The Usefulness of Polypores In Primitive Fire Making, by storm

Five thousand, three hundred years ago Ötzi, also known as the Ice Man, died at 10,500 feet in the Ötztal Alps, which divides Italy and Austria. The 1991 discovery of this mummified neolithic time capsule yielded a treasure trove of artifacts to anthropologists and challenged current theory regarding that transitory period between Stone Age and Iron Age. Among Ötzi's possessions were various species of polypores commonly found in the surrounding lowlands. Why did he carry such fungi? Was he aware of their inherent medicinal value? In such a barren, wood-less tundra, would a trek through this inhospitable landscape necessitate the importation of fire-starting materials or cooking fuel? My intentions with this article are three-fold: to address potential ancient uses of polypores; to share my experiences incorporating Kingdom Fungi into my primitive skills practitioning; and unite the disciplines of mycology and primitive technology in order to assist mycophiles and "abo's" in recognizing a primal link between mushrooms and humanity. Please read the accompanying article by Tamara Spillis, which is an exceptional treatise tracing the intimate relationship between fungus and its pyro-properties.

Being both a mycophile and stone-age skills practitioner for a couple years now, it was inevitable that these two passions would merge. As I traipse the temperate rainforests here in the Olympic Peninsula of Washington, my foraging eye is constantly searching for useful natural items, be it straight branches for friction fire (as thimbleberry and big-leaf maple often provide); stones for flint-knapping; or lichens, insects and mushrooms for the table.

During the winter of 1999 I was fortunate enough to teach at an outdoor school in southern California with Jeff Stauffer, ethnobotanist, amateur mycologist, and an adjunct primitive skills instructor for Raven's Way Traditional School in Arizona. It was then that I first became aware that fire lay dormant within sticks, ready to expose itself with a little coaxing from us. Surrounded by sand, sage and seep willow, Jeff would reverently produce a stout, slightly curved bow, whose ends were loosely connected by a length of twisted desert agave fibers. He would loop once the desert agave cordage around a half-inch thick, six-inch long wooden spindle, made from the flowering stem of California fan palm tree, and lay this apparatus aside while he prepared the rest of his friction-fire bow drill kit: a rectangular, three-quarter inch thick, foot-long hearthboard of the same wood; and a palm-sized, wooden hand-hold containing a small, carved, central depression.

Jeff carefully inspected the length of the hearthboard, along which were circular sockets of varying depth and charred condition. A triangular notch, cut all the way through the thickness of the board with a piece of sharp stone, connected each socket to the board's edge. The arrangement of the socket and notch are reminiscent of a traditional-style keyhole, with one point of the triangular notch intruding into the round socket. Selecting one of the newer, shallow sockets, he placed the hearthboard on the ground, taking care to avoid any moisture laden grassy areas which would conduct heat away from the hearthboard and render the attempt at friction fire much more difficult. To control conditions further, Jeff placed a thin piece of bark underneath the socket and notch that he would use to house a rotating wooden spindle in hopes of frictionally coaxing a glowing coal from desert wood.

storm works the hand drill. All photos this article by storm, except photo (upper right, next page) of storm drilling, by John Longcore

Momentarily fingering the deep calluses on his palms, Jeff turns his back on the prevailing wind in order to shelter this ancient attempt with his body. Picking up the spindle, which is still wrapped once by the bow's cord, he places one end of it into the socket, while the hand-hold is brought to rest on top of the spindle's other end. The spindle is sandwiched between the hand-hold and hearthboard, perpendicular to the ground. With one foot on the hearthboard to steady it, he gently, steadily pushes and pulls the bow, toward himself and away from himself, again and again, allowing the spindle and hearthboard socket to warm up as friction slowly carbonizes and disintegrates the cell walls of the fan palm wood. These small, darkened, powder-like wooden particles, or char, which will fuel the future coal, fall into the notch—the notch protects the char from energy-sapping wind and allows heat to accumulate here from the frictional process.

Using his index and middle fingers on his bow-hand he takes up the slack from the stretching cordage, which se-

Left: *Fomitopsis pinicola,* in its natural state.
Top right: storm works the bow drill on a Red-belted Polypore (*Fomitopsis pinicola*). Judging from the late bronze age linoleum, he performs these experiments in the kitchen, just like Tammy. Note the Paleolithic inscription, upper right. If you were wondering why it's called a Red-belted Polypore, just examine the edge that's facing you.
Middle right: The results of storm's labors: embers spilling from the hole in the conk.
Bottom right: The author demonstrates the difference between *Fomitopsis pinicola* (left) and *Ganoderma tsugae* (right).

cures the cord's grip on the rotating spindle. Pressing the hand-hold down harder with his other hand, Jeff increases the speed of the bow-draw. Whitish-buff smoke emanates from the socket as more char pours into the notch. After a few more seconds a hint of bright red color emerges from the notch as the char reaches 800-degrees Fahrenheit and spontaneously combusts.

