maple, Basswood, Cedar; (Root) Leather Root, Beach Lupine; (Whole stem) Tule, straw, Juncus. Each material has specific requirements for extracting and preparing the fibers, but there are only two basic ways for using the fibers to make a cord: braiding (or plaiting) and twining. Braiding was usually done with flat, split materials such as cattail or flattened straw. The instructions in this article will deal only with twining, specifically with two ply (S-twist, Z-ply, also called right-handed) cordage.

After preparing a bundle of fiber half the thickness of the finished cord, place your hands six to twelve inches apart and about one third of the way from one end. Twisting the fibers clockwise with both hands, wind the bundle tight (making single-ply cordage).



Bring your hands closer together and keep twisting. The kink should rotate on its own in a counterclockwise direction (Fig. 1a & b). Twist until two or three rotations occur (Fig. 2a & b). This is the start of a two-ply cord. At this time you can attach the end to something (or someone) which can rotate (free-end) and keep twisting with both hands turning clockwise OR you can attach the end to something solid (fixed-end) and begin twisting and counter-rotating (see below).

Figure 2a.

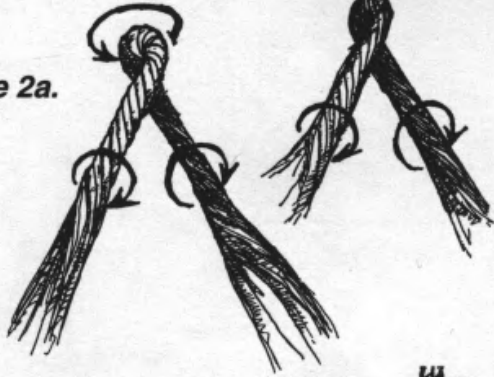


Figure 2b.

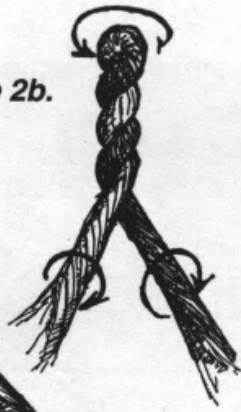


Figure 3a.

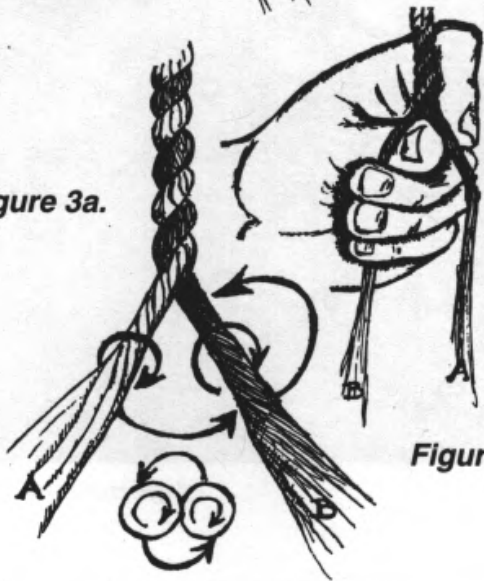


Figure 3b.

Counter-rotating, one form of finger-twisting, involves each hand applying a clockwise (S) twist into a ply, while passing the right ply over, and the left ply under (counter-clockwise or Z-plying). In Figure 3a, your left hand twists ply A clockwise, while your right hand does the same with ply B'. At the same time, you pass ply B over and behind your left thumb and lock it in place with your remaining fingers, as in Figure 3b. You then take A in your right hand and B in your left and repeat, over and over and over again. These two methods are particularly handy with larger and coarser materials such as cattail and tule ropes.

Finger-twisting finer material is usually done completely in the hand, with the finished string being wound on a bobbin or netting needle as you go. Your left hand acts to control tension while your right hand does the twisting.

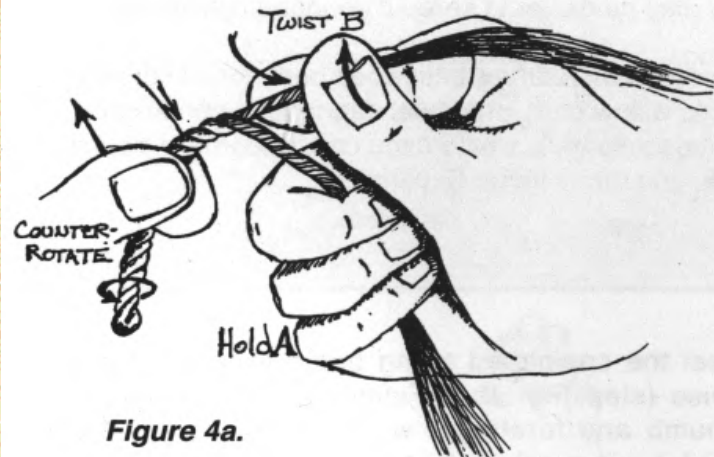


Figure 4a.

Begin as in Figure 1, then place the Y (the point where the two plys come together) between your left thumb and fore finger. Take the lower of the two ply strands and twist it tightly clockwise until it begins to kink. Lock the twist in by closing your remaining three fingers over the strand (see Fig. 4a.). Then, while holding the twisted ply A securely, twist ply B with your right thumb and forefinger. As you twist, you should feel the completed string begin to twist counter-clockwise (step Fig. 4b.). Follow this motion with your left thumb and forefinger while maintaining even tension and a symmetrical Y. Next move your left thumb up to the fork in the Y as before and repeat steps 1 and 2 until you need to add more fiber.

Splicing

If you began your cord off-center, then one side will run out of fiber first. As you get to within about

3 inches of the end of this short ply, prepare another bundle of fibers the same size as you began with, but taper the end of the bundle for about 4 inches. Lay this bundle parallel to the bundle being replaced, and sticking out about an inch beyond the Y (Fig. 5).



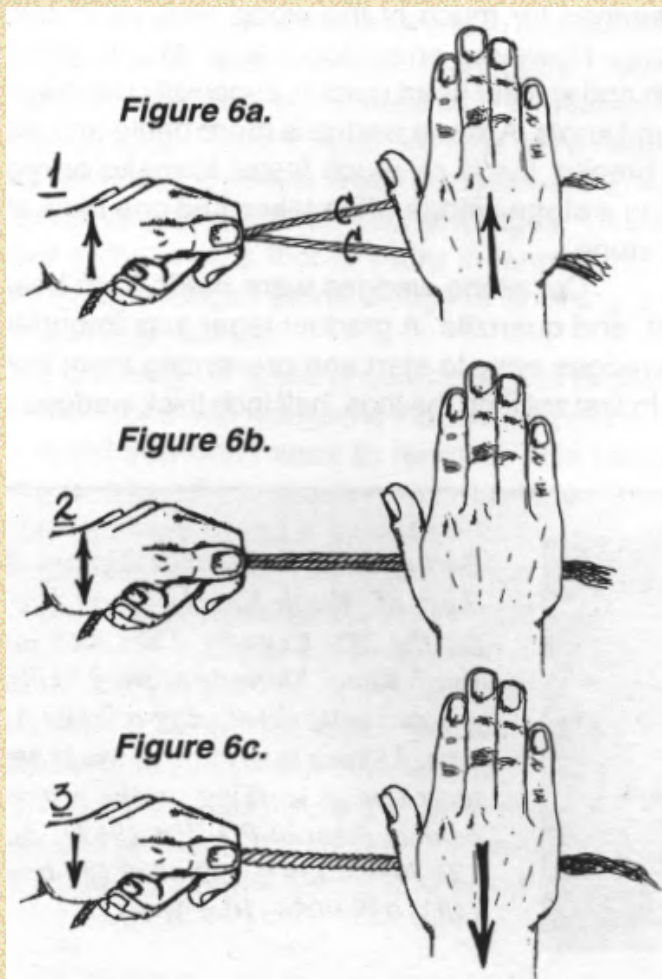
Continue twisting as before. You should also add in if one ply becomes thinner than the other, or if both plies become thinner than they started. In these cases add just enough fiber to bring them back to correct size. Ideally, your cord should stay the same size throughout, although aboriginal cordage did vary about fifty percent in nets. Bow strings and fish lines under heavy pull should be very even. It is also possible to add to both sides at the same time by bending a bundle of fiber in half and placing the Y of the bundle into the V of the Y, but it is harder to keep from making a lump at this point. After your string is finished, you can cut or burn (carefully) off the overlap ends to make your string less fuzzy.

NOTE: dry surfaces tend to slip, so you should keep your hands and the fiber damp while you are working. Squeeze out excess water though or your string will be loose when it dries.

Finger-twisting methods are best used when a relatively small amount of string is being made and/or has to be very tight and even, and when very stiff or coarse materials are being used, such as cattail or tule. When making mass quantities of cordage, it is much faster and easier on the hands to use the leg (thigh) rolling method. The principle is the same, S-twist, Z-ply, but the twist is applied by rolling on the leg, rather than twisting between the thumb and finger. You can continue to work without getting cramps in your hand muscles, and you can (with practice) work faster (about ten feet per hour). The critical element in making this method work is having the right surface on which to roll. Traditionally the bare left thigh is used. If you do not want to expose your skin, or if your legs are hairy, you can use pants, but these should be tight around your leg, so they won't bunch up as you roll, and they should have a rough enough surface to give traction. Keeping them damp is also critical. I keep a bucket of water next to me while I work. (This method is illustrated in Figure 6a-c.).

Roll both plies away from you with the palm of your right hand (pre-roll each separately). Your left hand holds the Y and follows the movement.

Bring the two plies together by moving the left hand forward and back. If the two plies did not get tightly rolled the first time, carefully pick up both plies and repeat step one first.



When the plies are tight and touching, bring the right palm back towards you, counter-rotating the two plies into two-ply cordage.

Before you begin, prepare as much fiber as you will be using during that session. Once you get into the rhythm of the work, you won't want to stop and clean material.

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STONE AGE HAND- AXES

by W. J. Kowalski



1. There were no handaxes at the beginning of the Pleistocene, and none at the end, but for one million years in between this was the tool of choice for stone age man. Although everpresent in stone age culture, the exact purpose and use of this tool remains a mystery.

The Pleistocene lasted from two million years ago to the present., which is called the Holocene. At the beginning of the Pleistocene primitive man was already using fire and making stone, bone, and wooden tools. He wore animal skins scraped clean with stone scrapers, cut in straight lines and stitched together with leather laces.

The reason handaxes seem to have no specific purpose is probably because they served a general purpose. They could be used for cutting meat, scraping skins,

chopping wood, digging holes, hammering bone or wood, and perhaps as a last resort defense against wild animals -- perhaps sort of a Stone Age Swiss army knife. The proliferation and abundance of handaxes suggests that perhaps everyone had one. As techniques for making handaxes slowly improved over the millennia, these same techniques would have led to new types of specialized tools, ultimately making the handaxe obsolete.





The handaxe appears almost everywhere that early man appears (see image at left), with the exception of the very far east. Ultimately the handaxe was replaced by an array of specialized tools, and may have ceased to have any value beyond that of pure tradition and culture. Perhaps every boy who came of age was given his own handaxe, or perhaps they came to have only

ritualistic use. Some late handaxes were excellently manufactured, but seemed to receive little actual use. A number have been found that were deliberately driven point first into the ground and left, for unknown reasons.

Handaxes come in many shapes and sizes, and many styles unique to cultures of specific periods and in specific geographical areas. Almost all handaxes have a point, are sized for the hand and shaped to be held. Almost no handaxes have notches for mounting. Attempts to dramatize

Stone Age man as a crude and warlike savage often show handaxes mounted as oversized spearpoints. Such comic personification says more about our violent modern culture than it does about this pristine world of teenage hunters (average age 19) who spent their time on beaches and riverbanks. They rarely lived beyond the age of 35, not because of hardship, but more probably because of disease, since even minor cuts could cause fatal infections.



These youthful cavepeople made fine stone tools, works of art, and spears and arrows for hunting, but they

made no weapons for killing other humans until about 26,000 BCE, perhaps when leaders (older males?) became predominant. The hunters of the stone age enjoyed abundant game during warmer climates, hunting many species to extinction. They had the time to create the most excellent stonework and wall paintings, circa 100,000 - 20,000

BCE. It has been noted before that the quality of stone age art has not been exceeded today -- only our technology has improved.

1. At the right is an early chopper from about 2,000,000 BCE. Chopper industries preceded handaxes but led directly to them as tool-making methods evolved. Choppers, also an all-purpose tool, were the first stone tools to be made rather than 'found'.



Acheulean Handaxes from Saint-Acheul, France. Dated to the Lower Paleolithic, Riss glaciation, or approximately 1,000,000 to 300,000 BCE.



Primitive Abbevillian handaxe from Olduvai, approximately 1,000,000 BCE.



Acheulean handaxes from Sbaika, Algeria. Made by homo erectus. Dated to the Riss glaciation.

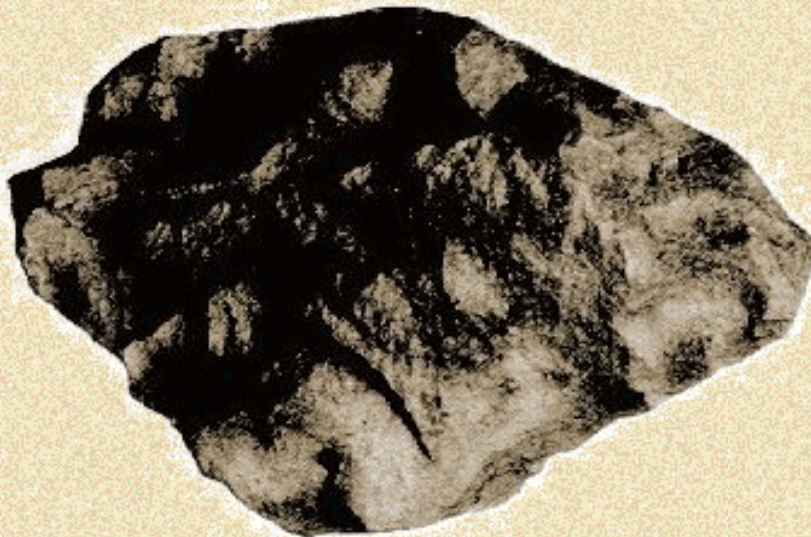


Crude Acheulean handaxes from Sbaika, Algeria. From about 1,000,000 to 500,000 BCE.





Crude handaxe from Abbevillian culture. Found in Abbeville, France. Perhaps from 1,000,000 to 500,000 BCE.



Large Padjitanian handaxe from Java. About 750,000 BCE.



Almond shaped handaxes from the Late Acheulean. Found near St. Acheul, France. Perhaps from about 300,000



to 100,000
BCE.



