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Number 3

PRIMITIVE TECHNOLOGY NEWSLETTER

A Supplemental Publication of The Society of Primitive Technology

The Society of Primitive Technology is a non-profit organization.

Special Topic:

LIVING WITH FIRE IN A STONE AGE HOUSE

A letter to Errett Callahan from Larry McCoach, Folkhill, NY - Jan. 6, 1996

I live with some friends here in New York state on 90 acres of land. We live a simple lifestyle, "simplicity" being the foundation of our philosophy. We live without modern conveniences or trappings such as electricity or running water, drink from a hundred year old well, and live by the sun and moon (no clocks or calendars). We do use some candles (bee's wax from our bees), but mostly we like light from the open fire. Our shelters have been an evolution. Ten years ago (long before I arrived) when the land was first purchased, a cabin was built. It was simple (12' x 25') with a wood stove, again no electricity, etc. . . Over the years other shelters were tried — tipis, wigwams, longhouses, earth lodges — all in the quest for simplicity. The original group of people who founded this place (and are still here) did not have any background in book or classroom primitive living skills. They just knew they wanted a simple life-style and were drawn to the Native American culture for that information. Lacking survival or primitive living skills, they improvised, first using blankets then carpeting as coverings on the wigwams. They used what was available to them and what worked. One wigwam is called the six blanket wigwam and is still used after three winters. It has no fire, and is only 7' in diameter and 4' high. It doesn't leak even in a downpour. With a few warm stones and some blankets it keeps a person warm in winter.

I moved up here in '94. I have some primitive or "simple" living skills I learned from survival schools and a lifetime of interest. With my knowledge (limited as it may be) we began working toward totally natural shelters. In some of the wigwams there are currently stoves with chimney pipes (wigwams are approx. 8' x 8' x 6'H). We are determined to get rid of these stoves and live with the open fire which provides, among other advantages, light, company, and smoke for meats.

> ***"Primitive houses are rather like living beings. You feel that at any moment a Stone Age man will step out through the doorway."*** *Hans-Ole Hansen*
> *I Built a Stone Age House, 1962*

Carol Hart

Don Clarke of Living History programs in Ridott, IL stands next to his Iroquois-style bark house.

The first open fire was made inside a small wigwam covered with blankets (6' x 6' x 4'H). A rock hearth was in the center of the shelter and a small smoke hole (about 1 foot square) was directly over it. When not in use the smoke hole would be covered with another blanket. This wigwam was only used part-time for sleeping and making tea. This set-up worked well with some smoke problems but again it was only used part-time.

Another system placed the fire closer to the door side of a wigwam, using the door as the smoke hole. This worked somewhat, but it was still very smoky. A stove pipe was placed over the fire and through the side of the structure creating a sound draft system. Very little smoke got trapped inside the shelter, but this still meant dealing with pipes. It worked, so it was used for quite a while (2 years). This shelter was covered with rugs.

I built a small (13' x 7' x 7-8' H) Iroquois-style longhouse last spring and covered it with carpet. The door was to the east end of the structure and the fire was placed in the center with an 18" diameter smoke hole directly above it (this was later enlarged to

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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.

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A Letter To Consider

In response to Larry McCoach's letter (see cover artice), I thought it woud be interesting to begin a new line of input from the membership - ***What have you learned from living in a stone age house?*** *I sent out a letter (partially printed below) to over 30 members that I knew had extensive shelter experience or were involved in ongoing projects related to shelters. What have you learned or what problems have you encoutered ? Look at some of the discussion topics below and let us know your thoughts. Please limit solutions to natural materials with some foundation in prehistory (possibly a plan view of an excavation - see page 3), and focus on information with enough detail that others can duplicate your solutions.* ***The Ed.***

Dear Members: We want to discuss the experiences one might encounter while living in an "enclosed self-standing structure" (water-proof house as opposed to a cave) i.e. water damage and leaking, smoke release methods, how much room is required for cooking, storage, sleeping; seasonal considerations. We also want to investigate simple structural questions and solutions: i.e. what is the optimal size of a structure based on available materials, occupants - Is there a size to work ratio? What is the point of diminishing return?; gable designs for waterproofing; common pole/frame gathering, planting, binding methods; covering methods - thatch, bark, mats; common regional applications, materials and solutions; etc. What we need are short tips, graphics, ideas, and models.

A Place To Begin

By Errett Callahan

Dear Larry,

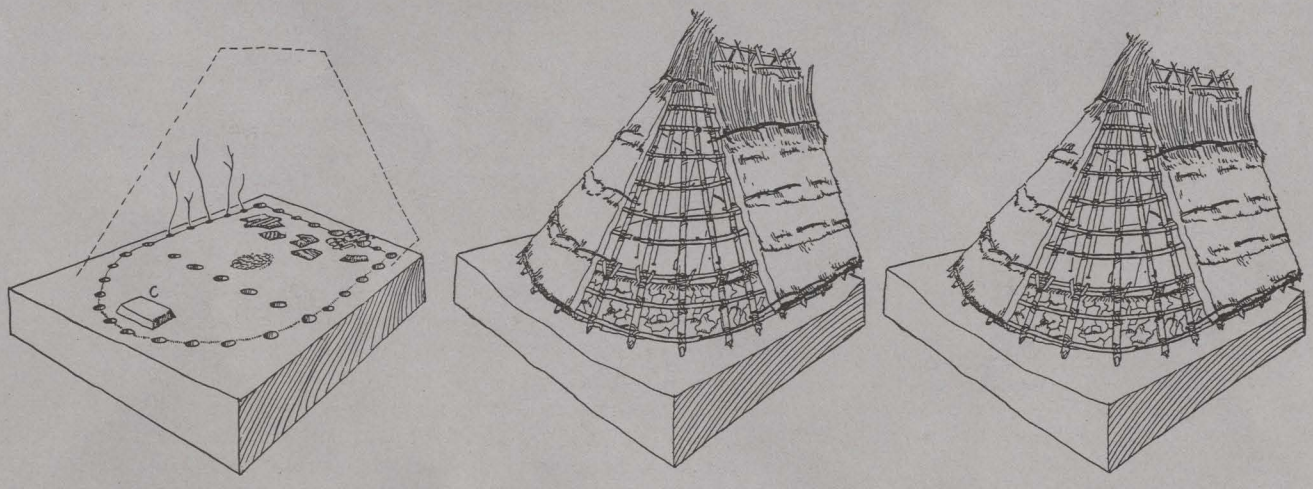
Thank you for your long & thorough letter. I know what you're going through, as I did numerous extended living experimental projects back in the 1970s. All of these got published in detail (Old Rag Report, APE #3,4, & my 1981 PhD dissertation). We stayed out for periods of 2 to 9 weeks, but always in the summer time. I'm perfectly well aware of the multiplicity of problems you'll encounter in the winter. I had to taste of them via several week long projects in the Arctic in winter recently.

