Workshop 1. Fire and its Conservation

Introduction

Open Pit Firing

Preserving fire how and why

What's this "Workshop" about?

The first point to have clear is that when we speak of the Fire Workshop we are not referring to the physical building of the craft workshop. Rather we are talking about an introduction or kind of overview of the Fire Crafts, a term that includes not only the works with fire itself (preserving, making, controlling) but also the material crafts that are historically related to that process. In our case these are basically concerned with, ceramics, metals, and glass. There are also ancillary elements that are useful for those works but not necessarily directly connected with them. Under that heading we might include working with wax, plastics, and mold making.

A second point to understand is that the work in these crafts is essentially individual and ongoing. The group works and "workshop" sessions are meant to facilitate the individual's pursuit of their own interests. That means each one goes at their own pace, and their own direction, following and developing their personal interests. Though, as is our way, we encourage interchange and team work that allows an amplification of the individual's intelligence and possibilities.

In practice that means there will be group sessions (public workshops) on a theme for example, the preservation of fire. These group works are then amplified and explored by individuals or teams of people with common interests.

As we will see these works (i.e. the Crafts, as that term is understood by the School) are meant to educate a three-fold sensibility of permanence, carefulness, and proportion. However, there are other benefits beyond these and which also have nothing to do with the artistic qualities of the items produced. For those who resonate with these works they are an important source of *inspiration* and insight. An interesting example of one type of surprising insight can be found in footnote XX to Silo's Myths (Collected Works Vol. 1, Latitude Press, 2003 text available on Silo.net).

Perhaps it is not surprising that in general the degree of such "inspiration" correlates with how primitive the techniques being used are. Melting copper and tin to produce bronze is an exciting and inspiring work. Smelting bronze from copper and tin ores is even more extraordinary. In general we will try to find a balance between various factors. That means while we will work in a *chronological* fashion from earliest or most primitive to the more recent and technologically sophisticated,

there are exceptions or anomalies. For example, in this very first work we will use clay containers – that though very primitive—may not have existed in the first moments of the domestication of fire. Other examples abound, for example, we will use techniques involving compressed Carbon Dioxide gas and plastic containers to prepare sand molds, and we will work casting acrylics before working in metals. Nonetheless, the general progression will be marked by the history of our use of fire. Beginning with its preservation, passing to its production, then to ceramics, copper, bronze, iron and finally to glass. On the way we will work with plastics, and low temperature metals (tin, zinc, pewter, etc) in order to master the necessary techniques.

But that whole process begins with this first workshop on the conservation of fire. Before that workshop proper begins there are some preliminary works to gather and prepare clay that could be carried out by interested individuals – even though they are not necessary for the workshop itself.

Why Crafts?
Before beginning this workshop it is important to understand our interest in crafts in general and the fire crafts in particular. Normally one works in the crafts for aesthetic or practical reasons. For us the crafts are a source of inspiration and they are also, if carried out correctly, an important preparation for other works of a very different nature. This is explained in introductory material on The Four Disciplines:

> "The crafts prepare one to enter into the works of the Disciplines. A craft teaches internal proportion and how to do things in a balanced way. One goes acquiring internal proportion thanks to these works with, what appears to be, external problems of accuracy and detail. There is a tone that associates internal states and external operations. A Discipline on the other hand presents a path of internal transformation. In the Crafts, one works trying to achieve carefulness, proportion and order at the same time that one goes achieving permanence. One learns to work in a balanced way and these crafts can consist of various topics."
> *The Four Disciplines (Preparation, page 1); www.silo.net*

> **What Crafts?**
> "They can involve work with materials, whether those used in the traditional plastic arts or perfumery, etc. They have their rules of work, their tricks and Craft secrets. We have only worked with ceramics, metal and finally glass. This range of work deals with kilns and substances that are transformed. This is different from perfumery where fire is rarely used except in the preparation of essences, or perfumes by means of distillation. In general fire plays no part in perfumery except when synthetics are involved. On the other hand, fire is

involved in those Crafts that we know more closely, e.g. ceramics where it is essential."
The Four Disciplines (Preparation, page 1); www.silo.net