Upper
Acheulean
handaxes from
Kalambo Falls,
northern
Rhodesia.
Approximately
100,000 to
200,00 BCE.



Small
Micoquian
handaxes from
La Micoque,
France. From
100,000 BCE.



**Medium sized
Micoquian
handaxes from
La Micoque,
France. From
100,000 BCE.**



Large
Micoquian
handaxes from
La Micoque,
France. From
100,000 BCE.



Small handaxe
made from
rock crystal.
Late
Mousterian,
about 100,000
BCE. From
Kulna cave,
Moravia.



**Small
handaxes. Late
Mousterian,
about 100,000
BCE. From
Kulna cave,
Moravia.**



**Upper
Acheulean
handaxes from
Isimila,
Tanzania. From
about 100,000
BCE.**



**Mousterian
handaxe from
Kulna cave,
Moravia,
Czechoslovakia.**



**Giant
Acheulean
handaxe from
Norfolk,
England, over
6" long and 2.5
inches wide.
Most handaxes
were only 10
cm long, but
then Homo
habilis and
erectus were
only about 4
feet tall.**



**Larger, more
evolved
Abbevillian
handaxes from
Olduvai,
Africa.
Approximately
500,000 BCE.**



**Small, crudely
struck
handaxes from
Swanscombe,
Kent, found in
the middle
gravels.
Acheulean,
perhaps
500,000 BCE.**



**Pointed
Clactonian
handaxes from
Swanscombe,
Kent, England.
This fine
workmanship
by a tool-
making
Neanderthal
was noted by
J.J. Wymer,
who was also
British.**



**Subtriangular
Mousterian
handaxe, about
500,000 BCE.**



**Triangular
Mousterian
handaxe, about
500,000 BCE.**



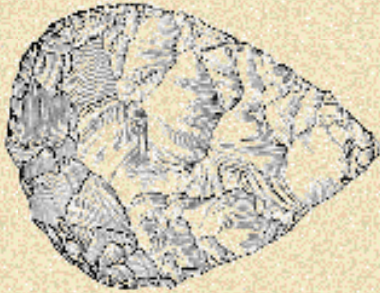
**Cordate
Mousterian
handaxe, about
500,000 BCE.**



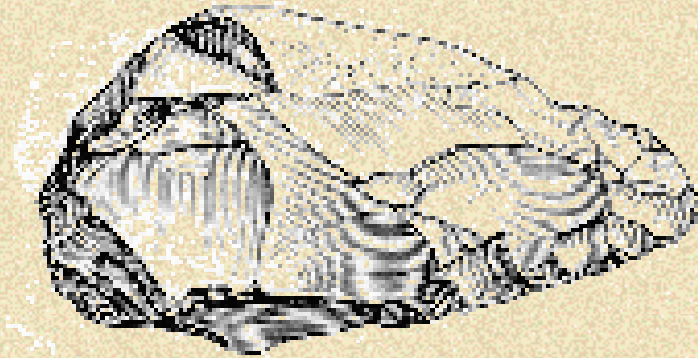
**Acheulean
cordate
handaxe made
of silcrete.
From
Elandsfontein,
Cape Province,
South Africa.
Middle
Pleistocene,
500,000 BCE.**



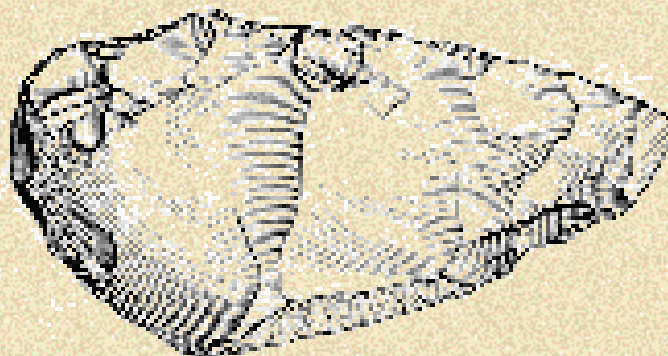
**Middle
Acheulean
handaxe from
Swanscombe.
About 300,000
- 500,000 BCE.**

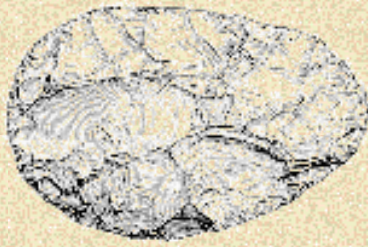


**Elegant
cordate
handaxe from
Hoxne,
Suffolk,
England. Late
Acheulean,
about 350,000
BCE.**

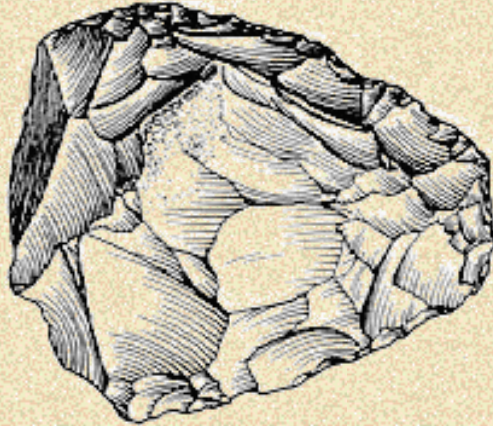


**Three views of
a backed
handaxe from
the Upper
Acheulean,
approximately
200,000 to
100,000 BCE.**





**Ovate
Acheulean
handaxe from
about 200,000
BCE. Found in
the dunes near
Abbeville,
France.**



**Small
Mousterian
handaxe of
Acheulean
tradition. From
Pech del' Aze.
About 100,000
BCE.**



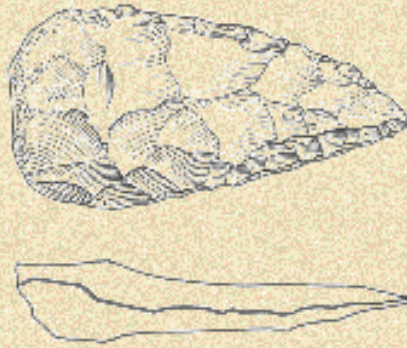
**Handaxes from
Perigord,
France. The
lower handaxe
still has its
point intact.
Mousterian
period. From
the Perigord
Museum.**



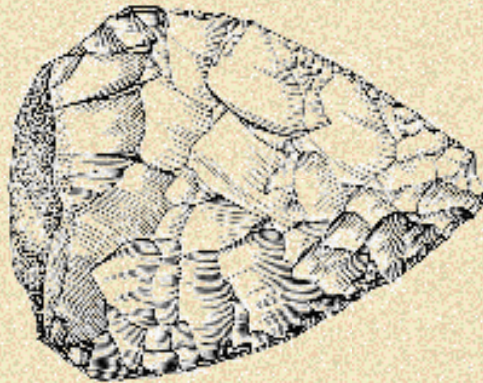
**Large handaxe
of the
Mousterian
period. From
the Perigord
Museum.**



**Ovoid
Mousterian
handaxe. From
the Perigord
Museum.**



**Mousterian
handaxe from
Volgograd,
Russia. About
80,000 BCE.**



**Mousterian
Cordiform
handaxe of
Mousterian
tradition. From
the beginning
of the Wurm
glaciation,
about 70,000
BCE. Note the
increased
attention to
detail.**



**East
Gravettian
(Pavlovian)
handaxe from
Dolni
Vestonice,
Czechoslovakia.
From about
30,000 BCE.**



Two views of a specialized type of late handaxe called a Prodnik, which was a sort of bifacial knife. From Wylotne, Poland, Middle Paleolithic (Wurm II) about 50,000 - 30,000 BCE. Later prodniks specialized further and became different tools, while handaxes themselves became rare and then disappeared.



An advanced, or 'perfected', handaxe from the late Mousterian or Early Aurignacian (Perigordian). perhaps 50,000 - 35,000 BCE. From the Perigord Museum.



Triangular handaxes of the perfected variety, Early Aurignacian. If the dating is correct, these are among the last handaxes that were made before the final diversification and specialization of fine stone tools made the handaxe obsolete.

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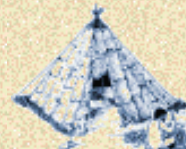
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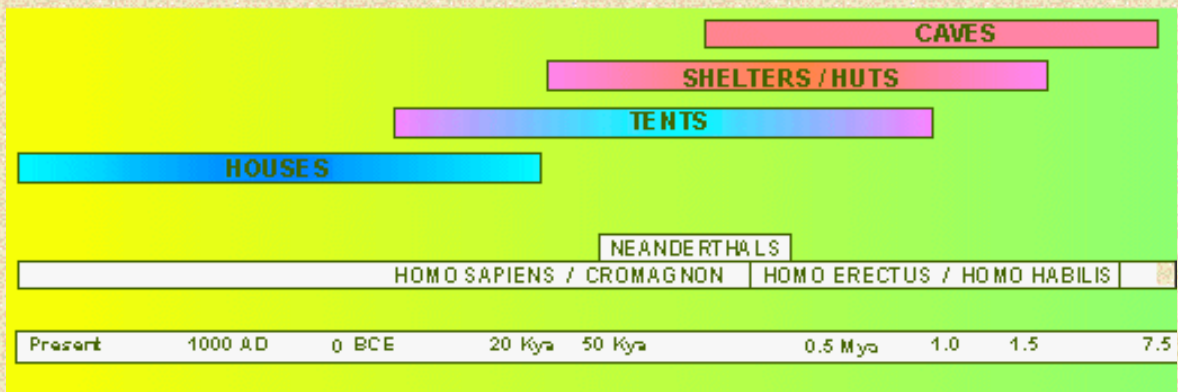
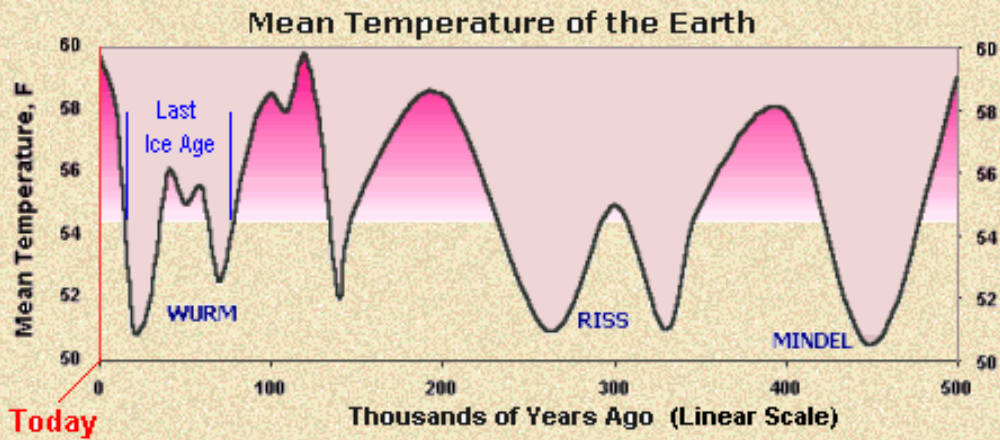
STONE AGE HABITATS

By W. J. Kowalski



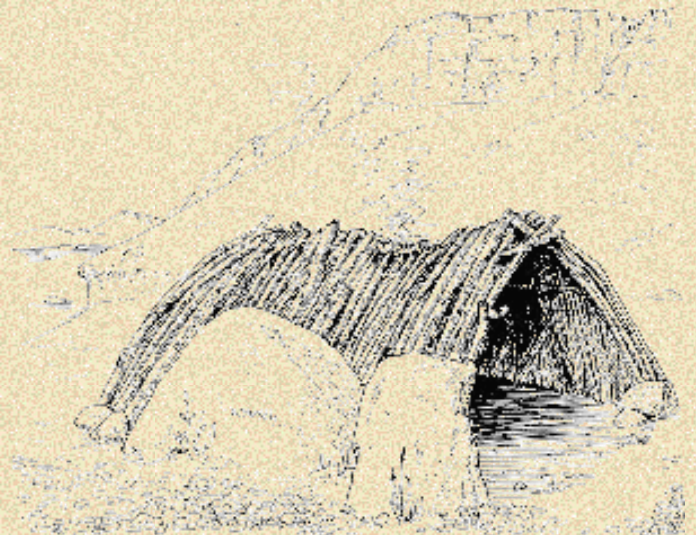
Man's earliest ancestors sought protection from the elements and predators in natural shelters such as caves and rock overhangs. Gradually, they learned to improve their caves with inlaid stone floors, walls at the entrances and fireplaces. Ultimately they began creating entirely new habitats in locations that had no natural shelter. The construction of such habitats may have been influenced by the cold weather of the ice ages cycles shown in the white areas of the diagram below.





The earliest evidence of a man-made habitat dates to about 2,000,000 BCE and comes from Olduvai Gorge in Central Africa. A small circle of stones were found stacked, apparently to hold branches in position. This was clearly the work of Homo Habilis, our tool-making ancestor. The precursor to Homo Habilis, called Homo Erectus, was a tool user (more than a tool-maker), had campsites, and was using fire as early as 3,000,000 BCE, but no conclusive evidence exists that he made habitats.

Evidence of a wooden hut found at Terra Amata, near Nice in France, was dated to the Mindel Glaciation, or between 450,000 and 380,000 BCE. The hut included a hearth, or fireplace and was made by bracing branches with a circle of large and small stones. Similar stone circles are found throughout the upper and lower paleolithic. The basic design of such habitats may have remained unchanged for a million years.





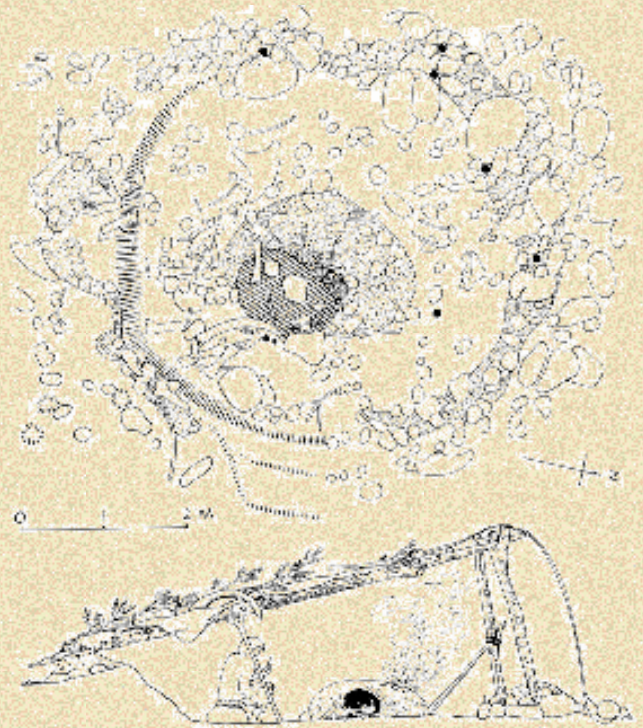
An Acheulean hut found in the Grotte du Lazaret near Nice, in France. This tent-like structure was built inside a cave and was made of animal hides draped over a wooden framework and held down by stones. It dates to perhaps 500,000 to 400,000 BCE. The interior measures 11 meters by 3.5 meters, and it was subdivided into two rooms, the larger of which had a fireplace. Animal furs, grasses, and seaweed were used as carpeting and bedding. The inhabitants, apparently Neanderthals, selectively used pine for heating in preference to more available types of wood.