My solution was not to invent and go thru all of history again working forwards, but to work backwards starting from known archeological reality—coupled with ethnohistoric observations & pictures. (All detailed in my dissertation) So I started with houses known to be solutions, not guessing at what must have been. We arrived at the same conclusion as Keegan—build high and avoid the smoke. (If you can get it to linger at chest height, then you can sit and be out of the smoke). However, bear in mind that Captain John Smith said the Virginia longhouses were "warm as stoves" but 'quite smoky". Remember too, that smoke is a preservative and is just what you need to preserve hides, bowstaves, next spring's crop seeds, basketry, leather, etc. It also drives bugs out of the thatch as well as the mice and snakes, etc. So you need smoke. But as for how much is too much, how to get rid of the excess, how to manipulate the smoke holes and drafts, day in and day out all year long, we don't know. This will be up to you to determine. We'd all like to know the answers you'll come up with. And I would suggest you start with prehistoric reality, make accurate reconstructions at full scale and work backwards from there. House attributes are always tied into the local environment and climate. (A Banto hut won't work in the Arctic, etc.) That means doing your homework. Go to your local archeologist, seek out the literature on prehistoric housing, on ethnohistoric observations, & go from there. Look up the experimental literature (much is mostly long out of print, but the SPT may reprint some day, if there's any demand.) I am currently doing a book on prehistoric house reconstruction (the Cahokia Report), but it's still several years from completion.

There was a year-long living experience (not experiment) done in England back in the 70's, sponsored by the BBC. Iron Age house reconstructions and an associated farm were used 100%. Most of their conclusions were about social problems. A great technological waste of time in the opinion of most observers.

Sorry I don't have all the answers. I just did enough research to uncover the problems and some of the mild weather solutions. It'll be up to this next generation to provide the answers to winter subsistence (as opposed to short-term survival). Again, to be of any value to posterity, tie your house types in with past reality and see if you can come up with some technolgical solutions to help us understand the past. That is, try to make predictions. Then you'll be doing something of lasting value instead of personal therapy.

We would like to thank Jay Anderson, author of Time Machines and The Living History Reader for providing access to the many project reports that we reference in this issue of the Newsletter. Jay's interest in Living History and Folklore made him an early historian in our field.



In his book, I Built A Stone Age House, Hans-Ole Hansen's project started with the post molds and hearths uncovered through excavation. The resulting evidence provided the blueprint for his intended house (never do a project on an existing site). These illustrations show the progress of his design: from original footprint to support wall and final covering.

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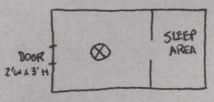
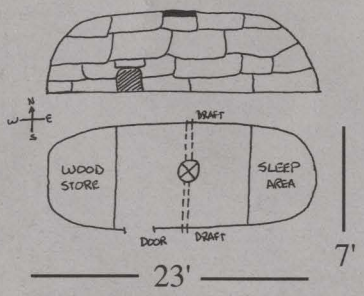


a 2' diameter). I lived there full-time from spring until fall (March-Sept.). Smoke was sometimes a problem - down pressure and east wind - but the fire wasn't used all that much (breakfast and dinner) and was put out between. It was warm., but smoke lingered somewhat in the top section. I stored blankets and clothes up high because of limited floor space, and these things got very smoke-stained. I was bathing in our pond every morning so personal hygiene wasn't an issue.

In September I converted the structure into a Lenape-style longhouse (23' x 7' 7-8'H). This gave me more space for storage of wood, clothes, etc. I planned to cover it with natural materials and made nineteen 6' x 7' grass mats using a simple loom, but an early snow stopped the project. I had intended to cover the whole thing and not have a smoke hole - just let the smoke filter out through the mats as I'd read it was done. Instead, I ended up covering the roof with carpet, leaving a smoke hole (18" sq.) directly above the fire pit. I dug two drafts running to the closest walls, one running to the north and the other south. I placed the door on the south side (longside) at



a location that was not directly in line with the placement of the fire pit.. I lived in this structure for about a month....until the cold weather changed things. The open fire which worked OK during the summer wasn't working so well in the cold. The fire was being used more and I was spending more time inside. This meant a heavier build up of smoke and ash on the inside (clothes, blankets, me). Everything I touched was sooty, and this was in spite of a large smoke hole. The door was either closed or partially closed much of the time due to wind and snow.

The smoke hole has another problem which is hard to solve. On nice days it lets in light but on snowy or rainy days....well, it lets in snow and rain. A lean-to-like covering was constructed over the smoke hole.This helped, but less light and slow smoke escape were the result. As I stated before, I was hoping the thatch would eliminate the need for a smoke hole.

Long-term living is a lot different than short-term survival. I'm sure you understand what I am trying to say. Most survival schools, as good as they can be, focus on short-term survival. And if long-term living is covered it's not covered in detail. Smoke created by an open fire inside of a water-tight structure is a problem unique to long-term situations. I know many knowledgeable primitive people, survivalists, etc. who've read, studied and spent weekends or maybe weeks living primitively. They were highly motivated, but knowing that a hot shower and clean sheets were waiting for them at home, they could put up with a lot of inconveniences. With me this is home, I have no other, though as I write to you I am living in that cabin I mentioned earlier. I want to be living in the longhouse by an open fire. Any simple, natural shelter will due as long as it has an open fire.

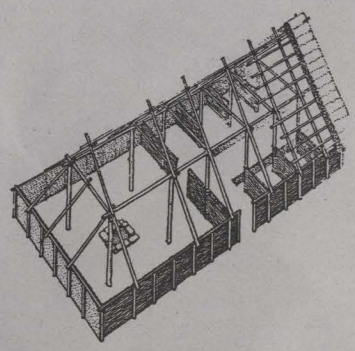
I've read about the "Black houses" in Scotland and how smoky they got without a smoke hole. I wrote to Barry Keegan and he told me of a weekend he spent in a phragmities-covered longhouse that was over 12' H and the smoke hovered just over his head. He said he was warm and comfortable. I looked at pictures of the Wichita thatched dwellings and how tipi shaped they were. I can see by these two examples that if I cover a structure with thatch (no smoke hole) it must be high to keep the lingering smoke above the head. But that means everything inside gets sooty very quickly, and is exposed to ash fallout. There must be a way to make it work.

This is how I like to live, but I do have needs to be somewhat clean. And during winter, water is a challenge. Can anyone help? What are some options? Again simplicity is the key. Do you know of any Native American dwellings that worked well? It seems to me that someone, somewhere came up with a dwelling that was livable to modern or at least close to modern standards. I don't want to live in a type of "Black house". I would hope that by using good drafts and shaping the dwelling properly I could get good results. I don't expect a primitive or natural shelter to be as sterile as modern people demand houses be, but I don't want to live in an ash pit either. So if anyone can offer any help, I would be thankful.