The Fire Crafts.
"In any case, the material craft is an interesting work, as is the introduction to it—the work with fire, which allows us to recreate how fire originated and was produced. Its invention came a long time after its conservation was understood. At that point it was no longer about stealing and conserving fire but producing it. We work with different forms of conservation of fire but it is in its production that more care is required. The average person trying to produce fire today will not find it easy. The work with fire and kilns is important.
The Four Disciplines (Preparation, page 1); www.silo.net

Where we are going with these crafts.
The subject of the crafts is very wide-ranging and we are only at its beginnings. While we are learning the craft we go gaining internal proportion, thanks to this external work. In general we say that those approaching a Discipline should have a minimal management of some craft."
The Four Disciplines (Preparation, page 1); www.silo.net

The History of Fire
It has been said that the history of humanity is the history of fire, and in many important ways this is not overstating the case. Long before we could make fire we learned to preserve it, to keep it going, and to carry it with us in our nomadic wanderings. Of course it is difficult, if not impossible, for us to know how or when we first learned to conserve fire (possibly in the embers from forest fires caused by lightning or volcanic eruptions). While we don't know when our first human ancestors began this process, indeed it may have been one of our pre-human progenitors who rebelled against the natural order and took the first hesitant steps to approaching – rather than running from fire. Perhaps millions of years passed before the necessary experience was accumulated that let us deliberately manipulate it.

In a talk given in 2003 Silo spoke about this theme:

...Some anthropologists, because they've never made fire except with matches, believed that fire was produced first and conserved later. Well, no, it wasn't like that. First it was conserved, and later it was produced…
People did not know how to produce it themselves. But it was produced in Nature. So then that fire was like a gift, coming from the volcanoes, from the fire in the forest, coming from the fire in different places... …But before it could be

> considered a “gift” it was recognized as threatening and dangerous. There is the first difference between hominids and other animals… …All of them flee before fire, but the hominids move closer to the fire. That is something that marks a historical difference. Because in these guys' circuitry there is sufficient capacity to oppose their own reflexes. Nature says “escape”; but they go against this and say, “move closer.” …

This incredible difference allowed our distant ancestor to resist the enormously powerful impulse to flee from fire – an impulse shaped by an evolutionary process that began with the simplest of cells almost 4 billions years ago and linked to our most basic instincts of self-preservation. In that sense that turning to the source of “instinctive” terror was a turn against nature or the natural order. That is an important thing whose importance has largely been ignored by philosophers and scientists but it is remembered and celebrated in certain myths like those of the Greeks. In those stories the gods are rarely friends of humanity, more often they are indifferent or even malicious, but divine Prometheus was different. This son of the Titans whose name means *forethought* was the great benefactor of humanity. In some versions of these myths he is even the creator of our species. Whether he’s presented as our creator or not, he is always shown as intervening to save humanity from destruction. He also teaches us the arts and crafts. Most importantly he steals fire from the gods and gives it to us. For this he is condemned to terrible eternal torture until the half-human hero Heracles rescues him.
**For more on these myths see, Universal Root Myths, in Silo’s Collected Works Vol. 1, Latitude Press, 2003 (the text is also available as a download on Silo.net)*

So the fire that Prometheus brought us, against the will of the gods, was the first step in a process that brought us from the earliest ceramics to the most advanced superconductors. Each step on this story can be understood in the context of learning the Fire Crafts. The first step was to learn to handle it, to conserve it, to take it with us on our journeys. As Silo said in the *Talk of the Stone:*

> …Let’s see, how do we get the fire out of that forest that’s burning, from that lava that burns everything as it flows, from that lightning that set the bush on fire. How do we take that fire before it goes out, take it, conserve it one way or another while it goes out on you... and it goes out on you, and it always goes out on you, and so
> you go to get more, when you can... …The centuries passed, and when they learned to produce fire, history accelerated. A little time longer, a little time less... and they went to bother other planets. Having produced fire, we can expect them on Mars, the moons of Jupiter, in distant places. It’s a matter of time. But, how were they able to produce fire? Having produced it, they will go constructing and accumulating. Now,

having something on which to support themselves, a platform for support, they were able to advance…
From "The Talk of the Stone" a transcription of a talk given by Silo in the "Pyramid" Workshop in Santiago, Chile November 19, 2003
From the document "Craft of Fire" available on Silo.net