Another reconstruction of the hut at Terra Amata. The hut was 8 meters long by 4 meters wide. Hand-axes and other stone tools and flakes were found in the vicinity.

These people, apparently Neanderthals, were hunters and the site contains remains of the bones of a variety of animals, including elephant, rhinoceros, red deer, ibex, and giant ox.

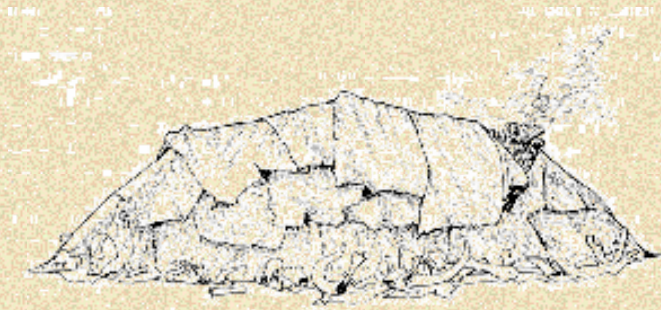
Plan and layout of an Upper Paleolithic hut from Dolni Vestonice, Czechoslovakia. This structure was first dug out from a slope and the roof was supported with timber set into post-holes. It dates to about 23,000 BCE. The low walls were made of packed clay and stones. The evidence of clay firing at this site are the earliest ever found. The famous Venus figurine was found at this site.



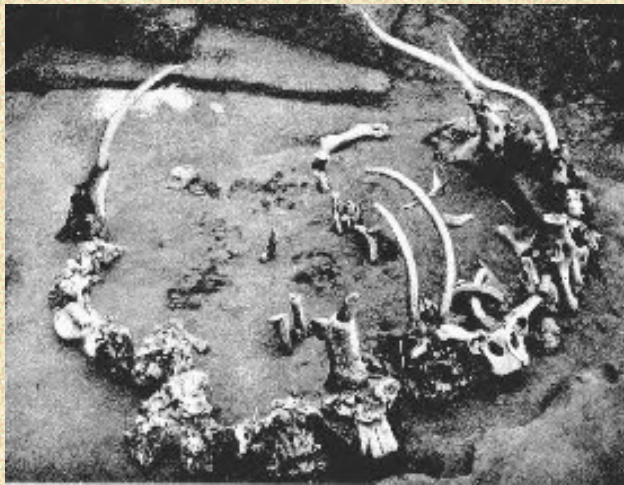
A Paleolithic hut divided in three sections and made of animal skins was found at Pushkari, Ukraine. The inside was dug out and the structure was built-up from mammoth bones.

No other animal remains were found here -- these were specialised mammoth hunters. Many of the bones found here had evidence of red paint, a common find at Paleolithic sites.

Circular base of mammoth bones found at Mezin, near Tchernogov, that provided a supporting structure for a Paleolithic hut of a typical mammoth hunting society. The tent was made of mammoth hides and was probably carpeted with mammoth hides, although fur hides, like fox, wolf, and bearskins, were often used for bedding.



Mousterian hut found at Moldova, Ukraine, made of mammoth bones and mammoth hides. The mammoth jaws used at the base were interlocked -- a clever technique found at most of the mammoth hunter sites. The mammoth hunting culture appears to have thrived for tens of thousands of years.



Circular base of mammoth bones found at Mezin with some support bones still standing. The mammoth hunters often built entire huts out of mammoth bones and covered them with mammoth hides stitched together and anchored at the corners. They also made tools and objects from the tusks. Remains suggest that some of them ate nothing but mammoth meat. They must have been delicious, since they ate every last one.

Here is a mammoth hunter hut from Siberia reconstructed at a stone age site in Perigord, France. Notice how the original jawbones interlock to form sturdy walls. This structure would then be covered with mammoth hides and carpeted with fur.



A Magdalenian tent from the Upper Paleolithic found at Plateau Parain in France. Dated to about 15,000 to 10,000 BCE, this animal hide tent was suspended over a wooden framework and held down by stones. It included a central hearth. Stone tools were found in the area around this site.



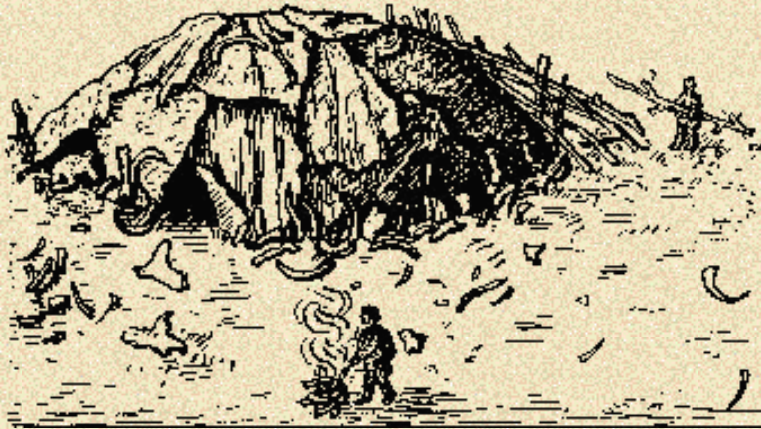
A Magdalenian double tent from Poggenwisch. This structure was made by connecting two tents, each with its own hearth. The structure was anchored with stones.

A Magdalenian tent from Pincevis, France. This animal skin over wood frame structure included two entrances and two hearths.



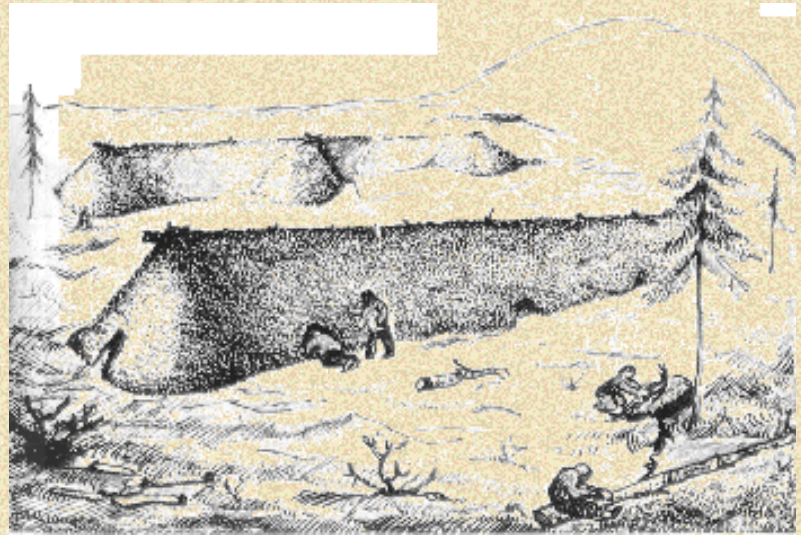
Reconstructed round hut from Moravia, Czechoslovakia. This structure was part of a large campsite which was rich in stone tools and bones.

Cross-section of a hut found at Dolne Vestonice, Moravia, Czechoslovakia. Post-holes were used to support the wooden roof posts. This structure included a fireplace.



Mousterian hut from Moldova, in the Ukraine. This animal hide covered framework was partially supported and braced with woolly mammoth bones. The use of mammoth bones, jaws, and skulls to build structures was common among the mammoth-hunting cultures of the Upper paleolithic.

Two long huts found at the Kostienki site near Alexandrova, in the Ukraine. One hut measured 33.5 meters by 5.5 meters and had ten small hearths in a row inside. The structure was designed to channel melting snow around and away from the huts.



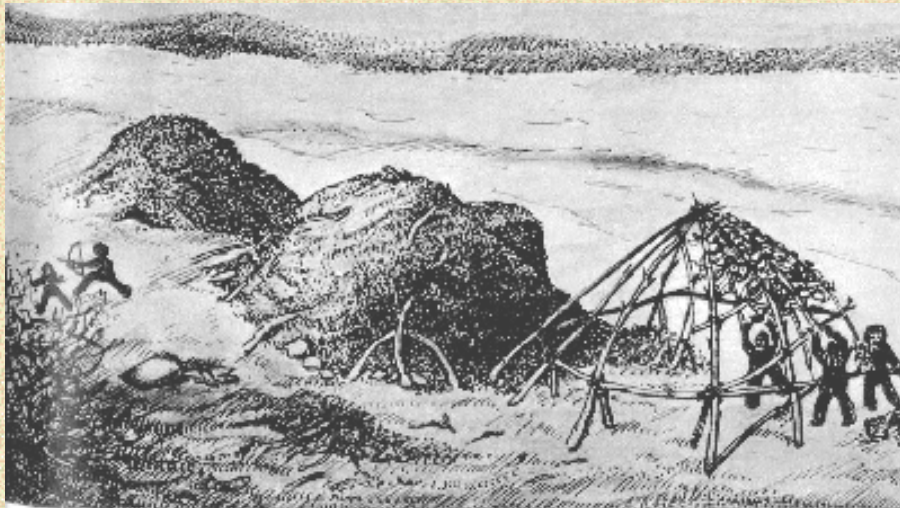
Upper paleolithic Huts from Mezin, Ukraine. These huts date to about 10,000 BCE.





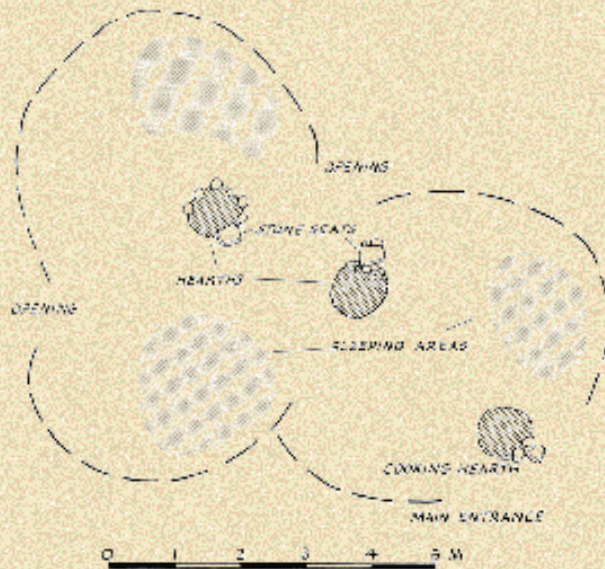
Circular dwelling made with a stone wall base, from Malta, Siberia.

Circular tents from Malta, Siberia. These animal hide covered structures were bolstered with stones at the base.



Upper Paleolithic huts from Buret, Siberia. These structures date from about 10,000 BCE.

Shown here is a layout of an upper paleolithic hut, a form often repeated in its general characteristics.



Upper Paleolithic hut from Pushkari, Russia. This hut was built over a shallow depression that was covered with a timber framework. Mammoth hides were drawn over the timber and anchored with bones and stones. It had three internal hearths.



Reconstruction of hide covered Perigordian tents from Le Thot, near Perigord, France. About 33,000 to 20,000 BCE.

Shown here is a dolmen, a huge stone slab set upon other huge stones. These type of structures began showing up near the end of the stone age all across Europe in what is called the megalithic age when people were energetically building structures such as Stonehenge. This one is from Sarlat, France and is about 7000 years old.



This dolmen is known as the covered alley of Le Blance, and is near Beaumont, in Perigord, France. At about this time in what is now Yugoslavia, hardened copper tools were being developed, and the stone age came to an end.

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ATLATL WEIGHTS: Function and Classification

By William R. Perkins

Reprinted from the SPT Bulletin of Primitive Technology, Spring, 1993

INTRODUCTION

Atlatl weights, both known and suspected, are a fascinating and frustrating subject. Based solely on the misinterpretation and lack of understanding surrounding them, and their occurrence in the archaeological record, debate and confusion as to their purpose has set them apart from most other artifacts.

There are a variety of atlatl weight types and suspected types found, interestingly enough, mainly in the United States. Their distribution seems to be contained within the forty-eight states with a little overlap North into Canada, and south of the Rio Grand River into Mexico. But generally, the political boundaries of the lower 48 United States hold most of the world's atlatl weights. As far as I am aware, atlatl weights do not occur outside North America, although atlatls most certainly do. Atlatls in a variety of styles are found more or less worldwide. The earliest examples date to well over 20,000 BP in Europe, and the atlatl is still used today by natives of Papua, New Guinea and the Australian aborigines. But regardless of where atlatls are found, nowhere other than North America are they found with weights attached to them.

The confusion surrounding atlatl weights begins with the many theories as to their purpose. The most popular of these seems to be that they are a counter balance. This theory suggests that the weight acts as an adjustment to balance the atlatl and dart in the palm of the hand. Many other theories have been put forth, mainly based on the idea that the attachment of the weight would propel the dart a greater distance.

Experimentation with many of these theories tended to show opposite results until

finally the theory of last resort, "hunting magic" was applied. When all else fails, it's a charm, the owner believed the atlatl weight possessed "hunting magic." No doubt about it, some weights are quite beautiful and finely polished, and I am sure their owners even believed that they possessed magical power. That's just the way we humans are. We're weird like that. However, not all atlatl weights are beautiful. Many are rather crudely finished and some are merely rounded river rock. Even these could hold some special meaning to someone, but the "charm theory" just doesn't hold. Atlatl weights have a function, and that function has to do with their mass.

WEIGHT THEORIES

This brings us to the contradiction in the term "atlatlweight". More often than not atlatl weights are referred to in every descriptive term imaginable except - mass. To apply the term 'weight' to an object and neglect to report its mass would seem illogical to a thinking human.

There is also the confusion of what is an atlatl weight. This is more of a word game than a question of function.

Several descriptive and functional names have been applied to known and suspected atlatl weights. Depending upon where you live or how you became familiar with atlatl weights you might refer to all weights in general as Banner Stones, boat stones, counter weights, bird stones, etc. This causes a great deal of confusion. Not long ago I was asking a friend of mine who lives in the East some questions on Banner Stones. Our discussion became quite confused until we realized that I was talking about a very particular type of atlatl weight and he was trying to give me answers for atlatl weights in general.