Thanks for your time. Peace and happiness.

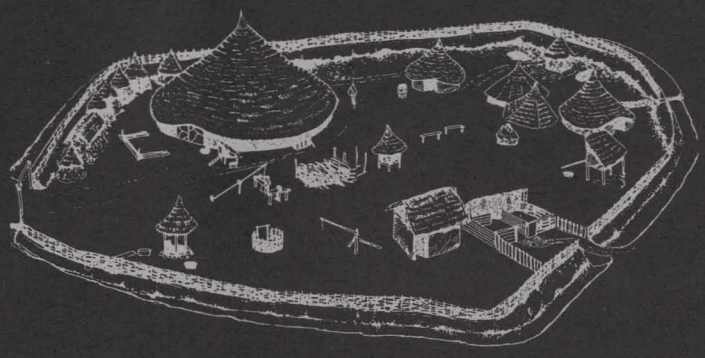
Larry McCoach

Larry is interested in networking with others concerned with this problem and can be reached at Folkhill, Forshee Rd., Smithville Flats, NY 13841. The SPT is very interested in following this discussion, so keep us posted.



A Neolithic longhouse from an excavated site in Britain.

It is necessary to live an experience in order fully to comprehend it.
John Percival
Living in the Past, 1980.



Living in the Past

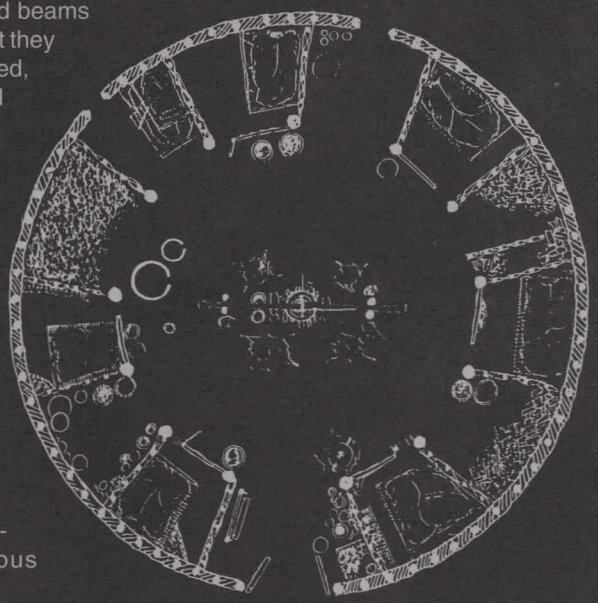
Excerpted from John Percival, © 1980

In 1980 the BBC sponsored a one year project to see how modern people would adapt to iron age technology and living skills. The following is a brief excerpt from the project journal relating to living in the grass thatched common house (30' high and 50' across).

The inside of the big round house was always filled with a thin haze of woodsmoke, which turned into a choking fog when the baking stove was fired in the early morning. Everybody was kippered by it. Skin, hair, clothes, everything, was deeply impregnated, so that they smelt, quite sweetly but distinctly of woodsmoke.....the round house was remakably warm. In the daytime, even with both doors gaping to the cold air to let in what little light there was, the area round the fire was always warm. At night, with the doors closed it was almost to hot for comfort. After the evening meal people would spread their sheepskins on the uneven floor and gather close around the fire, chatting, spinning, one of the girls might be kitting and one of the men whittling a knife hndle or making a thumb pot from clay prepared earlier in the day. The fire would be banked up brightly, not for warmth, but to provide extra light. So, as the evening lengthened, the circle widened as everyone withdrew from the heat, often to lie on the bare earth floor and gaze at the firelight flickering on the polished beams of the roof. Not that they were really polished, but the smoke had formed a shiny black carbon surface on the rafters and dyed the thatch a deep orange, the straw also seemingly varnished by the smoke until it shone. Thick black nets of cobweb, heavy with soot, spoiled the illusion of zealous cleanliness.

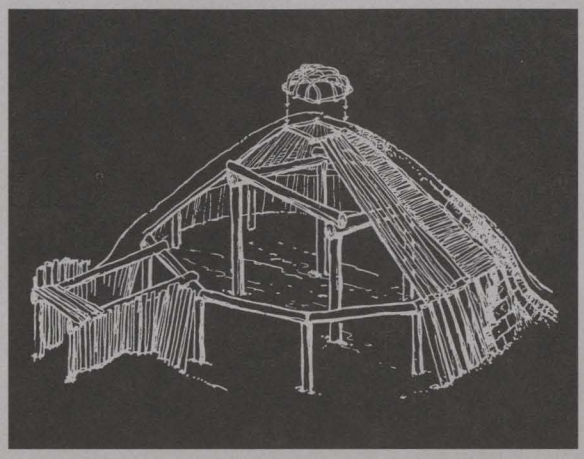
Archaeologists used once to believe that the fire hazard inside these round houses must have been a constant risk, and I had worried about myself. But the sparks which swarmed towards the roof seemed to die before they reached the black pocket of constant darkness, just beneath the roof cone itself.

On the nights that I stayed in the round house I would sometime spread my sleeping bag close to the fire as it slowly burned down. The villagers had a system for keeping it burning all night. The cooks for the following day - in practice it was always the man who was responsible for the fire - would cut and bring into the house a huge green log, an 'all-nighter'. The fire would be raked and scattered and the big log placed on the embers. The log would then smolder gently all night long and the cook in charge would only have to spend ten or fifteen minutes in the morning with dry twigs and split kindling blowing and fanning until it flared bright and hot to cook the breakfast of boiled wheat and cereal coffee.



Lessons From Living In An Earth Lodge

By Chris Morasky



I have built or helped build a pit house with a 35' inside diameter, an earth lodge with a 26' inside diameter, a grass-thatched wickiup with an 18' diameter, and a cattail mat lodge with a 12' diameter. I currently live in a 16' diameter tipi. From my experiences with these diverse structures, perhaps the most important concept I can suggest to would-be woods dwellers is that we humans are amazingly adaptable. These structures vary considerably in size, shape, heat retention, draftiness, and lighting, yet within a short time each one felt like "home". My primitive homes were used differently than most modern homes, however, in that they were used primarily for cooking, sleeping, and crafts on rainy days. I lived outside. By living this way, I have always had an extremely large living space, but often a small shelter.