Now it was time to add the coal, or fire-egg, to a nest of fuel from which it could hatch into fire. Earlier in the day Jeff had kneaded some dry sagebrush[1] bark into a bowl-shaped mass. He then filled the depression in the middle of this bark nest with shredded bits of red-belted conk (*Fomitopsis pinicola*). On top of this a pinch of flowering cattail fluff was added to ensure a gentle gradation of fuel sizes so that the coal could grow hot enough to produce flame.

Using a thin stick to separate the coal from the confines of the hearthboard, while cradling the coal on the thin piece of bark, Jeff transfers the ember to the nest. Blowing gently on this tinder bundle, the coal engulfs the fuels and produces flame in just a few seconds. A spark was planted inside me at that very moment.

Bow drill fire-making tinder is but one primitive use of polypores. Recently I've focused my efforts on a variety of fire-making ways, from flint and steel (spark-based) to fire plow (lateral friction – as Tom Hanks demonstrated in the movie *Castaway*) to bow drill and hand drill (rotational friction), among others. Having experimented with a few thousand combinations of woods available here and the central coast section of California (my former residence), I find myself yearning to include lesser-tried natural materials—which brings me to the pyro-properties of polypores. The most common sizeable conks around here seem to be red-belted conk (*Fomitopsis pinicola*), hemlock varnished conk (*Ganoderma tsugae*), and artist's conk (*Ganoderma applanatum*), of which all are currently (August) blossoming in a burgeoning bouquet of baby buttons. And Tamara Spillis sent me some birch polypore (*Piptoporus betulina*) and Tinder Conk (*Fomes fomentarius*) to experiment with.

I have already explained the bow drill process, which can be seen in the accompanying photos. Aside from being used as tinder, certain polypores can also be used as hearthboards (that's a red-belted conk in the photos). Compared to other esoteric hearthboard materials (rock, shell, antler, bone) that I have experimented with, shelf fungi work better by far. These polypores have generated coals in conjunction with a wooden spindle: *Ganoderma applanatum*, *Fomitopsis pinicola*, *Ganoderma tsugae*, and *Fomes fomentarius*. Casual observation indicates that these fungal hearthboards produce hotter, longer-lived embers than those derived solely from wood (oh, my kingdom for a thermocouple to measure such temperatures!).

In general, the amount of effort required to produce fire by utilizing polypores as hearthboards and tinder is less than that expended using wood. I suspect this is the case because shelf fungi can dry out more quickly than wood, since the tube layer provides a conduit for the quick evaporation of moisture. One might also consider the diet that certain members of the Polyporaceae family enjoy. I've had more success doing bow drill and hand drill on species that digest lignin (and a little cellulose) and produce a white rot (e.g. *Ganoderma* sp.). Cellulose (the white material left behind) is comprised of glucose molecules linked primarily by glycosidic bonds. When metabolized, it decomposes into fatty acids, which are said to be volatile.

The hand drill (see photo) is structurally similar to the bow drill, but the bow and hand hold are replaced by your strength. Bearing down on a longer, thinner spindle requires more stamina and power in order to achieve a coal in this manner. However, the intrinsic mystical simplicity of "rubbing two sticks together" and creating fire, without the technological evolution of the bow, strongly endears me to this method of friction fire. To date, I've only used the artist's conk as a hearthboard successfully with hand drill. How amazing it would be to drill an ember on a shelf fungus while it remained attached to the host tree!

Above: An assortment of fungal coal extender powders: top: gnat-produced *Laetiporus sulphureus* debris; top right: the original *Laetiporus sulphureus*; bottom: white rot; left: brown rot.
Below: White rot vs. brown rot
Lower left: *Laetiporus sulphureus* powder smoldering from a spark set into it by flint and steel.

Before the match was invented in 1826, flint and steel was the prevalent method used to start a fire. Taking a piece of flint, quartz, pendantlite, marcissite, or other hard iron pyrite, one can strike a piece of these minerals against a high-carbon steel (e.g. a file or older knife blade). The mineral tears off small particles of the metal, causing these pieces to heat up and hopefully land on dry tinder (mind your aim!). Traditionally, a char cloth was used to catch the hot sparks. Char cloth can be made by burning a piece of cotton fabric while it lay inside a reasonably air-tight container. The cloth blackens as it burns incompletely and readily catches fire when introduced to an intense heat source.