The center of all this confusion lies with the dispute over the true purpose of the atlatl weight. In my studies of the atlatl and dart I have found that they possess a deceptively advanced technology. The basic technology, the mechanical foundation of the system, is the flexible dart. Over time, humans have tinkered and toyed with the system improving and refining it to a very high degree. There are many levels of technology which have evolved from the basic mechanical foundation. Just as modern rifles evolved from muzzleloaders, to breach loaders, to lever actions to automatics, atlatl weights in general represent one very advanced level of atlatl and dart system technology. In fact, some weight types represent a higher degree of technology than others, a technology within a technology.

So how is the system improved by the application of a weight? Atlatl weights possess mass and when attached to an atlatl that mass affects the system. But contrary to popular experimentation you just can't strap a weight onto any old atlatl and expect a miracle.

Atlatl weights do not possess a sufficient enough mass to significantly influence

the speed at which an atlatl is swung in order to affect some degree of timing based on velocity. The fact that a weight increases the moment of inertia of an atlatl is just that, a fact. What good does it do? Why not make a thicker atlatl? And as far as a counter balance is concerned, that theory only applies when the atlatl and dart are at rest and not being used. The total system of atlatl and dart, with or without a weight, is fairly light, considerably less than one pound. The presence or absence of an atlatl weight makes no difference whatsoever as to how long or how steady an atlatl and dart can be held. A person can hold the system steadily, with or without the weight, for as long as that person can hold it steady. Which is about 6 minutes the last time I tried. After that, your arm cramps and falls asleep, making any attempted throw ridiculously ineffective. So forget about it!

The purpose of the atlatl weights mass is to resist acceleration. In order to understand its function of resisting acceleration a review of the technological evolution of the atlatl and dart must come first.

ACCELERATION

The basic mechanics of the system depend exclusively on the flexibility of the dart. When the dart is accelerated by the atlatl it flexes and stores energy like a spring. At some point during the swing, after the atlatl is no longer accelerating sufficiently to cause further compression of the dart, the dart then uses its stored energy to push itself away from the atlatl. This allows the dart a smooth separation between itself and the atlatl, giving it an effective and powerful launch.

One of the great evolutionary improvements to the system was superimposing flexibility into the atlatl. If this is incorporated successfully into the system, with the degree of flexibility of both atlatl and dart in a functioning relationship with one another, their function will be similar to that of a diver diving from a spring board. In this system the diver's legs are bent, like the dart, and store energy to be used to push away from the diving board. The diving board, like a flexible atlatl, is also bent back, storing energy to be used to push the diver away from the board. With the diver and diving board pushing each other away at the same time, the launch of the diver is considerably higher, smoother, and more powerful than if the diver had used a fixed rigid platform.

When the proper mathematical relationships of length and flexibility between atlatl and dart are achieved, the results are a long and noticeably flexible dart. But the atlatl on the other hand is, at approximately one third the length of the dart, short and somewhat stiff. The proper flexibility of an atlatl is rather subtle. The atlatl, which is correctly flexed, seems too stiff to be of any benefit. This is where the atlatl weight is applied to the system.

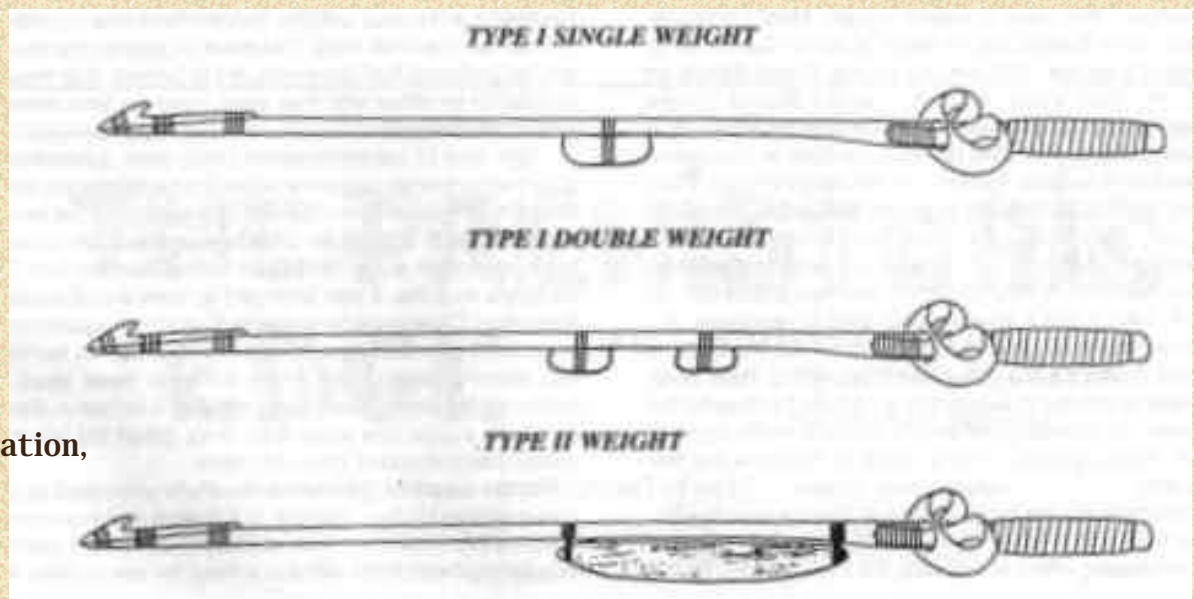
What atlatl weights accomplish in the system with the flexible atlatl is rather sophisticated and ingenious, representing a level of engineering skill, which is impressive even by today's standards. Its mass, located approximately at the

middle of the atlatl shaft, resists acceleration, (Newton's first law of Motion) and forces the atlatl to deflect further than is possible without it. This enables the atlatl to store more spring energy to be used to push the dart away from the atlatl. The weight's position along the atlatl shaft influences the amount and rate at which energy is stored and released. Therefore, the atlatl weight is a timing device influencing the amount and rate at which the spring energy of an atlatl is stored and released against the spring energy of a dart. That is its primary function. Its effects on the system are not so profound as to propel the dart to a noticeably greater distance or velocity, although higher velocities are achieved. (A longer atlatl will noticeably increase the velocity and distance of a dart at the cost of accuracy). When properly incorporated into the system, the atlatl weight improves the performance of that system in terms of efficiency. Smoother, more controlled and powerful launches make for better accuracy. And ultimately it is getting to the target that counts.

CLASSIFICATIONS

Now that atlatl weight function has been firmly established, the problem of classification can be more easily addressed. Archaeologists have attempted to classify weights according to their shape and hafting technique. In this they have failed miserably. Not only have the same atlatl weights been placed in a category Type III by one archaeologist and a Class I category by another but some categories contain only one known example. This being the case I have laid down the framework for a new system of weight classification based solely on function and effect.

The basic atlatl weight, or Type I in Perkins' atlatl weight classification, is a single point mass



weight with a mass of approximately 65 g. Mathematically a mass can be boiled down to one point where its influence is applied to the atlatl's flexibility. No matter how it is grooved, holed, shaped, or hatted to the atlatl its final position is that point at which its mass influences the mechanics of the system. Type I has sub-categories of multiple point mass weights. Type 1b would be two point mass

weights whose combined mass add up to approximately 65 g. These would be located along the atlatl shaft to render a smoother response to the flex of the atlatl with distributed point masses as opposed to one concentrated mass.

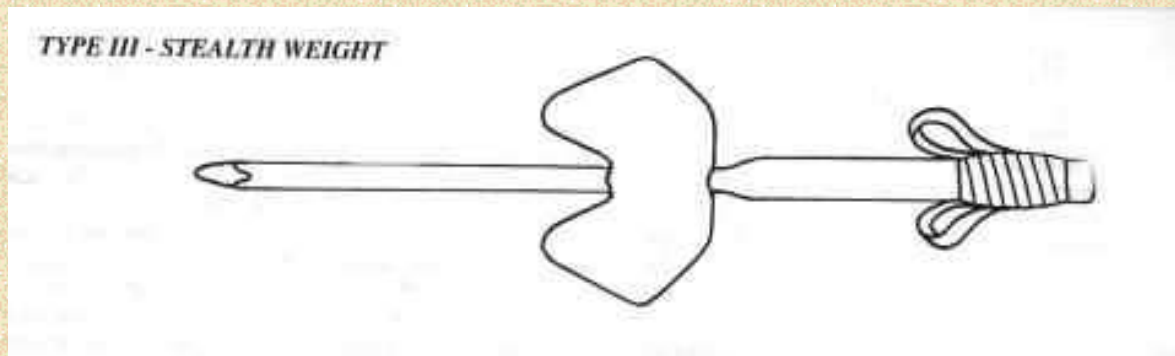
There can be further sub-types with three and even four distributed point masses, but as the base mass of 65 g. is divided the influence of the smaller weights becomes increasingly ineffective.

The improvement over multiple point masses in the evolution of this particular technology is the Type II weight. Its mass of approximately 65 g is distributed along its length and, given its unique moment of inertia and method of hafting, influence the atlatls flex at only one significant point. The Type II causes a finer, more precise response to the flex of the atlatl, accomplishing with one weight what was attempted with several.

This brings us to the most fascinating weight to be classified. The Type III stealth weight. More commonly known as a Banner Stone, there is some dispute as to whether they are atlatl weights or not. Based mainly on evidence from Indian knoll, KY where Banner Stones have been recovered in context and in alignment with atlatl hooks and antler handles, I believe that Banner Stones are indeed atlatl weights. Type III - stealth weights in fact. Their mass tends to be somewhat greater than other weights at approximately 80 g, but this can be resolved quite easily when the probable length of the associated atlatls is taken into consideration. Atlatls from the Western United States, which Type I and II atlatl weights tend to represent, are approximately 60 cm in length. Atlatls from the Eastern United States on the other hand, appear to have been somewhat shorter at approximately 40cm. Not having the mechanical advantage of length, Eastern atlatls seem to have utilized greater mass in order to influence the flex properly.

Mechanically the mass of Banner Stones tend to influence the system like a Type I weight, but their shape has the interesting effect of silencing the noise caused by the

swing of the atlatl. When a stick or atlatl is swung an audible "zip-like" noise is generated. It seems that when a Banner Stone is attached this noise is significantly reduced, generating more of a low frequency "woof" as opposed to the high frequency "zip" sound. One would think that because of the greater surface area created by the Banner Stone an increase in noise would result. But those who know physics will tell you that what might be expected is not necessarily what occurs.



THE EXPERIMENT

Since first discovering this effect I have demonstrated it to several people. At distances of anywhere from 5 to 15 meters I have asked observers to listen for a difference in sound levels between an atlatl equipped with a Type III stealth weight and an atlatl with only a Type I point mass. After three swings with each all observers reported a significant difference in that the stealth atlatl was noticeably quieter than the other. On the off hand chance that my observers were predisposed to report a difference in sound by being asked to "listen", I began asking subsequent observers to "watch" for a difference between the test atlatls.

The fact that these observers were asked to watch for an effect as opposed to listen resulted in a tendency to be more hesitant when reporting what was noticed after having the atlatls swung in front of them. But again in all cases, they reported that the atlatl with the Banner Stone was considerable quieter than the other atlatl. This result suggested that the effect was so profound that observers, led to believe that they were looking for an effect with their eyes, none the less noticed an effect with their ears.

This type of experimentation being more qualitative than quantitative merely suggests rather than confirms the effect of sound suppression by the Banner Stone weight. That being the case I began to arrange for a low budget electronic sound test to be conducted at the 1992 Rabbit Stick Rendezvous. To my complete surprise, it was arranged to have sound equipment from Rick's College made available to me for this purpose. The equipment provided was so sophisticated that its technology has been available only within the past three years. The microphones, about three feet long and 4 inches in diameter could, on a calm day more, than likely detect the sound of a needle being dropped into a haystack.

For this experiment the same two atlatls were used as for the observational studies. Starting at 5 meters and increasing the distance five meters at a time to a total of 25 meters, each atlatl was swung three times with and without the use of darts. A total of ten separate comparisons were made and recorded on magnetic tape. The five comparisons made shooting darts over the head of the technician handling the microphone were noted, for the record, as all traveling approximately the same distance. This was done in case it was suggested (as it subsequently was) that I was swinging the Stealth atlatl differently from the

other atlatl.


All things considered, the deviation in throwing was held to an absolute minimum. In fact, I maintained a degree of consistency surprising even to myself, since I was concentrating on NOT hitting the soundman more than anything else during this portion of the experiment. None the less, it should be noted that all darts traveled over the head and landed behind this trusting sole at a surprisingly consistent height and distance respectively.

THE OUTCOME

The data recorded on tape was analyzed by computer and for all ten the Stealth atlatl registered significantly lower sound levels than the unsilenced atlatl.

Although a mathematical module of this effect has not yet been formulated, the focus of maximum sound suppression seems to be between 20 and 25 meters, indicating an effect known as superposition of sound waves. But no matter what the mathematics are, the effect is definitely present.

Although these experiments may not confirm that the effect of sound suppression was the purposeful function related to the shape of Banner Stones, they certainly go a long way to indicate it. And as far as the actual advantage of noiseless atlatls is concerned, I will leave that to other researchers to contemplate, since they no longer have the counter balance" theory to consider.



Analysis.jpg (23119 bytes)

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Check out Atlatl Bob's site at: www.atlatl.com

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Atlatl & Dart Mechanics

Precision Atlatl and Dart Systems



By: **Bob "Atlatl Bob" Perkins**



The mechanical foundation of Atlatl technology is the flexible Dart. Under acceleration by the Atlatl, the Dart flexes and compresses like a spring, storing energy to be used to push itself away from the Atlatl and launching at velocities that easily exceed 100 mph. The first of many improvements to this mechanical system was multiple length atlatls to fine tune the system longer atlatls for increasing range. Interestingly, the number P1 is found for optimum performance in the Relationship between atlatl length and dart length.