All of these structures are beautiful, inexpensive (or free!} and have many other wonderful qualities, but I will focus on some of the difficulties that I have faced in building and living in primitive housing. One of the biggest problems has been smoke. All of these structures will fill up with smoke from a fire if the wood is wet, green, or poorly tended. I prefer to burn hardwood branches, always keeping a 3-4 day supply in a dry place. Structures with a high ceiling allow smoke to collect overhead. I generally prefer to let the fire die out at bedtime and curl up under lots of blankets than to breathe smoke overnight.

Another problem with some shelters has been moisture, particularly with the pit house. This structure was dug down nearly 6 feet, and ground water would seep in after every rain. To reroute the ground water, a ditch was dug around the structure to a depth below the floor of the pit house. This has worked well, and the ditch will be filled in with rock. The roof of the pit house, however, also leaked. It was built with log rafters, then covered with straw bales, then covered with 1-1.5 feet of soil. The seams between the straw bales plus unusually high rainfall were apparently responsible for the leaks. The 26' diameter earth lodge was of a similar construction, with a log framework covered with brush, then covered with loose straw, then soil. The earth lodge did not leak, though the straw and dirt layers were thinner and the roof pitch less steep. However, the rainfall in the area around the earth lodge is a bit less than half that of the area around the pit house

Traditional Hidatsa and Mandan earth lodges were generally covered with approximately 6 inches of willows, followed by a layer of grass (sometimes woven}, then a final layer of soil or sod. After a heavy rainfall, their roofs leaked, too. Perhaps one of your readers can suggest a better means of waterproofing an earthen roof with natural materials? Bark shingling (elm} was occasionally used and was reported to be waterproof.

The earth lodge and the pit house were also quite dark inside, since the only openings for light were the smoke hole and entrance. During the short, cold days of winter the pit house entrance was often closed to conserve heat and the smoke hole partially closed: I felt like a mole. The trade-off for light was the incredible heat efficiency that these structures afforded. A fire could be easily maintained to provide a comfortable overnight temperature even when the temperature outside was near 0 degrees F.

A final difficulty encountered with both the pit house and the earth lodge was shifting of the lodge poles. The cause of the problem seemed to be uneven application of soil around the roof and walls. The shifting was so severe in the case of the earth lodge that the soil had to be removed to straighten the framework. Once the weight of the roof was evenly distributed, the structures became quite stable.

All of this information might suggest that plywood and plastic sheeting are our only hope for a comfortable, dry, low cost shelter, but don't despair. With each attempt at primitive architecture we learn secrets that help us make our next shelter better. Keep trying! Few things are more satisfying than sitting beside a crackling fire in a natural shelter of your own making, listening to the wind and rain outside, and knowing that you are "home".

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Chris Morasky operates Earth Circle School of Wilderness Survival. He may be contacted at: P.O. Box 742 Grangeville, ID 83530. Or leave a message at (208) 983-3406.

Considerations For Open Fire As An Enclosed Heat Source ?

Text and Illustrations By Tamarack Song

Here in the Upper Great Lakes area one of the major challenges to year-around primitive living is comfortably warm winter shelter. In my effort to gain the skill I have gleaned but tidbits of information on the topic from the historical literature, I've found little of substance in contemporary sources, and I have yet to meet someone who knows and lives the skill with proficiency.

I, myself, do not possess the skill to my satisfaction; I have much yet to learn. The various lodges I've built have provided me the opportunity to experiment and to put to test what I have collected from other sources. In the interest of fostering and participating in a sharing to further the collective knowledge of the skill, I here present a facet of what I have gained thus far. So that all may benefit, I suggest we use this publication as a forum for further exchange. (I'm amenable to personal communication as well.)

Because of the broad range of the topic and limited space, I will confine my discussion to heat provision only. Attendant skills and considerations, such as site selection, shelter design, materials and construction, though essential factors, will be touched upon only as they directly relate to heat provision. In my experience the limiting factors are smoke evacuation and, to a lesser degree, heat retention, so I will prejudice my contribution in favor of these considerations. Functional dynamic will be itemized in order to give you the base understanding needed to pursue your own experimentation.

Before offering anything I need to emphasize the extreme potential danger of open fire in this application, both because of the highly combustible nature of the setting and because of the risk of asphyxiation. I've learned about each the hard way; they are potent and frightful teachers. These notes are not intended as a complete how-to, so please exercise caution in your experimentation and take pain to incorporate the wisdom of others.

CRITICAL FACTORS

1. Conservation

This is our first consideration for the cozier the shelter the less heat is needed, and the less often heat is needed. The easiest-to-heat lodges are small, round-floored, low-doored (air exchange is rapid when a small-volume, high-doored lodge is opened), super-insulated and draft free.

2. Height-Diameter Ratio

Elevation is necessarily to create adequate draft—the force which evicts the smoke. Thus squat shelters (see Fig. 1) usually have poor draft. Peaked forms, although providing adequate elevation, do not allow for the formation of a good "doughnut" (see sidebar) so may yet be smoky. (Tipis are a peaked form which does work because the draft is augmented by suction [i.e., negative air pressure] created in the lee of the smokeflaps by the draw of the prevailing wind. Tipis are generally not found in woodlands because of weak winds of variable direction, caused by the eddying effect of trees.)

Although no ideal height-to-diameter ratio can be arrived at, because of the variables associated with non-conforming designs, we can generalize by stating that a lodge with vertical to slightly bowed walls, a rounded roof tending toward horizontal and a profile approaching the third in Figure 1, has potential for having good draft.

3. Positive Air Pressure

Being hotter and thereby less dense than the surrounding air, the smoke naturally wants to rise and exit. In order for it to do so there has to be an available surplus of air to replace it, i.e., positive air pressure.

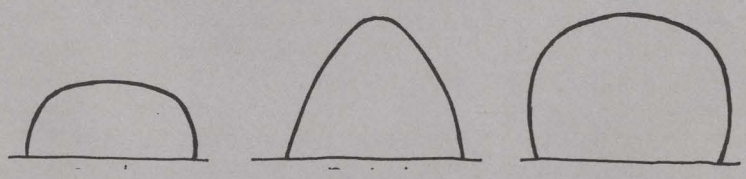
The fire itself helps to provide this by heating and thus expanding the air in the lodge. The greater the temperature differential between outside and inside the greater the effect of the expansion (and, in fact, the better a well-designed open fire system works).

However, the fire also consumes air, which in net effect creates negative air pressure inside the shelter. To compensate, the shelter sucks in air along the path of least resistance, which is usually the smoke hole. This, of course, clashes with the plume of exiting smoke, drawing it downward and in the process disrupting the spiral of the "doughnut." The shelter will also draw in air through apertures in its structure, creating cross-currents which further disrupt the "doughnut."

The upshot is that we now have a smoky lodge which is also cold because of untempered air being drawn in from all sides toward the fire. The solution is an air intake flue.