Having fire and being able to keep it going and even transport it, brought about a revolution of almost unimaginable importance[i]. It meant we could stay warm in the cold, have light in the darkness, keep predators at bay, and cook food. Carrying your source of heat with you means nomadic journeys to cooler environments become possible. Being able to light your way in the dark, and fight off attackers (animal or human) all would begin to change our way of life. The ability to cook food would have immediate impacts by making new sources of nutrition available, preserving food and reducing the chance of food-borne infections. These would in turn lead to important biological and social changes (e.g. smaller gut size, easier digestion liberating energy to support a larger brain, etc). Two of the biggest impacts may well have been related to the specialization of knowledge (perhaps a class of "fire-keepers", etc) and in having a manifest center for nocturnal social gatherings.

Myths and religious beliefs from around the world record the importance of our gradual domestication of fire. And we'll see some of them as we proceed.

Session 1. (this can be done in a single day or as a weekend retreat)
-At some point before the session you'll want to do some prospecting and find a source of clay.
-At the beginning of the session read aloud and discuss the introduction to this material. It is interesting if everyone understands the reason we are interested in these crafts and how we will work in them.
-Make sure you all understand something about the nature of clay and how to identify it. This can be read and discussed in the field while prospecting or digging up the clay.
- Dig up clay (shovels, buckets of various sizes)
-have sand or chopped up straw/grass available
-make bowls (see photos below)
-set them aside to dry

-The explanations, stories and myths can be read aloud while working on the related activities.

Bibliography: The Four Disciplines, Fire Craft, Silo, Universal Root Myths

Clay and Clay Bowls
In general these workshops follow the chronology of the relation between humans and fire. There are exceptions and this is one of them. While we probably first

conserved and transported fire in natural containers (burning branches, embers smoldering in a branch, or shell sitting in a reed basket, etc) we will begin by making clay bowls suitable for the transportation and also useful for when we produce fire in the next module.

At this point there are a few options. The simplest is to purchase some clay (some form of earthenware, low fire clay available at any pottery supply firm) and begin with that.

It is however more interesting to begin with a session where is to dig up some clay and use that as you find it to make the bowls. This will not take much longer than working with the store-bought variety. Bowls made this way are almost certainly not going to be very robust and we will look at various ways crude clay can be refined.

Finding Clay

Clay comes in a wide range of qualities. The best clays are plastic, they dry with minimal shrinkage, resist thermal shock, etc. When you buy commercial pottery clay it is usually a mixture of natural clays that have been carefully selected and combined. We are making only very simple objects so for our purposes we do not need very high-quality clay. [ii]

You may find clay in dry rock-like formations or damp and muddy. If you have some dry material you suspect is clay, scrape some off and see how it dissolves in water. In a wet area you'll dig it up from under the sand, leaves, etc.[iii]

Clay is made from very fine particles. If you rub a bit of the moist substance between your fingers and it feel grainy. It's probably mud. If it feels slimy and smooth, it's likely clay. If you have a dry sample simply add a little moisture (spit on it!) and test it in the same way. Then take a small amount and roll it into a coil and bend that around a finger, if it is smooth and holds its shape you have clay.

However, the clay you dig up may be too dry or too sticky. If your clay ring is too crumbly try adding something like chopped up grass or straw might work. If it is too sticky add some sand or grog (dry ground up clay that's been previously fired).

The importance of the ceramic revolution (and even its various phases) can be found reflected in myths from various cultures. For example, there are examples in stories recorded in sources as diverse as the Story of Gilgamesh (the oldest written narrative) and in the Mayan Popul Vuh. Silo refers to these in that same talk:

> "…And I think that we should start with that baked mud which is not yet clay, it's the mud of the *Popul Vuh*, the mud used by the Shapers, the Annunciators, the Grandmother of the Dawn, the Grandmother of the Day, to make the first human being.