The great innovation of atlatl weights in the evolution of this technology bears the mark of true genius. By super imposing flexibility into the atlatls shaft and applying a mass to influence the amount of flex during the swing, the energy stored in the spring of the atlatl can be exactly matched to that of the dart. This allowed for a more efficient use of available energies by forcing the atlatl to push away at the same time the dart is pushing away from the atlatl, much like a diver pushing away from a

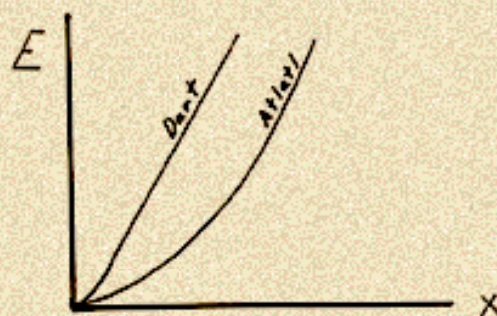
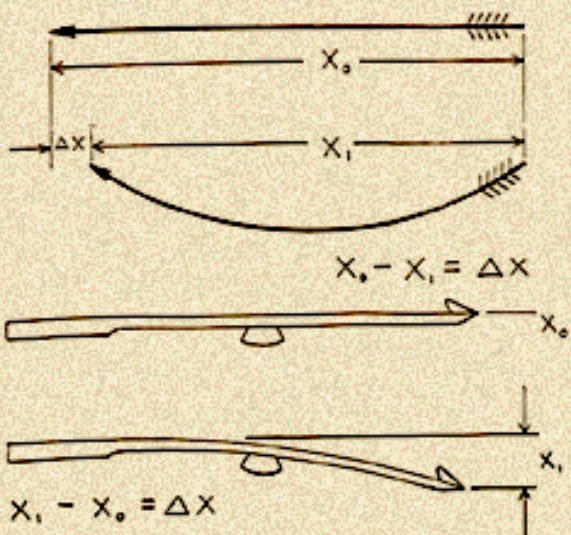
springboard platform.



Overtime different types of atlatl weights were developed to improve upon this effect. One particular type commonly called a Banner Stone and using Agent Stealth Technology, went so far as to silence the ZIP like noise caused by the swing of the atlatl.



These and many other aspects of the atlatl and dart have been rediscovered by BPS Engineering. We have been credited with some Half-Dozen discoveries in the field, or, virtually all that is known of the deceptively complex mechanics of the Atlatl and Dart System. Claiming that BPS Manufactures the finest Atlatl and Dart Systems in the World is no idle boast. It's just a given fact.



$$\text{Energy dart} = \frac{1}{2} k \ln \cosh 2X$$

$$\text{Energy atlatl} = \frac{G}{2} X^2$$

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Atlatl Archeology

Precision Atlatl and Dart Systems



By: Bob **"Atlatl Bob"** Perkins

Over 12,000 years ago, hunters tracking herds of the last ice age across the frozen tundra of what is now the state of Alaska became the first immigrants to enter the North American continent. These hunter-gatherers brought with them a weapon that reigned supreme among them and their descendents for thousands of years to come, the Atlatl. It was the first true weapons system developed by humans, originating in Europe over 30,000 years ago and spreading to every corner of the globe that humans occupied. In fact the Atlatl and Dart were used and improved upon for so long by our ancient ancestors that, comparatively speaking, the Bow and Arrow can be considered a recent development in projectile technology. So powerful and effective was the Atlatl that scientist and scholars speculate that it, along with the overkill tactics so common to the human race, caused the extinction of the Woolly Mammoth in North America before the end of the ice age.

Largely replaced by the Bow and Arrow around a birth of Christ, it was still being used by some Native Americans during the age of discovery, 500 years ago. When Columbus encountered natives using the Atlatl during his voyages to the New World, Europeans who had long forgotten the weapon, soon became familiar with it again. These encounters were most certainly with the business end of the weapon, the European wondering, "what was

that?", just before dying.

The Aztec's preferred the Atlatl as a weapon of war. We get the word "Atlatl" (pronounced at-la-tal) from their language. In fact, the Atlatl and Dart was the only weapon Cortez and his Conquistadors feared easily piercing Spanish armor and often sending the hapless soldier to meet his Maker. If Montezuma had not mistaken Cortez for the Feathered Serpent God Quantzaquatl, history may have been very different, with the 200 or so Spanish conquistadors being only a footnote in the history of that Nation, foolish invaders who were overwhelmed by superior firepower.

The Atlatl and Dart have enjoyed widespread use throughout the world. At one time or another people everywhere have used it as their main weapon for food and procurement and war. Even today it is used by the native of Australia, Papua New Guinea, and some tribes in South America and Northwest Mexico. But it was in North America, more specifically in what is now the continental United States, that the weapon was developed to its fullest potential. In a trait so common to our species, Native Americans tinkered and toyed with this weapons system, developing and improving the technology to such a high level of sophistication that it is impressive even by today's standards. Just as firearms have developed from muzzle-loaders to breach loaders, to lever actions and automatics the Atlatl has undergone a similar evolution.

All but lost 2,000 years ago, BPS Engineering has brought the technology of the Atlatl and Dart back from the past to be enjoyed today.



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EFFECTS OF STONE PROJECTILE POINTS AS A MASS WITHIN THE ATLATL-AND-DART MECHANICAL SYSTEM AND ITS RELATIONSHIP TO THE BOW-AND-ARROW

WILLIAM R. PERKINS

Stone projectile points represent the single most durable artifact occurring in the archaeological record. An enormous amount of research and speculation have gone into their interpretation. Materials and knapping techniques have been studied, point styles have been typed, categorized, and dated, and volumes of information have been published which relate directly and indirectly to stone projectile points. However, other than explaining that notching and fluting represent a hafting technique, and the sharp edges and tip are for inflicting traumatic wounds, their function and effects as a mass within the mechanical systems of the bow-and-arrow and atlatl-and-dart have been largely ignored.

The primary motivation behind advances in projectile technology is to make a smaller particle go faster. Higher velocities generate flatter trajectories, promoting greater accuracy. Velocity influences the kinetic energy of a particle to a greater degree than does its mass. In the mathematical expression for energy, one half the mass of a particle multiplied by the velocity squared, it can be readily seen that velocity plays a more significant role in increasing the energy of a particle than

does mass. Over time, progressively lighter particles attaining higher velocities: spear, dart, arrow, bullet, have marked advancements in projectile technology. However important the velocity of a particle when analyzing a weapons system, the mass of that projectile, how that projectile is accelerated, and it's effects upon the mechanics of the system, are paramount in the interpretation of that weapons system.

Prehistorically, the concept of making smaller projectiles travel faster can be generally traced in the study of stone projectile points, with heavier points generally occurring earlier and lighter points occurring more recently in the archaeological record. Studies of stone points from sites known to have utilized either atlatl-and-dart or bow-and-arrow systems have shown a trend toward lighter points for arrows (3 grams or less) and heavier points for darts (4 grams and greater).

Generally speaking, the atlatl predates the bow by a considerable margin, and, in fact, the atlatl has enjoyed such an extended and widespread tradition that, comparatively speaking, the bow-and-arrow can be seen as a recent development in projectile technology. In North America, the atlatl can be traced back in the archaeological record some 8 to 10 thousand years, whereas the bow is generally accepted as having been introduced only 1,500 to 2,000 years ago. It is true that the atlatl-and-dart was used in North America longer than any other weapons system to date. Therefore, a detailed study of the projectile point mass, and it's effects on this system, establishing parameters for minimum and maximum mass will help, through a process of elimination, to distinguish between arrow, dart, and lance points.

TOOL TRADITIONS

Projectile point types are primarily identified by style. Size, material, and knapping techniques are noted to a lesser degree, but mass generally not at all. The stated diagnostic for the various types is hafting technique. Indeed, this seems to be the case because of the variety of notched, stemmed, and fluted points found. Hafting technique certainly played a role in certain styles of points and the similarity between the points of a particular tool tradition. But, as the primary function, hafting technique falls short when

considering the point as part of a mechanical system.

What can be seen in the similarities among the points of a tool tradition, when considering the point as part of a mechanical system, is production-line consistency. Keeping in mind that a highly sophisticated weapons system is literally behind the projectile points of a particular tool tradition lends an entirely new perspective to the interpretation of stone projectile point attributes. For a weapons system of any degree of sophistication, consistency in the manufacture of its various components is paramount for the success of its deployment.

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Other materials such as bone, antler, and just an old-

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stick work just as well. Stone possesses one advantage over these other materials: density, concentrated mass. Projectile points made from other materials can be made to have the same mass as a stone point, but they would be larger, less efficient and, therefore, less desirable than stone.

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Both the bow and the atlatl accelerate a flexible shaft from the rear and are therefore defined as flexible shaft accelerators. The arrow and dart are defined as the flexible shafts under acceleration. The flexible shaft stores and releases spring energy used to accelerate away from a launching platform. When a flexible shaft is accelerated, the point mass at the opposite end resists that acceleration and causes the shaft to flex and compress, storing spring energy to be used for the launch. Point mass plays a critical roll in the amount and rate at which energy is stored and released.

Under acceleration from the rear a flexible shaft cycles threw a series of harmonic isolations propagating transverse waves. The period of oscillation, the time it takes the shaft to complete one cycle, is the same whether the force imparted is large or small. Changing the length, flex, or point mass alters the period of isolation for a given shaft. This alters the actual launching point of the shaft: when the shaft pushes itself away from its launching platform and separates to travel down range. Timing is critical and needs careful consideration in the mechanics of flexible shaft acceleration.

The difference between the bow and atlatl lies in the type of acceleration applied by each. The bow is a linear accelerator, accelerating a flexible shaft in a straight line. The atlatl is an angular accelerator, accelerating a flexible shaft in an arc. In the atlatl system, the dart itself is the single most important component. Mechanically, the dart acts like a long spring. When accelerated by the atlatl, it flexes and pushes itself away from the atlatl spur, launching smoothly and effectively. The mass of the projectile point acts upon the system by resisting that acceleration and causing an "efficient" compression of the dart's spring.

In order for the mechanics of the atlatl-and- dart system to function, the dart must be flexible. The flexible shaft is the mechanical foundation of

this system, and the point mass plays a critical role within it by causing the shaft to flex and store spring energy.

In the bow system the arrow functions exactly the same. The arrow is accelerated from the rear by the bow's string. The arrow flexes and stores spring energy to push itself off the bowstring at launch. The point mass influences the amount and rate energy is stored and released. This suggests a closer relationship between these weapons than previously recognized. The physics and mathematics describing the arrow and dart are exactly the same. Only the constants in the mathematical formulas are different. The relationship suggests that the bow-and-arrow is not the novel invention it is thought to be, but rather a progression of existing technology. The bow did not replace the atlatl, the bow evolved from the atlatl.

The potential energy available to a given flexible shaft is dependent upon three things: the length and flexibility of the shaft itself and the mass of the projectile point at the business end. The mass of the point directly controls the amount and rate at which energy is available to the system. Without proper point mass, the system will not function to it's full potential. Mechanically the flexible shaft is defined as a spring-mass system. A mass is required for efficient operation.

Foreshafts were developed to help maintain the precise working relationship of length, flexibility, and point mass. Considerable effort went into manufacturing a properly tuned, flexible shaft. When launched downrange, the chances are likely that the stone point will break upon impact. Sometimes, the breakage can be repaired with acceptable loss of mass, still within functioning parameters. But, if the point snaps and takes part of the heft with it, a one-piece shaft would be shortened

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Also, stone was not predominately used in the manufacture of projectile points because of its durability, convenience, or it's ability to pierce hide and flesh. Other materials such as bone, antler, and just an old-fashioned pointy stick work just as well. Stone possesses one advantage over these other materials; density, concentrated mass. Projectile points made from other materials can be made to have the same mass as a stone point, but they would be larger and less efficient and, therefore, less desirable than stone.

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The mass of stone projectile points must be more carefully considered in order to gain a more complete understanding of the weapon system they represent. As stated, the atlatl-and-dart system is a deceptively complex mechanical system and the point mass is an integral part of that system. The lighter the point, the more sophisticated the system. There are limits to the minimum mass that can function in the system. Part of this minimum limit has to do with the materials from which the dart is manufactured. The less dense the dart material, keeping in mind the parameters of length and flexibility, the lighter the point mass that can be successfully used on a dart of that material. Experiments with several types of dart material have found that, "locally" (Gallatin Valley,

Montana), red osier dogwood is best. With this material, a dart with a minimum point mass of approximately 5 g can be designed for peak performance. Because the density of red osier is .6 kg/L, the lighter the projectile point, the less influence it has on this material. Dart materials of lesser density, such as cedar, can be designed to function efficiently with lighter point masses. A cedar dart can be designed to function efficiently with a point mass of 3 grams. This dart would be approximately 54 inches in length, and functioned well with an 18 to 20-inch atlatl having an effective range of 20 to 25 yd. Beyond this minimum, designing a dart that will function effectively with a less than 3-g point mass is not efficient. Due to the limits of the acceleration available to the system, as the dart shortens, the effective range of the system also shortens in order to maintain the proper timing match between atlatl and dart. Also, because the acceleration is angular rather than linear, less velocity is achieved by shorter atlatls that are required to function with shorter darts. There is also effective mass to be considered. This is the mass of the point after it has been hefted onto a shaft. Experiments conducted in hafting stone points found that the glue, sinew bindings, and the surrounding wood of the notch itself add an average of 1 g to the overall mass of a dart point. Arrow points were not tested but some increases in mass can be expected. In effect, a 2.5 gram point may have the effective mass of 3.5 grams. Is it a dart point or an arrow point? In order for a lighter point to function effectively in a flexible

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In considering what is the maximum point mass that can be tolerated in the atlatl and dart system, all aspects of what were considered for minimum point mass are reversed. With greater point mass goes greater dart and atlatl length. The Aborigines of Australia are known to use darts up to 12 feet in length with correspondingly long atlatls of more than 3 feet in length. Although no opportunity to directly weigh any Australian dart points presented itself during museum study, many were observed hafted to extremely long darts in the Smithsonian collections. They were quite large and certainly in excess of 30 grams. Atlatl-and-dart systems of this massive design are far less efficient than the more reasonable North American dimensions. In experiments of dart design lengths in excess of 8 ft. point mass becomes less critical for efficient operation due to the leading mass of the dart material itself helping in compression along the entire length of the dart. Indeed, some Australian darts had no point mass at all and did not appear to be designed for any. So long as a dart is sufficiently flexible, extreme length lessens the sensitivity of an influencing point mass. Australian atlatl systems appear to represent an extremely basic technology, one that is a step or two above a hand

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spear. They conform to the basic definition of an atlatl and dart
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since the dart is flexible and uses spring energy to launch itself
away
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Australian
atlatl design. The lengths of the darts are generally three times
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the atlatl. In theory this relationship works out to p times the
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The question of what is the maximum allowable point mass for
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Maximum mass however can be as much as 20 to 30grams, and, of
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Stone projectile points represent the single most durable artifact
occurring in the archaeological record. An enormous amount of research and
speculation have gone into their interpretation. Materials and knapping
techniques have been studied, point styles have been typed, categorized,
and dated, and volumes of information have been published which relate
directly and indirectly to stone projectile points. However, other than
explaining that notching and fluting represent a hafting technique, and the
sharp edges and tip are for inflicting traumatic wounds, their function and
effects as a mass within the mechanical systems of the bow-and-arrow and

atlatl-and-dart have been largely ignored.