4. Air Intake Flue

Based on my experience, an open fire can perform satisfactorily only if directly fed controlled/tempered air from a source outside the lodge (see Fig. 2). Properly designed and executed, this system can eliminate the negative air pressure problems discussed above. Incoming and exiting air are traveling in the same direction, so there is no disruption of draft or doughnut, intake air is pre-warmed (tempered) by its passage through the ground, so less energy is



Squat *Peaked* *Round*

Figure 1.

demanded from the fire (which means less fuel burned and more available heat), and there is little inducement to cold drafts in the living area.

The flue should be made large enough to serve the largest fire you expect to make. Again, there are so many variables involved that we can only generalize on size, but the diameter of the palm of a large hand is a good average. The coarser the flue construction material and the longer the flue, the more the resistance to air flow, so flue diameter needs to be increased to compensate.

In cold climes the flue should be run below frostline if possible, so that the air can be tempered by the warmer underlying earth. In such circumstance rough-surfaced stone or similar materials make a good flue liner, as its large surface area makes it a good heat transfer medium.

An air intake control is needed on the flue in order to regulate the burn rate and to retard the air exchange in the lodge when the fire is out (as convective forces will otherwise keep drawing air). The simplest—and perhaps least convenient—control I've found is an adjustable cap on the outside opening. I'd suggest dreaming up a method that regulates airflow from the inside of the lodge. Note: The control must regulate incoming and not outgoing air. To attempt to control the fire by restricting outgoing air (such as by capping the fire or closing the smokehole) could reduce the fire to a state of incomplete combustion, with resultant production of carbon monoxide gas — a deadly poison.

Make the flue intake opening rain and rodent proof, and in snow country locate it far enough from the lodge that it will not be affected by off-sliding snow. Extend the flue above ground to a point that will be safely above the deepest snowfall. The system works best with the intake located on the windward side of the lodge.

5. Quality Fuel

A hot fire is needed to spin the doughnut; a small diameter fire is needed to create a narrow smoke plume that will easily exit the smokehole. A small, intense fire also creates little smoke or carbon monoxide. And it is considerably more economical fuelwise to build several of this type of fire over the course of a day and let each burn out than to keep a large, cool fire smoldering.

For such a fire, dry fuel of small diameter and short length is the first requisite. Wet wood cools the fire by consuming a percentage of its energy to dry out, and a cool fire is a smoky, poison-producing fire. Small diameter wood has a large surface area in relation to its volume, so its combustibles can easily combine with oxygen to burn completely and intensely. Short lengths are completely engulfed in the fire-no cool, smoldering ends sticking out.

Softwoods make a fast, hot fire, but many throw sparks. Weight-for-weight, all woods provide virtually the same amount of heat. The Natives of my area

The Doughnut

Every indoor fire needs a chimney, and open fires are no exception. The chimney of a properly functioning open fire is the hole in a doughnut-shaped mass of rotating air which I, for lack of a more descriptive term, simply call "the doughnut" (see Fig. 2).

Here's how it works: The doughnut gets its rotational energy from the fire—the air closest to the fire is heated, rises to the ceiling, then falls along the outside wall as it is cooled and returns to the fire to again be heated. The cylindrical hole in the center acts as an effective chimney because its upward-moving sides keep the smoke moving up toward the smokehole, and because the differences in temperature and density between the smoke and the doughnut discourage their ready mixing.

For optimal performance the doughnut needs a hot fire located in the exact center of the lodge, with a smokehole about the width of the occupant's elbow-to-fingertip span located directly above. The door flap needs to be closed and any shelving needs to hug the walls and be continuous in order to interfere least with the doughnut's rotation.

The warmer the weather the poorer the doughnut performs. At such times I suggest cooking outside and taking the chill off the lodge by bringing in outside-heated rocks. A friend improved the performance of his doughnut by setting a cupola, with the side lee of the wind left open, over his smokehole.

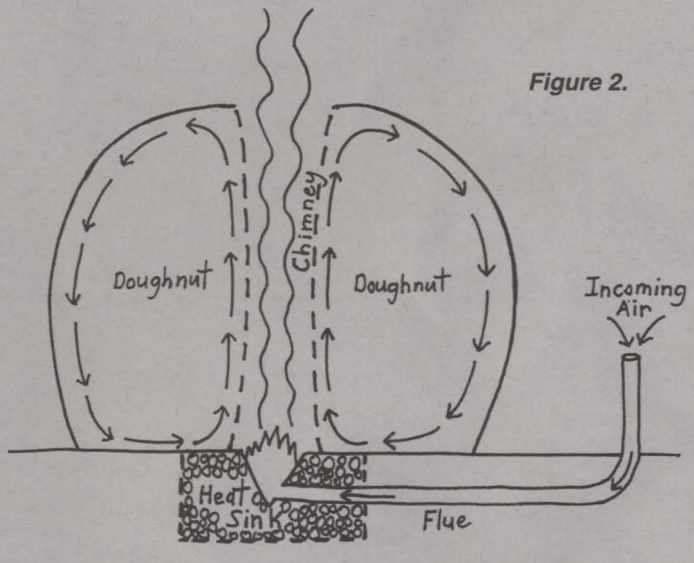


Figure 2.

kept one of their most precious winter stores right beside their lodges—a canopied rack of well-seasoned hardwood.

6. Fire Pit Design

. . . is the second requisite for a proper fire. With regular attention to keep the fuel concentrated, a flat-surface fire-bed works well. I prefer a shallow cone, as it automatically keeps the fuel falling in upon itself, it keeps coals alive in the collected ash at the base, and it snugly accommodates a variety of fire sizes.

7. Heat Sink

A small, intense fire burns efficiently, but it also burns out quickly—a feature which could cause radical temperature fluctuation. This seeming limitation is overcome with a heat sink—a mass of rock, adobe or similar which tempers the quick heat release by absorbing much of it, then (with smokehole closed) slowly radiates it back.

My present lodge has a below-ground sink (as in Fig. 2) incorporating about 1500 pounds of rock. The pit is lined with birch bark so that the rocks remain clean and dry, in which state they more efficiently transfer heat. A prior lodge of mine had an above-ground sink, which I did not care for because of the amount of floor space it took up.

8. No-Flame Night

A well-designed lodge can stay safely warm all night without active fire by thoroughly warming the heat sink before retiring, burning large-diameter hardwood down to charcoal (at which point carbon monoxide is no longer manufactured), closing the smokehole with an insulated plug, and sleeping either on the heat sink (particularly feet) or on a sleeping platform (to stay above the cold air which accumulates on the floor).

Because of the energy expenditure required to assemble a well-functioning open fire system it may not be a practical option for short-term or sporadically used shelter. My alternative considerations are, in order of decreasing preference:

* **Do without fire, relying instead on insulative clothing and sleeping gear**
* **Heat rocks on an outside fire and bring them in**
* **Use a reflector fire**

The second and third options are not efficient uses of fuel, and the third requires periodic maintenance. However, they are still much less work for occasional heat than is an open fire system, and they are less demanding of the shelter.