There may be ways to primitively craft an easily combustible, charred material, but one can turn to the gastronomic workings of the fungus gnat larvae for an effortless flint and steel tinder alternative. Probably anyone who has left dried conks in a bag for months can attest to the ravages that hidden insects can inflict on a poor, defenseless polypore and the subsequent powdery debris that settles to the bottom of the bag. Recently I collected some dried sulfur shelf (*Laetiporus sulphureus*) fungi that had enjoyed protection from the elements by growing on the underside of a large, slightly elevated log. I was demonstrating flint and steel to school groups at the time and thought these specimens could prove useful. After storing the sulfur shelf in a basket for a while I noticed small piles of whitish powder accumulating on the floor. Upon inspection I discovered small holes running through the fungi (and many more fungus gnats flying around my place than usual). Thinking that this powder might burn, I cranked out a few hand drill embers and placed them on top of the powder. The embers steadily engulfed the new fuel, extending the lives of the coals (hence the oft-used term in primitive circles, *coal extender*).

Above: Brown rot being used as a coal extender, to spread the fire to the rest of the tinder.
Left: It catches!
Below: Letting the tourists do the work: white rot being tromped out of a log on the trail.

Considering this success, I wondered if the sulfur shelf, in its whole, intact, unprocessed condition, would catch a spark and grow a coal. Well, not only did the sulfur shelf catch sparks easily and burn quickly, but blowing on the polypore and even smothering it would not put it out—I found this out by discovering the extinguished (not!) fungi fully engulfed in flame on my front steps 20 minutes later! Only dousing it in water would lay the fire to rest. *Fomes fomentarius* and *Piptoporus betulina* also work well in this manner. It was very satisfying to have a nine-year-old girl from inner-city Seattle successfully make fire with flint, steel and sulfur shelf later that week.

Polypores also generate a by-product that is useful to these efforts. As shelf fungi infect the bole of a tree, it either digests cellulose (leaving a brown rot), or cellulose plus lignin (creating a white rot). White and brown wood rots can be ground up and applied to a friction-fire generated coal in order to extend its life, giving a person more time to construct a tinder nest in which the coal will hopefully be blown into flames. Wood infected with brown rot burns slow and doesn't create flame by itself. Preliminary trials that I have conducted show that brown rot is more effective than white rot as a coal extender. When an ember is placed on a chunk of white rot, the wood bursts into flame. Perhaps some of you can enlighten me as to why this might be the case—I'm not up on the specific roles that cellulose and lignin play in the combustion of wood. This has important foraging implications in primitive or survival situations. We get 92 inches of rain per year here, and up to 160 inches just two hours to the west. Imagine yourself in such a wet environment, in need of a fire. You are searching for dry fuel—all wooden surfaces in the forest are useless. But dig into a log, especially a rotten log (which is infinitely easier to dig into), and pull out some fluffy, dry, punky, white wood...congratulations, you live!

Lastly, we come to the conk stove. Simply place a burning coal on top of any large conk and watch the fungus slowly become engulfed in flame. Better yet, procure a piece of hollow elderberry or bamboo stem and blow gently on the burning mass, and watch the fungus *quickly* become engulfed in flame. Then set a pot of water directly on the conk and *voila*, it boils within ten minutes.

I hope this Winter Issue article has warmed you to the possibilities of extending your love for fungi toward their usefulness in our pre-historic relationship with our environment. To learn more about stone age skills please visit the following excellent resources:

- Thomas Elpel's Hollowtop Outdoor Primitive School: www.hollowtop.com

- The Society of Primitive Technology: www.primitive.org

This is one of the best organizations in the country from which to "learn the old ways": they publish the *Bulletin of Primitive Technology* as well as two fantastic books. Become a member!

- The Native Ways Association: http://nativeways.tripod.com/id43.htm

- Vince Pinto's Raven's Way Traditional School: www.hollowtop.com/ravensway.htm

- www.primitiveways.com This website is maintained by a core group of top-notch primitive skills practitioners/instructors. They answer and post your primitive skills questions—an extremely valuable resource!

Above: The "polypore stove," a large *Ganoderma applanatum* (or Artist's Conk), starts burning.
Below: Boiling water on the Artist's Conk stove.

Storm grew up in northern Maine, where he attained a B.S. in Ecology. Working westward as a logger, ecological field technician, farm laborer, National Marine Fisheries Service Observer, bar-room bouncer, and most recently naturalist/stone-age skills teacher, he now calls home the temperate rain forests of the Olympic Peninsula of Washington, ancestral lands of the Makah, Klallam, Hoh, Ozette, Quinault, and Quillayute. He values the sharing of knowledge and skill, so please feel free to contact him via the following addresses: Olympic Park Institute, 111 Barnes Point Road, Box 1, Port Angeles, WA 98363;
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