But they made the first human being, and the rains started and so the legs of the man of mud would bend and he would fall. And so they had to make another human being. That's proper to a pre-ceramic civilization; they lacked a temperature high enough to make an interesting human being. That is, they were getting to about 800C. In that historical moment in which the Popul Vuh was written. Then they achieved higher heat and started making things out of ceramic. But that was baked mud, and baked mud works if it is burnished… baked mud, not ceramic. It can hold water for a while, and then it starts to leak, and finally it falls apart on you. And that's just like in the Popul Vuh. In any case, I believe we could start with baked mud. It's clay that you let dry out well so that it doesn't fall apart, and then you fire it to less than 800C (you can get to 800 or 700C). It's a mud that all prehistoric civilizations have known: baked mud. It's not ceramic. …in Mesopotamia (between the Tigris and the Euphrates rivers), a man is made with the same model. And so Enkidu is born, and he is the double of Gilgamesh. The same as him, but hairy. Like adobe is. It has straw to give it strength... Out of these kinds of things a myth is made. This is wonderful, it's very beautiful and very intelligent..."
From "The Talk of the Stone" a transcription of a talk given by Silo in the "Pyramid" Workshop in Santiago, Chile November 19, 2003
The Craft of Fire available on Silo.net

In the module on Ceramics you will find instructions for refining the clay you can dig up yourself, but in this case you can move to making the clay bowls or pots that we will use for conserving, and transporting fire. You can use a variety of designs but the walls and floor of the bowls should only be as thick as necessary, as that will help them keep from cracking. Keep them simple. A hole on one side near the base

will also be very useful. Leave them to dry. Depending on their thickness the amount of time required will vary. This will take about a week.

Session 2
This session will focus on firing the clay bowls that you made in session 1.

The simplest way to fire your pots is with what is called open-pit firing, that is by letting them cook in a large bonfire. There are much more sophisticated versions of this primitve method.[iv]

These clay pots we have made will be used in the conservation and transportation of fire.

In the "Talk of the Stone" Silo mentions the problem faced at the beginning of this long historical process.

> "…You begin with a pit, and later, when you want to conserve the fire, how can you keep it in the earth? And how do you carry the fire when it's raining and then a violent wind blows over you? ...Unless you have it in your cave – but in fact you have protected it because the cave is acting like an umbrella..."
> *From "The Talk of the Stone" The Craft of Fire p22. Silo.net*

The question of how to protect and transport fire that you have found is recalled in various myths. This particular one is based on a traditional story told by the Choctaw people of Tennessee and Mississippi. It is an interesting tale to read out loud around the fire while you are firing your clay bowls.

The story of how Grandmother Spider brought us Fire

> "The Choctaw People say that when the People first came-up out of the ground the Great Spirit took pity on them and opened their eyes but the people saw nothing, because the

world was dark, no sun, no moon, not even any stars. All the People moved around by touch, and if they found something that didn't eat them first, they ate it raw, for they had no fire to cook it.

All the People met in a great Pow-wow, with the Animal and Bird People taking the lead, and the Human People hanging back. The Animal and Bird People decided that dark was not good, but cold and miserable. Someone spoke from the dark, "I have heard that there is a great fire in the East and it gives warmth and light. Another voice said, "But the people of the East are too greedy to share with us". So it was decided that the Bird and Animal People should steal what they needed, the fire!!!

But, who should have the honor!!! Grandmother Spider volunteered, "I can do it!!! Let me try"!!! But at the same time, Opossum began to speak. "I, Opossum, am a great Chief of the animals. I will go to the East and since I am a great hunter, I will take the fire and hide it in the bushy hair on my tail". It was well know that Opossum had the furriest tail of all the animals, so he was selected.

When Opossum came to the East... he soon found the beautiful-red-fire jealously guarded by the people of the East. But Opossum got closer and closer until he picked up a small piece of burning wood, and stuck it in the hair of his tail, which promptly began to smoke, then flame. The people of the East said, "Look, that Opossum has stolen our fire"!!! They took it and put it back where it came from and drove Opossum away. Poor Opossum!!! Every bit of hair had burned from his tail, and to this day, Opossums have no hair at all on their tails.