Open fire in appropriate application is efficient beyond one-dimensional comparison, as it provides both radiant and convective heat as well as light and cooking. But most efficient or not, fire will brood and leap upon my unshackled hearth. In my estimation it is the epitome of comfort and convenience. It gives my lodge life; it is the heart-center from which I go a thousand directions for a thousand reasons, yet to which I always return. It is the heat in my body and in my food; it is the flicker in my eyes and the spark of my dreams. All of life pays fire due respect; we who are human are alone gifted the hand to embrace it.

Tamarack operates the Teaching Drum Outdoor School. For information on courses, publications and mail order catalog write: 7124 Military Road, Three lakes, WI 54562. Or call (715) 546-2944

The Law of Fire

from, I Built a Stone Age House, by Hans-Ole Hansen, 1962 English edition.

Do you know the law of fire?

You will learn it now. From the day the first man fetched fire from a burning tree or from the flame-pewing mouth of the great volcano, he and his descenants for thousands of generations have been subject to the law of fire.

My companions and I had to learn the laws of fire too. We did not tend our fire as we should, we were irreverent and did not see that there was always someone in attendance. So, one day the fire rose, stretched up, and reached for the roof. Straw and rush heads began to glow and curl up in the ties. Then it got hold of the roof. Suddenly we saw its face appear over the ridge of the roof, and our hearts went into our mouths in horror.

We did what we could to master the fire, labored by the sweat of our brows. We fought for the house that we had toiled so hard to build and in which we had spent so many happy hours. But the fire grew and grew, became a giant. Hissing, it spread along the underside of the roof, then rose up like an ogre and took the roof up with it into the air....the heat became so intense that we had to withdraw quite a distance to watch our handiwork being destroyed and collapsing rafter by rafter.

At last the Fire God himself fell silent and sank down behind the now blackened daub walls. Then there was silence everywhere, except for the loud, clear song of the grasshoppers in the bushes. We felt as if the fire had embraced the whole world, although it was only a thing of our own that had burned. Carefully and respectfully we stepped into the fire ravaged floor, still hot and now open to the sky, to see if anything had survived.

The memory of that day is firmly imprinted on our minds, and our advice to you is: ***profit by our bitter experience and remember to respect the law of fire.***

Stone-Age House Notes

Text, Photos and Illustrations By Brent Ladd

My experience with stone age shelters has been a labor of love, as well as frustration during the past two years. The past four seasons I have had the good fortune of using as my sole dwelling a conical birch bark lodge. I have also experienced constructing and using wickiup and domed (wigwam) bark shelters as well.

The question of "What size and type of shelter?" I believe will be a compromise among three important factors: (1) smoke, (2) heat, and (3) light.

Smoke and heat are both related to the size (base width, how tall from fire to peak, overall volume) of the shelter. The smaller the shelter the less volume to heat and you will be closer to the fire, but invariably also have more smoke to deal with in a small shelter. A larger smoke hole will let both more smoke and heat out and let more light and rain in. A shelter with more volume, especially overhead volume will raise the smoke level and tend to be a much more smoke-free shelter. However, more energy will be needed to heat this lodge and to stay warm.

Brent's bark shelter in winter splendor.

Another factor influencing smoke and heat will be draughts or the lack there-of. Air tubes or vents that lead up to the fire itself will help a fire to burn more completely and give off less smoke. However, they do not push smoke out of the lodge. This is important in winter when a shelter needs to be as draught free as possible. The more floor draughts coming in, as well as draughts above head level will help push smoke out of a shelter. This is great in warm weather.

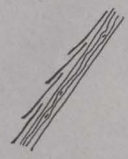
The question of "What size and type of shelter?" I believe will be a compromise among three important factors: (1) smoke, (2) heat, and (3) light.

Thus a more air tight shelter will need to be taller with more volume, especially overhead to rid the shelter of smoke. If a shelter is used only in warmer weather, a smaller lodge with more draughts will work fine.

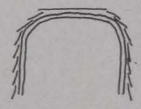
The shape of a shelter will also affect smoke and heat. A lower ceiling as in a domed lodge (wigwam) will retain and reflect more heat than a shelter with a lot of overhead volume. As I mentioned previously though, a lower ceiling means increased smoke. The wigwam shape in fact tends to deflect smoke and it rolls back down toward the ground. A tipi or conical shape will reflect heat quite well unless it is very large, but more heat will escape out the smoke hole along with more smoke.

Of course the more occupants to house the more floor space is also needed. I believe the nomadic people of the upper Great Lakes (or elsewhere) were able to use a wigwam (not because they liked smoke) because one or two families would occupy it. This made it warm with only needing a short, hot fire maybe in the morning and before sleeping. They spent their time outside and therefore stayed warm by being active. For those of us not having a family or two willing to join in on winter living out of doors, we have to come up with something that won't give us lung and eye problems, yet keeps us thawed out in the winter (for us in Northern climates). I have found a 12 foot diameter with 14 foot peak (from fire to peak) and poles being somewhere around 17 feet long to work very well on smoke and heat, as well as space for two beds and two occupants along with gear and belongings. I have used this lodge type now through four seasons and temperatures ranging from -40° F up to +106° F. So, it can be done, but expect some difficulties. Acclimating to weather be it cold, rain, or heat is an important part of using a stone age shelter long-term.

Very few stone age shelters well be leak proof. Leaks can be minimized, though. If using bark or thatch to cover a shelter, be sure to overlap starting at the base around and then working up. This gives a shingling effect and rain will shed.



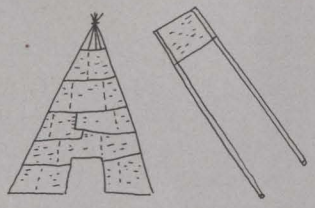
Cone Shape



Dome Shape

The slope of the walls will also influence how rain sheds. A conical structure with shingled bark panels sheds rain very nicely, while a more domed structure may tend (in cases I have experienced) to have more leaks because of water "sitting" before draining off. Most rain will tend to come in through the smoke hole. If a fire is not needed during a rain storm one can place a bark panel or skin covering over the smoke hole. I found an acceptable compromise on my conical bark lodge by cutting the

frame poles short and placing bark rain guards at the north and west sides of the smoke hole and bringing the smoke hole down a bit on the south-eastern side. Leaving poles long, simply catches that much more rain to follow the pole down and drip inside the lodge.



Two rain guards placed at North and West sides of smoke hole. With poles cut short, one can place a cover over the entire smoke hole as well. All while maintaining an opening for smoke to continue flowing out.