The primary motivation behind advances in projectile technology is to make a smaller particle go faster. Higher velocities generate flatter trajectories, promoting greater accuracy. Velocity influences the kinetic energy of a particle to a greater degree than does its mass. In the mathematical expression for energy, one half the mass of a particle multiplied by the velocity squared, it can be readily seen that velocity plays a more significant role in increasing the energy of a particle than does mass. Over time, progressively lighter particles attaining higher velocities: spear, dart, arrow, bullet, have marked advancements in projectile technology. However important the velocity of a particle when analyzing a weapons system, the mass of that projectile, how that projectile is accelerated, and it's effects upon the mechanics of the system, are paramount in the interpretation of that weapons system.

Prehistorically, the concept of making smaller projectiles travel faster can be generally traced in the study of stone projectile points, with heavier points generally occurring earlier and lighter points occurring more recently in the archaeological record. Studies of stone points from sites known to have utilized either atlatl-and-dart or bow-and-arrow systems have shown a trend toward lighter points for arrows (3 grams or less) and heavier points for darts (4 grams and greater). Generally speaking, the atlatl predates the bow by a considerable margin, and, in fact, the atlatl has enjoyed such an extended and widespread tradition that, comparatively speaking, the bow-and-arrow can be seen as a recent development in projectile technology. In North America, the atlatl can be traced back in the archaeological record some 8 to 10 thousand years, whereas the bow is generally accepted as having been introduced only 1,500 to 2,000 years ago. It is true that the atlatl-and-dart was used in North America longer than any other weapons system to date. Therefore, a detailed study of the projectile point mass, and it's effects on this system, establishing parameters for minimum and maximum mass will help, through a process of elimination, to distinguish between arrow, dart, and lance points.

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The question of what is the maximum allowable point mass for efficient operation of the atlatl-and-dart system is much less defined than is the minimum mass. Minimum mass can certainly go down to a precise 3 grams. Maximum mass however can be as much as 20 to 30grams, and, of course, the greater the design mass, the greater the deviation in that mass that can be tolerated in the system for efficient operation. This may result in the stone points of an early tool tradition varying in mass by as much as 10 grams or better

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Brains, Bones & Hotsprings: Native American Deerskin Dressing at the Time of Contact

What can we learn? What myths can we let go of?

by Matt Richards - photos and illus.

Adapted and updated for the web from an article printed in
[The Bulletin of Primitive Technology](#), Fall 1996

INTRO

My original purpose with researching 100 first hand accounts of Native American tanning was to find easier, more direct techniques to accomplish that goal: velvet soft buckskin. I knew (or at least hoped, prayed and begged) there would be a way to get wet-scraped hides to brain and soften more easily than what I currently knew. There was! And it has revolutionized the way we and other tanners brain tan deerskins (and resulted in the book [Deerskins into Buckskins](#)).



Inuit tanner takes a break

The secondary purpose was to learn how to efficiently tan with only stone-age tools -- methods that could be used in a wilderness survival situation. Where better to look, than at the experts?

I was highly surprised by many of the other patterns that emerged. There are several

common 'myths' about Native American tanning and stone tool tanning that simply don't hold up to any scrutiny. For instance, the idea that 'white buckskin was only used ceremonially'. The written record clearly shows that many tribes never smoked any of their hides and most only smoked hides for particular uses!

It is also important to point out that not only did different tribes use different tools and methods, but so even did different people within different tribes! The plethora of different techniques, tools and substances used in the process boggles the brain (ever tried using mashed Saguaro cactus seeds instead of brains?). In modern days, we often say there are as many techniques as there are tanners, and the same seems true of the past. Despite this, there are many definite patterns that we can learn from.

One of the challenges of researching tanning on the Plains is the obsession early anthropologists had with buffalo hide tanning. There is typically a long description of this process and then a cursory mention of deer if any at all. The result has been the assumption that deer and buffalo were tanned the same way, which is not at all true! One advantage that an experienced tanner has over an anthropologist, is that we understand a lot more about the practical side of tanning. You read some of these reports and laugh at the conclusions drawn by the anthropologist, things they'd never say, if they had ever brain tanned even one hide...

In this article, I will describe and illustrate most of the recorded approaches to each step in the process. Sometimes a technique is dependant upon other techniques being done or not being done on the very same hide. My purpose here is not to teach you a process, but to show you the many options that were traditionally practiced by Native Americans, and to varying degrees why, so that you may experiment and adopt ones that work for you.

This article will be limited to the dressing of deerskins. Because of their durability, softness and availability, they were the most commonly tanned, worn and utilized skin in North America; the most widely used "fabric" of pre-historic times. While many of these techniques can and were applied to the dressing of other skins (caribou, elk and antelope especially) each skin type has its own structure that requires specialized methods. All information presented here-in is based on the materials I was able to find. There are many tribes for whom I have not been able to find any detailed information (particularly on the east coast). If you know of any reports that would shed a different light on certain details, please [contact me](#).

These deerskin dressing methods will be broken down into subjects in the order of their most common application: beams, fleshing, graining, structure openers, brain solutions, softening, smoking and dyeing.

DRY- SCRAPE OR WETSCRAPE?



Almost all stone-age North Americans scraped deerskins wet over a beam. Even on the plains, where dry-scraping was intimately understood for graining (and thus dehairing) buffalo, most peoples chose to wet-scrape deer. However, the reports of deerskin dressing on the northern plains have been greatly obscured by the focus that buffalo tanning received. It is clear that the Blackfeet and Assiniboine dry-scraped some of their deerskins. It is probable that its use extended to other northern plains tribes, at least occasionally, though many of them clearly wet-scraped.

My belief is that dry-scrape was primarily used as a thinning technique on thicker hides to render them lighter weight, easier to brain and soften. This use translated occasionally for some tribes and regularly for a few, to deer. Deerskins are naturally thin, readily softened, and easy to grain wet with primitive tools.

"Beaming tools are thus identified with the dressing of deerskins and in this respect stand distinct from the adze-tool used in dressing buffalo skins. They seem to be used whenever the dressing of deerskins is prevalent."

Clark Wissler, Plains Indians anthropologist, 1910.

Pulling

hide is pinched between tree and beam

Tree-leaned

Apache	Shivwits
Cheyenne	Snohomish
Havasupai	Wishram
Kutenai	
Nez Perce	
Okanogan	
Palute	
Pueblo	

Tree-leaned (Sitting)
Tlingit

For fleshing and graining with edge tools

Pushing

hide is pinched between waist and beam

Waist-Beam (Supported)

Atsugewi
Chippewa
Chumash

Waist-Beam (Horizontal)

Gulf of Georgia
Puget Sound
Wintu

Waist-Beam (Embedded)

Cree	Sask
Menomini	Saulteaux
Modoc	Seminole
Pawnee	Shuswap
Pit River	Sioux
Potawatami	Twana
	Ute

Tree-leaned (notched for limb)

Lilloet
Navajo
Shuswap
Thompson

Horizontal Plank?

NW California (drawing is my interpretation, hide is pinned by rock and scraped with Elk antler end tool)

End Tool Fleshing

Apache
Assiniboine
Blackfoot
Cree (eastern)
Chippewa
Palute (honey lake)
Ute

Graining (Dry Scrape)

Assiniboine
Blackfoot
and...?

Stretched For use with end tools

Traditional Native Scraping Methods

BEAMS

To wetscrape, a solid surface is needed to provide resistance to the tool as layers of skin are pushed or pulled away. Almost always these surfaces took the form of logs leaned against a tree or implanted at an angle in the ground with the other end waist high. Both forms were widespread. Other styles did exist. Horizontal waist-high beams were used in the Gulf of Georgia-Puget Sound area, and horizontal planks were used in NW California.

FLESHING

Depending on how the deer was skinned, fleshing was done before or after graining. If the skin had chunks of meat or fat, it needed to be fleshed first. There were two basic types of fleshing tools, end and edge. For example, with a cannon bone, the end of the bone was cut at an angle and used as an 'end' tool. While the side of the cannon bone could be modified and used as an 'edge' tool.

Edge tools were used to push or pull the flesh from the skin, which was pinched between a wooden beam and the tool. End tools were used with a chopping motion to remove flesh from skins held under tension in a frame, pegged to the ground or between an object and the other hand. The working edge of the end tool was sometimes serrated to grip the flesh better.



EDGE SCRAPERS- nearly universal, used for fleshing and graining.

Top to Bottom: Rib, Buffalo (also Deer, Elk, Mtn. Sheep, Moose). This one is actually an extension of a vertebrae from upper rib-cage. Very flat, stout tool, with natural edge. Rib, Buffalo. Ulna-radius, Deer. Natural edge. Don't over clean, as sinewy membranes hold it together. Use narrower beam. Used in scattered locales. Cannon bone beamer, Elk (also Deer, Mtn. Sheep). Extensive use away from Plains. Two edges created by hollowing out center. Wood and bone scraper. Bone shard implanted in wood with pitch binder. Common to Eastern Woodlands. Great tool.

Split stick, Oak. Various hardwoods. Some use on NW Coast and scattered other locales.

Most tribes used the edge tools for fleshing, the same one that they grained with. End tools were used on the northern plains, and filtered into adjacent areas. End tools were extensively used for other types of hides, large ones that were easier to work pegged out, or lashed to a frame, and hides which the hair was to remain on. With hair-on hides, deep fleshing is crucial. This can better be accomplished with end tools because edge tools must be used with a beam, pinching the hide and often damaging the hair. End tools were used throughout North America for this purpose, and are therefore common in the archaeological record. Deerskins were predominantly fleshed with edge tools on a beam.

END SCRAPERS- some use for Deer, very common for furs and large hides.

Left to Right: Hafted knapped stone for fleshing. Elbow adze, knapped stone on wood, for fleshing and dry-scraping. Cannon bone flesher, beveled edge, wrist thong brace. Most common of the end scrapers. Serrated cannon bone flesher, less common than previous, gained in popularity after contact. Elk antler, beveled edge, for graining wet-scrape on wooden plank (NW California only). Works, but is it worth the time?



DEHAIRING/GRAINING

The same edge tools that were used for fleshing were used to remove the hair and grain. Many required but slight modification from their natural form. Tool edges were either squared or beveled. Ribs, cannon-bone beamers, and ulna-radii were the most common. Due to their curved shapes, the ribs and ulna-radii require a narrower crown on the working surface of the beam, so that they don't contact too large of a skin surface and lose their bite. I've scraped several deerskins with their own unmodified ulna-radius, and its been easy, though not as fast as with a cannon-bone beamer. I've also been trying out some oak scrapers. So far they've been losing their edge too fast, and not gripping the grain enough to push it off. I would like to try some even harder woods like mtn. mahogany, and/or fire hardening the working edge. Amazingly to me, the Yurok reportedly used old douglas fir branches, not even a hard wood. End tools, particularly the adzes, were used for dry-scraping. NW California tribes reportedly used beveled elk antlers to scrape hides, with a wooden plank backing. If this is accurate, this would be a case of an end tool being used to wet-scrape.

STRUCTURE OPENERS

Never heard of this step, huh? This is the really exciting stuff! Fresh hides are structurally bound up by the "ground substance", a.k.a. mucopolysaccharides (many sweet mucus?). This is something you need to deal with with every hide you tan! Until recently, most modern wet-scrapers had to brain and rebrain deerskins until they got soft. This can be very annoying. It is necessary because the fibers are coated with "many sweet mucus" that inhibit brain penetration. In living tissue these mucoids prevent penetration by whatever weird stuff you immerse your skin in. Stone-age Indians as well as ancient and modern old world tanners had ways of dealing with this, and did so conciously with each and every hide, and so should you! The bottom line is that if you can neutralize the ground substance, you can get complete brain penetration in one simple dunk in the brain solution.

"...powerful control (is) exerted by the ground substance over the passage of ions through skin. The mucopolysaccharides in ground substance ...bind water so firmly that few other types of ions can normally reach the fibres. ...Tannage of pelt with the ground substance still present, e.g. the tanning of raw skin, tends to be slow, uneven and uncertain."

R. Reed, Ancient Skins, Parchments, and Leathers

These are some definite, and some speculative, structure openers that I have found in neolithic deerskin dressing:

* marks the definite ones

*Curing dry skins

*Alkaline soaks (usually wood-ash)

Tannic acid soaks

Carbohydrate soaks (particularly corn)-

Hot springs (opens my structure at least)

*Sharp-tool scraping(dry-scrape)

*Pre-smoking

Repeated freeze/thaw

*Multiple brainings--includes multiple wringings

CURING

"Have you ever noticed that when tanning skins in August, its easy to get the brains penetrated and the hides supple? You think you know what you're doing... and then you get fresh hides in September and SLAM it takes three brainings to get them soft."

Matt Richards

As a dried hide sits over time, it cures. My theory is that the cure involves the mucus bonds weakening and then dissolving. This allows much easier brain penetration. Whether this was conciously used I cannot say, but many peoples had the rhythm of hunting deer in the fall and either fleshing, or fleshing and graining, and then drying and storing their hides until spring or summer. Many tribes had traditions of drying brains and storing them which implies this rhythm. Whether concious or not, this method was and is widely used. In some instances at least, it is likely that the hides were stored in the rafters of dwellings, and were thus pre-smoked (see pre-smoking section) as well as cured.

In my experience, partial cures seem to occur in 4-6 months and full cures seem to require a minimum of 9-12 months, depending on weather and storage conditions. If you find a three year old hide in Aunt Bessie's barn, tan it! If the bugs haven't beaten ya too it, it'll scrape and soften easily.

ALKALINE SOAKS

"The hide of the deer was soaked in water and ashes and the hair removed, and then the process of tanning continued until the buckskin was soft and pliable."

Geronimo

Many tribes soaked their skins in wood-ash water prior to scraping. The reason for this is often credited to the ashes causing the hair to fall out. The real value of the ashes lies in the alkalinity's ability to disrupt the mucoid bonds. It opens the structure in two to four days. Michelle and I are excitedly using this method. By adding ash to your pre-scraping soak, you can get complete brain penetration in one simple braining with fresh hides. The Comanche used burnt lime rock for the same effect. It was likely intentionally and unintentionally practiced in desert areas by soaking hides in alkaline lakes, pools or creeks (I now doubt this as few natural bodies of water are alkaline enough to be effective). This method was used, at the very least, throughout the Plains, Great Basin, California, and northern Mexico, as well as scattered other places. This method was also the predominant one used by American pioneers as well as modern commercial tanneries (who use hydrated lime or commercial lye).

Getting the p.h. of the solution right is the key to this method. The ideal alkali content is between p.h. 12 and p.h. 13. Pioneers would float an egg or a potato in the lye solution, if it floated so that an area the size of a quarter was exposed above the surface, then it was perfect. Alkali will temporarily cause hides to swell and feel rubbery. The merit of wood ashes were summed up by Andy Schuebeck, an eighty-four year old rancher that I met this spring, who was reminiscing about his youth when his family and neighbors made buckskin,

" They would soak the hide in wood ash water to get the glue out, so it tanned easier."