They met again, and once again Grandmother Spider said, "Let me go!!! I can do it"!!! But this time a bird was elected, Buzzard. Buzzard was very proud. "I can succeed where Opossum has failed. I will fly to the East on my great wings, then hide the stolen fire in the beautiful long feathers on my head". So Buzzard flew to the East on his powerful wings, swooped past those defending the fire, picked up a small piece of burning ember, and hid it in his head feathers. Buzzard's head began to smoke and flame even faster!!! The people of the East said, "Look!!! Buzzard has stolen the fire"!!! And they took it and put it back where it came from. Poor Buzzard!!! His head was now bare of feathers, red and blistered looking. And

to this day, buzzards have naked heads that are bright-red and blistered.

Next they sent Crow, for Crow was very clever. In those first-days Crow was white as snow, and had the sweetest song of all the birds. But he took so long standing over the fire, trying to find the perfect piece to steal that his white feathers were smoked black. And he breathed so much smoke that when he tried to sing, out came a harsh, Caw!!! Caw!!!

The Council said, "Opossum has failed. Buzzard and Crow have failed. Who shall we send"!!!

Tiny Grandmother Spider shouted with all her might, "LET ME TRY IT PLEASE"!!! Though the council members thought Grandmother Spider had little chance of success, it was agreed that she should have her turn. Grandmother Spider looked-then like she looks-now, she had a small torso suspended by two sets of legs that turned the other way. She walked on all of her wonderful legs toward a stream where she had found clay. With those legs, she made a tiny clay container and a lid that fit perfectly with a tiny hole for air near the bottom of the pot. Then she put the container on her back, and walked tip-toe until she came to the fire.. She took a tiny piece of fire, put it in the bowl and walked back on tiptoe until she came to the People. Since they couldn't see any fire, they said, "Grandmother Spider has failed"!!!

"Oh No", she said, "I have the fire"!!! She lifted the pot from her back, and blew gently into the hole at the base of the pot until the fire flamed up. All the Birds and Animal People began to decide who would get this wonderful warmth. Bear said, "I'll take it" but then he burned his paws on it and quickly changed his mind.

The Birds wanted no part of it, as Buzzard and Crow were still nursing their wounds. The insects thought it was pretty, but they too, stayed far away from the fire.

Then a small voice said, "We will take it, if Grandmother Spider will help". The timid humans, whom none of the animals or birds thought much of, were volunteering!!!

So Grandmother Spider taught the Human People the secret of feeding, protecting and carrying the fire. And the Choctaw people remember her until today. They made a beautiful

design to decorate their homes, a picture of Grandmother Spider, two sets of legs up, two down, with a fire symbol on her back. This is so their children never forget to honor Grandmother Spider, Fire-bringer!"

There are many versions of this story. This one is modified from one of the many that are now in circulation.

The myth of Prometheus and fire

Prometheus, a Titan in the Greek Mythology stole the fire from the gods and while he was celebrated by the mortals he was cruelly punished by the God of all Gods. Considering this Prometheus's deed as one of the biggest crimes ever – although it was not the first time that Prometheus tricked Zeus – the Mighty God had Prometheus chained to the rock where the eagle was to eat his eternally replenished liver every day.

Prometheus was one of the Titans, who at some point were sent to Tartarus by the enraged Zeus who didn't accept the Titans's fighting against him in the famous Battle of the Titans.

However Prometheus was not directly involved in the war, so Zeus saved him from Tartarus and gave him a mission – to form a man from water and earth. Prometheus accomplished the task, but while working on his creation, he grew fond of men. He didn't care much ever about the Gods and their hierarchy, and however friendly treated by them, he was much more comfortable being around the immortals. In any case, Zeus's idea was not to have men having any unusual power. But Prometheus was thinking the other way, and decided to steel one of the powers Zeus was particularly sensitive about – fire.

Prometheus Steals the Fire

Thinking about steeling fire was easy, but it finally proved a bit more complicated. Prometheus, known for his wit and intelligence, had an immediate plan – to trick the goddesses throwing them a golden pear (in some version – apple) into the courtyard with a message: "For the most beautiful goddess of all".