Another question to ponder before making a "new and improved" shelter is "What did the indigenous people of this area use for shelter and why?" The natives, be they Great Lakes, Siberia, or Ireland, etc. used the best designs possible for their situation (nomadic, sedentary, materials availability, climate). Their lives depended on it. It is difficult to construct the ideal shelter using primitive materials and stone-age techniques. But then, that is why so few live in stone age shelters today The more of us working on shelter the closer we can come to working out the fine details. There is much more than meets the eye. Good luck and let us know what you develop.

Brent Ladd has lived for the past two years in bark shelters such as the one pictured in his article. He lives, practices and teaches woodland living skills in the Great Lakes area. Reach him at 11642 E. 1050 N., Otterbein, IN 47970.

A Simple Shelter for the Eastern Woodlands

By Scott Jones, Hofunee Programs, © 1996

Recently (June 1996) I conducted a one-day course on simple shelter here at my home, The Woods, in northeast Georgia. One of the objectives was to produce a functional semi-permanent dwelling with available materials (brush, deadfall, leaves) incorporated into a simple conical "wickiup" design. Long-term objectives include collecting information about structure durability and maintenance, site formation process, heating and fuel optimization, and research regarding Woodland period storage pits. In the interest of saving time, a few small sweetgum trees and one dead pine were cleared from the site two days prior to the workshop. A chainsaw was used to fell the trees, but all subsequent site preparation was by prehistoric means. The next thirty-six hours were spent in a low-intensity effort to burn the downed trees into usable structural members; this effort also included burning off the sawn ends in order to replicate the process as closely as possible within practical limits.

On the morning of the workshop, our team of six people extinguished fires and we began processing hickory bark for lashings. The trunk of a small hickory was pounded with smooth river cobbles until strips of bark could be "spudded" off with a digging stick. Sections of the pine tree were lashed together to form a sturdy tipi-style tripod; the remaining burned sections and massive amounts of deadfall from the surrounding area were stacked randomly into the crotches of the tripod, leaving a gap for the doorway. The void above the door was filled with woven sticks and grass thatch and a lintel was lashed into place. The entire structure was covered with leaf litter, bark, and more deadfall timber (to help keep the leaves in place). Finally, two small trees (hacked down with cobble choppers) were lashed horizontally around the structure for stability.

The day's last activities included digging a small storage pit in the hard clay loam inside the shelter and building

Beginning the structure by laying poles against a central tripod.

a central fire hearth. Using small digging sticks, bark scoops, and large biface (actually a reproduction Acheullean handaxe) for cutting roots, production time for the pit was 40 minutes. Hearth construction consisted of a raised platform of approximately fist-sized stones rather than an excavated fire pit. This configuration is common in Woodland and Archaic sites here in the southeast and will be examined more fully in an upcoming research project regarding alternative (non wood) fuels for small shelters.

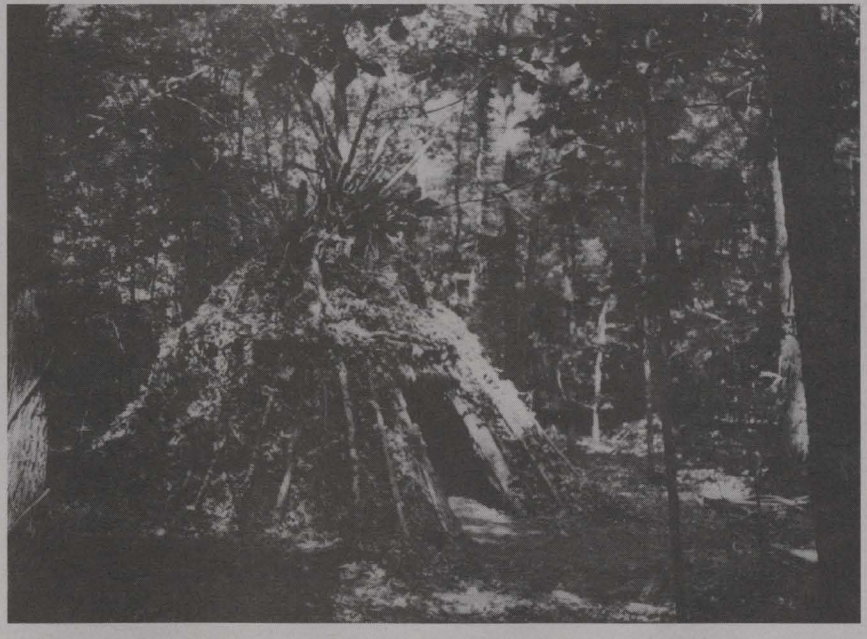
We had planned to finish the project with the addition of a door, but the day's work combined with the sweltering early summer heat left us all exhausted. This was no great disappointment; we had, after all, managed in just one day to produce a structure suitable for extended occupation by two or three people. Also, I have since had some new insights into doorway construction that I would like to incorporate into this shelter in the near future.

This project is not a reconstruction of any known historic or prehistoric structure type from the region, conical shelter design, however, is common throughout the world, whether covered with brush, grass thatch, mats, hides, or soil, and this shelter represents the simplest technology combined with the most readily available materials in our area. I pondered this inconsistency between historical accuracy and independent design, and finally resigned myself to the fact that it could not be reconciled and to be content with what I had. But experiment and experience work together in strange ways; one can make an accurate historical reconstruction of an aboriginal structure, yet if the processes from which the design is derived (culture process) are poorly understood then the reconstruction is merely a static object, an artifact without appropriate processual context (culture history).

One rainy afternoon as I sat by a smudgy fire (the mosquitoes were out in force) in my latest "state-of-the-art" brush hut, I began to mentally improve upon my design. I had given up trying to establish any "indigenous" connection,

Burned sections are stacked randomly to fill in voids and a lintel is lashed in place to form the door.

yet the smoke swirling up through the solid framework of rafters was vaguely familiar, and the coolness of the earth beneath me was pleasant; could I incorporate the insulating properties of soil into my next brush shelter? A mantle of earth over the exterior—excepting the smoke hole—would certainly stay cooler in the summer, and warmer in winter. Sturdier timbers, I thought...and maybe a couple of posts near the center to help support the extra weight...excavate a slight depression to supply the soil and, viola', you have a truly indigenous



The entire structure is covered with leaf litter, bark, and more deadfall timber that keeps the leaves in place.

earthlodge! Until that moment my interest in earthlodges and pithouses had been nominal at best, but when I realized I had happened upon a likely developmental process, the die was cast for my next reconstruction project. Doubtless my past experiences in other reconstructions conspired subconsciously with my current situation to produce these results, yet I experienced the immense pleasure of slowly realizing that I had, in my own circuitous way, discovered a possible ancestor of the earthlodge.