For a complete guide to this method check out the book [Deerskins into Buckskins](#)

TANNINS

Prior to braining the Klallam soaked their hides in boiled fern leaves. Other peoples added tannins to their braining solution in the form of punky douglas fir or shredded wood barks. This could have two possible effects. Tannins chemically combine with collagen fibers and change their nature, possibly interfering with the mucoid bonds. Acidity alone has much the same effect as alkalinity and would likely disrupt these bonds in much the same way. I have not used tannins in this way, though Steven Edholm and Tamara Wilder have. They did it with one hide and said that it seemed to improve brain penetration

CARBOHYDRATE SOAKS

"Young Indian corn, beaten to a pulp, will effect the same as brains."
John Lawson , describing the Indians of North Carolina, in 1709.

Indians of the southeast, northeast and the southern plains soaked their hides in corn water. Either using mashed sweet corn alone, or ground flint corn and brains to tan their hides. Soaked corn as it sits quickly sours, with two possible effects. Yeasts (such as acidophilus) digest the carbohydrates in corn and excrete acids ... and acids disrupt mucoid bonds. And, if you remember, our friends the mucoids are mucopolysaccharides. The saccharides, are also carbohydrates that the yeasts will digest, opening the structure. I have tried this in part with one hide, and I believe it improved brain penetration. It merits more experiments. There is no evidence that stone-age Indians allowed their corn to sour

for this effect. However, mashed sweet corn, soaking for 24 hrs., during corn season on the east coast where it is 90 degrees, 24 hrs. a day, is guaranteed to sour and have these effects. So it must have happened.

The technique of using soured grains was very commonly used in Europe for the same reasons. There they would use, soured grains or even beer dregs.

SHARP TOOLS/DRY- SCRAPE

Using a sharp tool allows one to scrape deeper, removing the entire grain and papillary layer where fibers are densely packed and the ground substance is particularly concentrated. It is easier to penetrate brains into the remaining fiber core where the fibers are larger and less tightly packed. Dry-scrape and sharp-edged wet-scrape(a modern hybrid) both accomplish this, and this is their advantage (see Jim Riggs' [Blue Mountain Buckskin](#) for a thorough account of dry-scraping). They can be very efficient methods, and I have successfully used them many times. The drawback is that you can very easily scrape too deep, creating holes and an uneven surface.

PRE- SMOKING

A few tribes hand-stretched their hides over a smoky fire after the first brain soak prior to the second, and a few others dried their just-scraped hides over a smokey fire. As mentioned before, this may have also been done incidentally by storing hides in smokey rafters. Smoke changes the internal structure of a hide creating crosslinks which I don't pretend to understand. It is still practiced in Canada by Native Americans on moose hides and by the Dinsmore bros in Montana on deerskins. They say that pre-smoked hides are easily brained in two soaks. For more information read Joe and Victoria Dinsmore's [online guide to 'pre-smoking'](#).

FREEZE/THAW

"The Shuswap declare that skins are rendered much easier to dress by freezing
(after graining)"

James Teit, ethnographer, 1900.

A few tribes conciously froze and thawed their hides repeatedly, claiming that it made them easier to brain. Matt McMahon and Molly Miller did this for years with the same effect. It is not claimed to result in one soak braining.

BRAIN/REBRAIN

Some tribes, like many of us, simply rebrained their hides once or twice, after working them partly dry, especially large skins. Each time the hide is soaked, brains penetrate deeper, opening the structure more. Repeated wringing and soaking is an efficient form of this practiced by some peoples, then and now. This method is also used when other methods fall short. I tanned 100's of hides with this general method, and hadalways hoped there was a better way. There is and there are....

Structure openers work. Understanding the need to neutralize the ground substance can make your tanning predictable and fun, instead of unpredictable and irritating. Each of

these methods has its ins and outs. I encourage you to experiment and where possible seek out knowledgeable sources for more detailed how-to information.

Technical Notes for Tanners

A suggested control for deerskin experiments

You must know the status of your hide's internal structure if you want to experiment with ways of improving brain penetration. Use fresh, frozen or wet-salted hides, hides which have not significantly dried since the deer's death.

When hides dry they start to cure and an unknown factor comes into play: how much is cure affecting your results?

Dried hides don't fully resaturate easily, which interferes with any soaking experiments you may try (e.g. wood-ash soaks). Hides frozen with the hair-on, or wet-salted seem to undergo no noticeable curing. They are just as tough to brain as fresh ones. Wet-salted means wet, not damp, almost as wet as it was on the deer's back. I experiment with frozen and wet-salted hides, and use fresh hides for the ultimate test.

Let's define "A Braining"

As we work to simplify our techniques, hide-tanners often discuss how many brainings it takes to get a hide soft, but we have different definitions of the term. For some, it is how many times a hide was soaked in the brains, for others it is how many times a hide was worked until dry. Each time a hide is brought to the ' wrung out sponge' moisture content and then put in the brain soup, brains penetrate deeper.

I suggest that if you get complete penetration in one soak, call it one braining. If you wring and resoak four times, call it four brainings. If you don't work the hide dry in between then you are rebraining efficiently, but you are rebraining. (note: hides brain better damp than dry, there is no advantage to working them all the way dry inbetween brainings)

Despite the fact that some techniques can result in consistently complete penetration in just one soak, you're always better off braining more than once just to be sure.

BRAIN SOLUTIONS

Brains contain emulsified oils, which permeate the water that they are mixed with, rather than separating from it. This quality allows the tanner to coat the fibers with lubricating oils, without saturating every pore of the skin with oil. Nearly all tribes used brains, although there were a few notable exceptions. Tribes of the southern Colorado River region used saguaro cactus seeds. The Tonto Apache used jajooba berries, a plant renowned for its emulsified oils. Sometimes, tribes in the southeast used sweetcorn. Peoples from the

Gulf of Georgia used fish and sea mammal oils, with a somewhat different methodology. They would completely saturate the skin repeatedly with oils and then they'd degrease it with urine. This would chemically create a different type of leather, known as oil-tan. This is paralleled in modern days, by the tanneries that use cod oil to saturate the skin and then degrease it with sodium carbonate, resulting in what is popularly known as chamois.

Other substances were put directly into the soak solution with the brains. Some of these, added oils; possibly to improve the feel of the finished skin, or at the least, to help the brains go farther. Other additives may have improved penetration by helping the brains slip past or break down the protective mucus.

ADDITIVES TO BRAIN SOLUTIONS:

Oils: spinal fluid, liver, bone marrow, tallows and fats, fish oils, acorn soup, pine nuts.

Soaps: soaproot lather (amole lilly), yucca

Tannins: decayed wood (mostly fir), wild rhubarb, others

Ashes, corn meal

Decomposition: The Sanpoil, Thompson, Wishram and Okanogan purposely decomposed brains for months before using. What this added, besides stench, I do not know, but I imagine something. Would you try this out? and then tell me all about it...

SOFTENING

Buckskin is stretched from damp to dry to make it soft. Tools are used to aid in the stretching, as well as to abrade the surface of the grain and flesh sides. This abrasion of the outer surfaces, allows the skin to stretch fully, and the texture to be soft. Abrading tools were used by all tribes. There were two types, rough surfaced and sharp edged.

The sharp edged tools, because of their shape, also stretch the fibers, serving two functions. Some of these are the "thumb-nail scrapers" common to archaeological sites. Many people mistakenly assume these tools are dry-scrapers.

SOFTENING TOOLS- counter clockwise from upper left:

Pumice, great for abrading without overly roughing up surface, extensive distribution. Mussel shells, abrades and stretches. Used as found, convenient thumb slot, and very effective. Common tool on west coast. Simple and retouched flint flakes, and slate shards. Many types of stone used including split river rocks (skipping stone types), extensive distribution. Stone and wood elbow adze, used with frame. Abrades and stretches. Used by buffalo hunting tribes. Hafted knapped stone, abrades and stretches. Plateau, Tlingit, Ojibwa, Natchez. Buffalo humerus core, from bulbous end of bone. It is porous and very abrasive, after aging. Plains. Elk antler, beveled. Abrades and stretches. Plateau, NW California. Cannon bone, beveled. Abrades and stretches. California, Plateau, Apache. Deer antler, beveled. Abrades and stretches. Also, any thing abrasive or with an edge: turtle shells, sandstone, buffalo tongues!





CABLES- left to right: Braided rawhide (buffalo sinew also used). Both mentioned mostly in connection with tanning Buffalo robes. Stretches hide well, a little abrasion, but not very durable (note wear in center). I might try a rawhide thong next time, for same effect, and no time braiding. Buffalo scapula, center of bone removed, working edge beveled sharp. Stretches and abrades, durable. Really shreds! Wild grape vine, lasts longer if used while still living. Some initial abrasion, good stretching. Also, any rough barked woody sapling, vine, or branch. Comanche, Potawatomi, northern California, eastern Great Basin.

Deerskins were very frequently softened in frames (woodlands, plateau, NW Coast), hanging from horizontal poles (plateau, Apache), over beveled posts implanted in the ground, and with the hands and feet. The beveled post was common

wherever the frame was not. There were many combinations of tools and softening techniques.

SOFTENING SET-UPS clockwise from lower left:

Wooden post with stone implant. This stone has sharp, squared, top edges, so the post abrades as well as stretches. Couer D'Alene, southern California. Wooden post, hide stretched as its pulled over beveled top. Doesn't really abrade. Very common tool. Suspended hide; hide suspended by buckskin thongs from pole supported by tripods. Allows for easy hand stretching and use of abrading and stretching tools. Plateau, Apache. Frame stretching; frame and hide lashed with rawhide. Allows you to stretch hide larger, thinner and flatter. Also reduces amount of stretch left in finished hide, which is good or bad depending on intended use. NW Coast, Plateau, northern Plains, Woodlands, Southeast. Knapped chert hafted to stick; long for two handed softening. Stretches and abrades. Common with frames. Beveled wood frame softening tool. Stretches, little abrasion.



SMOKING

"...heated smoke; and by some chemical process or other, which I do not understand, the skins thus acquire a quality which enables them, after being ever so many times wet, to dry soft and pliant as they were before, which secret I have never yet seen practised in my own country;"

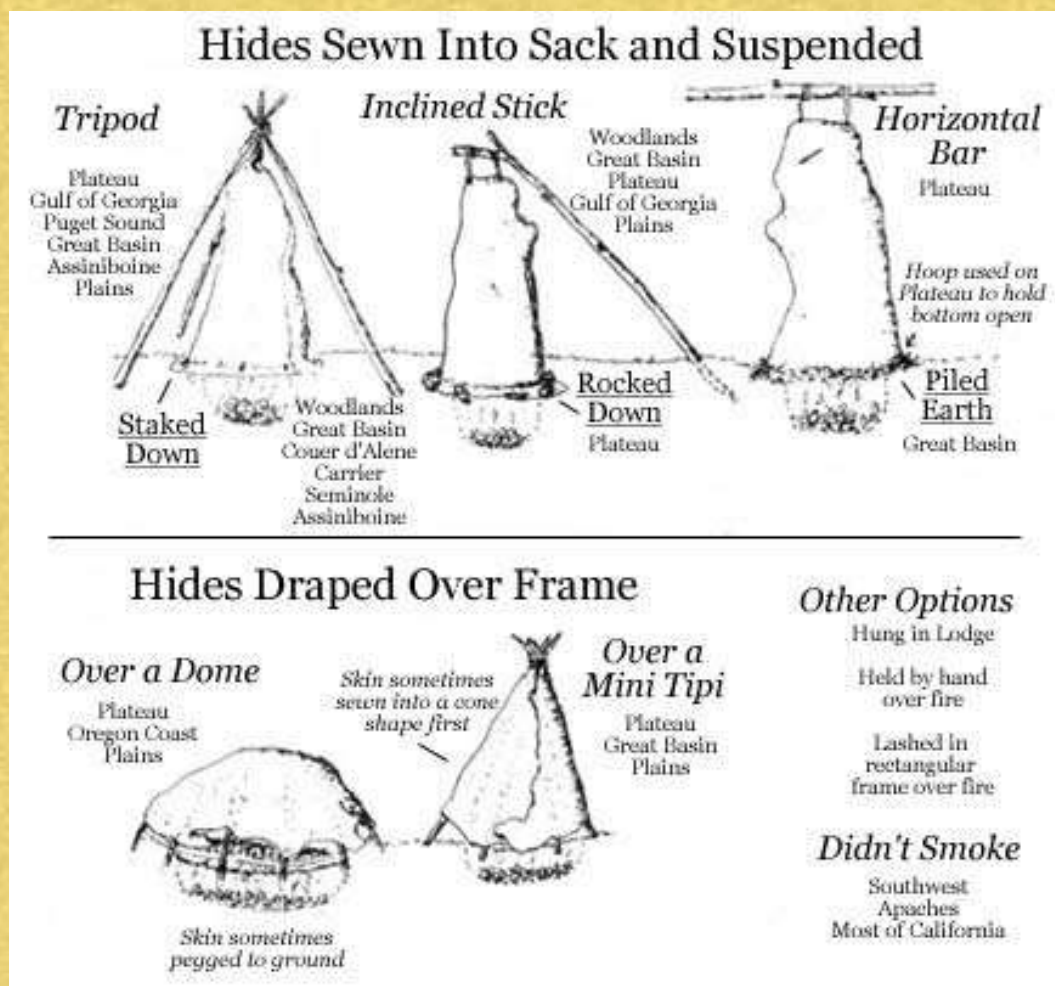
George Catlin, from his travels on the northern plains, 1832-1839.

Smoking was not nearly as important as we imagine. Some tribes did it regularly, most did it situationally, and many didn't smoke 'em at all. Many tribes only smoked moccasins. Next in line was leggings. Others smoked these two items until they were colored, and smoked other hides but not long enough to color them. In drier southern areas (the southwest, Texas, much of California, parts of the great basin) they never smoked their hides. Why not?

The myth is that if white hides get wet they must be completely resoftened. I've tested this alot, intentionally and unintentionally. The reality is that when white hides get wet they are somewhat harder to resoften than smoked hides, though not nearly as hard as unworked hides. However, the effects of the brains can be washed out of the hide and he more hides are smoked the easier they are to resoften, especially after multiple wettings. That is why smoking was more important in northern regions and moccasin hides were the most likely recipients.

I think it is also safe to surmise that native people's buckskin got functionally smoked in their daily lives: hanging up in the lodge, around the campfire, etc. If you've ever lived in a tipi or earth lodge or nearly any native dwelling, you've no doubt had your clothes smoked a bit too.