It worked as he planned – the goddesses started a fight over the fruit while gods were completely enjoying the scene. All of them were distracted and Prometheus didn't have a hard time steeling the fire from Hephaestus's workshop. Hephaestus was, among other stuff, the Greek god of fire. Prometheus happily left the Gods' playground and took the fire with him either in a hollowed pumpkin or hollowed reed (depending on the interpretation) and brought it to Earth and gave it to humans.

Oh, how Zeus was mad. After so many times being defied by Prometheus, Zeus decided that it was enough. Nevertheless, he made Hephaestus himself to chain Prometheus on Mount Caucasus where the eagle would eat his liver forever.

But, time passed and Zeus offered at one occasion to free Prometheus in exchange for a revelation of the prophecy that predicted the dethroning of Zeus. Prometheus refused. But much later Zeus's son Hercules, on his journey to fulfill the Twelve Labors, passed by the Mount Caucasus, saw Prometheus and decided to kill the eagle and free the chained Titan. Zeus was very angry initially but eventually agreed to grant Prometheus his freedom.

Well, some sort of freedom since Zeus wanted Prometheus to carry a reminder of his punishment forever – he ordered Prometheus to make a steel ring from the chains he was in, and wear that ring from then on. Since then, the mankind started creating rings in order to celebrate Prometheus and commemorate his help.


Place the greenware (the unfired clay pots) in an area cleared for your fire. Set them on a base of fuel (newspaper, wood, etc) and surround them with enough fuel for a small fire. Heating them in a small fire until reaching a temperature hot enough to boil water will make them less likely to crack when the heat increases.
Start the fire and gradually add fuel increasing the temperature until your at a range where water can boil. Maintain the fire at that size for a while then gradually start increasing the temperature by adding fuel, carefully covering all the greenwear. The fire needs to continue only for an hour or less once the fire is at its maximum.

Let the fire gradually burn down to ashes. Carefully remove the bowls and allow them to cool.

Session Three
-build a bonfire
-figure out your strategy for keeping your embers burning all night in a form that you can transport
-make a simple reed or rope strap to transport your bowl
-place your chosen fuel in your bowl
-take some burning embers
-see if you can keep this seed fire going throughout the night

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[i] While the controlled use of fire almost certainly begun at a much earlier time, the first (though not conclusive) evidence discovered so far consists of charred wood and seeds found at the early Paleolithic site of Gesher Benot Ya'aqov dating from about 790,000 years ago. Of course the evidence pointing to the use of fire in human settlements is scant and uncertain. However, a growing number of archeologists argue that there is evidence from more than a million and half years ago.

[ii] Most of the surface of the Earth is made from igneous rock, minerals that have

been melted and moved by incredible heat and pressure. Over millions of years that rock has been worn down. When certain rocks with a lot of alumina and silica where ground into fine powder and mixed with water the result was *primary clay.* When that clay was moved (usually by running water) it mixed in other minerals like quartz and mica and formed *secondary clay.* This dense naturally occurring substance mud-like substance is very plastic and can be shaped in various ways and, up to a point, will hold that shape. Drying it and heating it allow it to maintain its shape even more. Heat it to a high enough temperature and not only will it harden it will become *vitreous* (glass-like) and made impervious to water which early would have dissolved it as easily as it does mud.

[iii] Since clay can be found in almost any area and filled such an important role historically it is often possible with a little research to find what were the important clay pits of an earlier time. Even in cities it may be possible to find the original brickworks (usually constructed at or near the clay deposit) that produced the bricks that built that city in earlier times. In rural areas conversations with local potters, historians or archivists can lead you to these important sources of high quality clay. It is also possible to find clay of varying qualities very close to hand. The shorelines of rivers and old riverbeds are likely places as are construction sites, road cuts, or even under the topsoil in your yard. If the ground gets slippery after a rain you may be walking on clay.

[iv] Once our ancient ancestors first learned to use fire they would continue developing increasingly more sophisticated ways to work with it until passing from fire pits and bonfires to the earliest fireplaces (hearths). These were constructed by placing stones around an area or simply by letting the ash from repeated fires build up into a wall. These kinds of constructions can be found as early as 200,000 years ago in Africa and Israel. Tens of thousands of years would pass before we began to use clay hearths and the earliest kilns about 35,000 years ago. It seems likely that these were most often not totally sealed on top but were simply mud banked into walls.