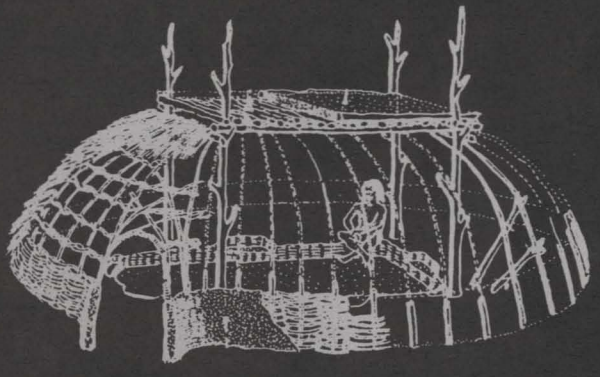
Technical Data

Dimensions (interior measurements):
2m high,. to apex of tripod
3.44 m diameter, average
Crew Size: 6
Construction Time: 9 hrs., excluding site clearing and timber prep. Includes fire hearth and storage pit construction.
Tools Used: 1 quartzite cobble chopper, 1 quartz cobble chopper (both used for limbing, chopping, and bark strip prep.), 3 digging sticks (for spudding and stripping bark), 1 river mussel shell knife (for cutting grass), 1 forked stick "rake", 1 rake made of deer antler lashed to a forked stick with hickory bark (both used for gathering leaves to cover shelter). The antler rake was an "on site" invention of a class participant.

Fire Heart: raised platform of fist sized rocks, roughly circular, 50 cm avg.

Storage Pit: 60 cm x 48 cm oval, 33 cm deep
Construction Time: 40 min.
Crew Size: 2

The crew celebrates completion of the shelter.



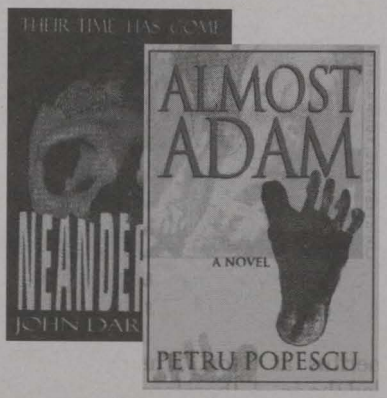
from - Living a Stone Age Life: Report of a Creative Game

R. Horreus de Haas, © 1978

On the whole the huts stood the test....Now after two years, they are still completely intact. For the test hut, built at Bilthaven in 1973 of whattlework and covered with thatch, this was the fifth winter. Therefore, we are convinced that it is unecessry to use durable wood for the building of simple low huts. One has merely got to see that the roofing is good. If it does not let through the rain, thin perishable willow will hold out for years. The same material exposed to all sorts of weather has completely perished within a year.

Battling Neanderthals or Indiana Jones Strikes Back!

Another Project ? Don't we have enough to do already ? Well, haven't you noticed the increase in media interest in prehistory lately. I mean just look at the best seller list, or even the new logo from Upjohn Pharmaceutical (right). Rock art is in and programs teaching primitive skills are on the rise. We at the SPT are very interested to see what you find in your neck of the woods. The plan is to compile a central file of articles on topics related to the SPT's central focus. Clip and send releases that show up in the local paper or other sources that you have acces to.



If we get a good response, we will try to compile a topical index or possibly even get them onto the internet. We already have a good start, but we need your help to really make it fly. So send in those interesting clips and notes to the SPT office.

Whether it's a specific topic or a general reference to prehistory, send it in. The amount of information that is reaching mainstream media is amazing. Start now, or go through your files and send in your favorite articles. I know all of us have clippings of some sort that we really relate to. Share them with the SPT.

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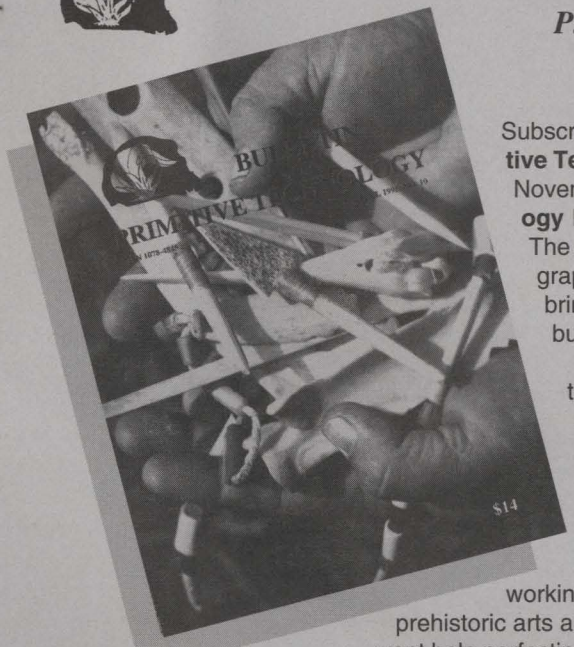

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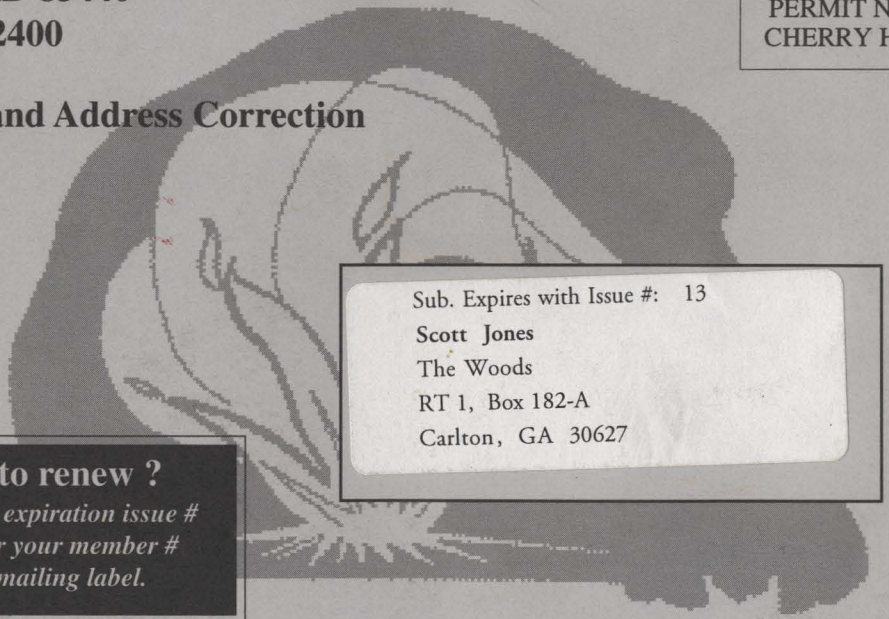

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