Traditional Native Hide Smoking Methods



TANNIN DYES

"... yellow and red, some black and russet, and every man according to his own fancy."

Spark, one of the explorer De Soto's companions, describing the deerskin clothing of the Florida Indians.

It is often stated that pre-contact Indians did not know of the use of tannins on hides. This is clearly not true. The very earliest reports, from nearly all sections of this continent, describe the natives coloring their deerskins with various bark dyes. They do not seem to have used them to create a full bark-tan, but even a short soak in tannins will change a hides nature to some degree. Tannins make skins less stretchy and a bit thicker, great for moccasins. They color skins. They may also make them slightly less water absorbant, long soaks do. I do not know how they effect their ability to go from wet to dry repeatedly.

Dyes were specifically used on white unsmoked hides. The art, and range of color were highly developed in the southwest and the southeast. There use was as widespread as smoking, though not always as commonly used. In some areas, tanners clearly had a choice whether to dye, smoke or leave a hide white, depending on the intended use, and the preference of the tanner. Like smoking, dyeing was particularly mentioned in connection with moccasins.

Tannin dyes used: alder, oak, paper birch, douglas fir, canaigre, ferns, sumach, hemlock, ironwood, willow, elm, elder, white maple, mtn. mahogany, indigo bush(dalea emorii), ephedra, lemonade berry (rhus trilobata), oregon grape, honey mesquite, leather root, mistletoe.

PARTING THOUGHTS

"Once the buffalo became virtually extict, and deer and elk scarce, hide preparations and use came to an end, and so abruptly that it has not been possible for scholars to reconstruct in complete detail all of the old ways of dealing with hides."

Thomas E. Mails, referring to the plains cultures.

For the previous generation of brain-tanners, studying old accounts was a hard way to relearn the art of brain-tanning. Thanks to them, we can learn the basics in a week-end class anywhere in the country. And once we have some

hands-on experience, the ethnographies, european leather technology, and experimentation, can teach us how to recreate processes that are efficient, authentic, in sync with our bioregion and fun. They may also help us understand how different techniques create different types of buckskin, best suited for specific uses. Whatever its future, brain-tan will forever en-deer you to its sumptuous softness, and primitive strength...

Feel free to [email us](#) any of your thoughts and comments on what you just read!

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the [entire bibliography](#) of over a 100 works is now online...

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HAFTING AND NATURAL GLUES

By Charles Spear

(Bulletin of Primitive Technology, Spring 1994)

The methods of hafting used by 'primitive' man involved natural materials, which by their very nature resist change contrary to many modern adhesives which deteriorate over the long haul of time. To greatly overstate the case most natural glues are the residues of deciduous and coniferous trees and the glues from animal hide and bones. In the case of deciduous trees I have found black locust, tulip, white ash, wild cherry, apple to secrete a gummy residue, which are water-soluble glues. They are quite sticky and dry to a hard tenacious binding when coupled with fiber wrappings. In addition, when dry they resist water unless they are soaked.

Conifers such as blue spruce, fir, yellow pine, white pine produce a pitchy-resin which is very adhesive and dries to hard and waterproof glue. In order to prepare the conifer type resin glue I begin by collecting hardened lumps from the tree trunk and on the ground after they fall. The lumps are then packed into a tin container and covered with turpentine. The can is then set aside until the whole mass has softened and is more like a thick varnish. The viscous liquid can now be strained and heated but do not allow it to boil. Strain again and store in a clean ceramic pot with a tight fitting cover. The resin is then used in socket and notched hafting conditions and allowed to set over low heat as the turpentine and volatiles evaporate.

The deciduous gums are collected in the same manner by making a small horizontal cut in the above mentioned trees which greatly increases the amount collected. Several trees are cut and the gum

collects below the cut. These nodules of gum are placed in a mortar with a small amount of water and ground and mixed to a pasty consistency, a small amount of egg yolk can be added to increase the body and toughness of the glue. The hafting is brushed with the glue as it is wrapped and allowed to dry in a warm location over a fire or in the sun.

The hide and bone glue is made by boiling these items until most of the water has evaporated and the gelatin is released. The contents are cooled and separated from the hard matter. Again the mixture is reduced by slow boiling until the excess water has evaporated. This viscous gelatin glue is put on hot and allowed to cool and dry out over a weeks time when it becomes tough and resistant to water and wear, especially when combined with fibers as binding.

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WHAT KIND OF SOUND DOES A GOURD MAKE?

The Plant, The Process & The Possibilities

Text by Steve Watts



"Their chief instruments are rattles made of small gourds or pumpeons shells. Of these they have base, tenor, counter-tenor, mean and treble. These they mingled with their voices, sometimes twenty or thirty together..."

John Smith, 17th century, Virginia

GOURDS? First . . . a little taxonomy for clarity's sake: The use of the term "gourd" in popular literature and common speech sometimes leads to much confusion. In England, if you were to ask for a "gourd" you might get a pumpkin or a squash. So-called "ornamental gourds" (*Cucurbitapepo*), typically found on the decorated American

Thanksgiving table, get the same label. "Loofah gourds" (*Luffa aegyptiaca*)-that utilitarian fibrous vegetable used historically for washing dishes and more recently for up-scale human bathing-is actually most closely related to the cucumber. In Middle and South America we find the "calabash" or "tree gourd" (*Crescentia cujete*)-a species unrelated to all of the above. For the purposes of this article, the word "gourd" is used to refer to the so-called "hard-shelled gourd" (*Lagenaria siceraria* or *Lagenaria vulgaris* in the older literature). *Lagenaria* are members of the Cucurbitacea family. This large plant family includes cucumbers, pumpkins, squashes, watermelons, cantaloupes, ornamental gourds, etc. Hence, we discover some of the root of the confusion.

DISTRIBUTION

Hard-shell gourds are found in the temperate and tropical zones of the Americas, Africa, Asia and the Pacific. Much has been written concerning their origin. The debate usually comes down to a choice between an African or American genesis theory. (For one of the best treatments of this question in the popular literature, see *The Gourd Book*, Charles B. Heiser, Jr., 1979, chapter 7.) Whichever continent may ultimately lay claim to its birth, the fact remains that *Lagenaria* fragments appear in the American archeological record as early as 6 to 7,000 years ago. Recently, identifiable gourd seeds were found in Florida in preserved mastodon dung!

For the modern primitive gourd crafter, distribution may be as near as the backyard garden (see "Gourds: Their Culture and Use", Hamlin, *The American Gourd Society*, Mt. Gilead, Ohio for cultivation information) or a commercial grower/distributor (Lena Braswell, Braswell's Gourd Farm, Wrens, Georgia is a first-class contact. See BPT #3, Resource Directory).

PROPERTIES AND PREPARATION

Gourds were perhaps most likely used by early humans for containers or a less than tasty food source. Additionally, *Lagenaria* possess certain properties which make them ideal for the manufacture of a variety of musical instruments. And, variety itself is one. Hard shell gourds come in sizes which range from just a few inches in diameter to bushel basket size. And, the shapes-globular, elongated, spherical, flattened, tubular, hourglass, goblet and bottle-shapes are only some

of the forms-forms which can compete favorably with the human imagination.

A good, mature gourd is "woody" and extremely durable to a point, yet can easily be worked using stone-age tools (see Watts' forthcoming *The Primitive Gourdworkers Handbook*). Being hollow, gourds serve as a natural resonating chamber, so important in the magnification of sound. Only bamboo rivals the gourd as the choice material for the construction of primitive musical instruments worldwide.

Preparation of gourds for instrument manufacture is simple once a mature gourd is obtained. Gourds have reached maturity when the vine has died and dried (photo 1). Cutting a gourd from the vine prior to maturity will result in a rotted, not a dried, end product. Depending on the gourd's size, it will dry (preferably outside in cold weather) in a few weeks to several months. When dry it will be relatively light in weight and one can hear either the seeds or a large lump rattling around inside when shaken.

During the drying process, the outer skin (a thin layer which covers the thicker shell) will flake, mold, mildew and generally begin to look like a leftover science project gone bad. Have no fear. The transformation now begins. After wetting down the gourd's skin to soften it, begin to scrape away the offending matter with a knife, shell or stone flake (photo 2). The skin will peel away and you will be rewarded with a beautiful, smooth, cream to amber colored shell. This preparation serves more than an aesthetic function, by the way. The cleaning of the shell's outer surface (like the removal of the pithy material inside the gourd) will aide in the prevention of future deterioration. An unscraped gourd will continue to draw moisture, even from the air in humid climates. And, if your are looking for a resonator here, be assured that improved appearance equals improved performance. You are now ready to cut, empty, interior scrape, perforate, oil, decorate or otherwise modify the gourd to suit your purposes.

THE INSTRUMENTS

What follows is a sampling of the variety of musical instrument forms which can be created from the hard-shelled gourd (photo 4). There are many others. Only historically ethnographically based examples are cited here. Your imagination and creativity alone define the limits.

What kind of sound does a gourd make? Using the traditional ethnomusicological classifications of instruments, let us begin to explore.

IDIOPHONES:

Pick up a mature dried gourd and shake it. You have just discovered (as did many an ancestral musician) one of the most widespread of all idiophones-the rattle. Gourd rattles may take either the simple or the composite form-i.e. the whole intact gourd with seeds inside (sometimes perforated to "let the sound out") or, a cut gourd with a handle attached and stones or seeds added to create the desired sound. African and Native American examples abound, from which you may choose. "Shake re"-type rattles derive their distinctive sound not from objects within but from the netted arrangement of seeds, shells or beads which hit and rub against the gourd's hard outer surface.

The concussion "drum" of Hawaii-the ipu is simply a large bottle gourd with the top removed, which is sounded either by slapping with the hand or by being dropped/thumped on the padded ground. This is a true idiophone, not a drum in the classic sense (see membranophones below).

Rasps, or friction idiophones (known as guiros in Latin America) are created by cutting a sound hole or removing the end of an elongated gourd and cutting grooves across its surface. Sound is produced by rubbing across these grooves with a wire or thin wooden stick.

Gourds also serve as separate resonators in some composite idiophonic instruments-the "thumb piano" of Africa and the wooden-keyed xylophones or marimbas of Africa and South America are often amplified with the addition of gourds.

AEROPHONES:

Cut both ends from an elongated gourd, blow in one end bugle-style, and you have the simplest of gourd aerophones. Traditional Africa is filled with a variety of horn-like instruments either made from gourds entirely, or in which gourds are used as a component. These include trumpet-type horns (either transverse or end-blown) along with double and single-reeded oboe and clarinet "snake charmer" types.

Simple gourd whistles and nose flutes have been reported from Polynesia and the Native North American Southeast. These are single to triple-holed affairs made from small pear-shaped gourds and blown "bottle-neck" fashion. The long necks of dipper gourds have also been fashioned into multi-holed flutes (see "Gourds of the Southeastern Indians", Frank G. Speck, 1941).

Perhaps one of the most unusual of aerophones is the "swing top" from Hawaii (see Hawaiian and Other Polynesian Gourds, Dodge, 1978). This musical amusement is made from a small gourd with its top removed and swung by a string around the head in a bullroarer fashion. It produces a high pitched whistling sound which one can interpret as soothing or annoying depending on your mood and taste.

MEMBRANOPHONES:

Stretch a wet rawhide over the cut off end of a gourd and you have a drum. It seems obvious enough, considering the hollow resonating structure of the gourd form. Yet, I find ethnographic examples only from Africa-none in Asia or the Americas. I trust that there are readers who can enlighten me further. I do know that I've seen a few nice gourd drums made by modern practicing primitives, of both the single and double-headed variety. (I'm referring here to the drums, not to the makers.)

CHORDOPHONES: From the most simple of musical bows (like the berimbau of Brazil) to the most elaborate of sitars and vinas from India, the gourd functions to amplify the sound of the plucked string. Various forms of lutes, zithers, harps and harp-zithers are found throughout Africa-many with one or more gourd resonators. (See African Music: A People's An, Bebey, 1969 for excellent examples.) The birthplace of the Afro-American banjo is disputed. But, whether its inventor was a free man of West Africa or a slave in the Americas, gourds were there at its inception.

What kind of sound does a gourd make?

Perhaps it's the quite, mellow sound of a single-holed flute in the woods of the tidewater Virginia Rappahanock.. or the deep throated booming sound of a whole orchestra of gourd drums in Africa's Upper Volta... or the sensual wave of sound that flows from an ancient classical Indian raga . . . or the soft but sure sound of the healer's

rattle from deep within the Amazon Basin.

Or maybe, it just might be the sound that you make...from where you are here and now.

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Working Soapstone With Bone Chisels

By Steve Watts, 1997

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Soapstone bowls can be worked from start to finish using only stone picks, hammers, scrapers and unmodified flakes (see Allison & Jones). I believe these were the tools used most often by prehistoric bowlsmiths, and completely authentic replicas can and are created using such tools. Yet, sometimes a faint track from ancient times leads us a bit further down the trail. Hence, this short tale.

Sometime around 1981, I decided to try to add bone and antler chisels to my soapstone working tool kit. They worked pretty well, but I discovered that they needed to be relatively narrow in the bit (1 1/2 inch or so) to be effective. Before long, I dropped their use and pretty much forgot about it.

Five or six years later I met Terry Ferguson-an archaeologist at Wofford College in Spartanburg, South Carolina. Terry has looked at more aboriginal soapstone

bowls, bowl fragments and quarry sites than anyone I know or know about. His thesis work involved the location and survey of archaic soapstone quarries and soapstone bowl manufacturing sites up and down the entire eastern seaboard. He had noticed some characteristic markings on late stage bowls and bowl fragments-shallow parallel groves on both the interior and exterior. Sometimes these groves were evident even on the surfaces of completed vessel - their traces having not been completely removed by final stage finishing processes. He speculated the use of some kind of toothed implement.

With this inspiration, I returned to the bone chisel experiments. Only, this time instead of a straight bit, I created a toothed bit-much like the metal chisels used by modern-day stone sculptors (see illustration below).

These tools, when used with a wooden mallet, give the bowl maker lots of control in the final stages of work. There is less fear of breakage and the bowl walls can be thinned with regularity. The secret to the toothed arrangement lies in the spaces between the teeth. With a four-toothed chisel, you essentially have four tiny chisels working together simultaneously. A broad flat bit has too much to push/ cut at once. Multiple passes over the same area with the toothed tool removes material at a quick rate without getting hung up on inclusions which can often stop, chip or misdirect the straight- bitted tool.

Chisel manufacture is simple. I make mine much like a bone hide flesher, but with larger, thicker teeth. Choose a strong leg bone (deer, elk, etc.) one free from cracks-as it will take a lot of abuse. After cutting the bevel and the teeth, round off the upper end. This is the end that takes the mallet

blows, and the rounding strengthens the surface and saves wear and tear on your mallet.

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