UDC 903.2(100):398.31(=861):291.212.6

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ANCIENT METHODS OF MAKING FIRE

I Early fires

The oldest remains of fire date back approximately 1,000,000 years, and were discovered on Petralona site, Greece, and in Chou-Kou-Thien, China, from layers dated about 700,000 years ago. Other fire remains in Europe of later date were found on the sites Torralba and Ambrona in Spain, Vèrtesszöllös, Hungary, Terra Amata and L'Escale, France, and belong to the Mindel glaciation period (476.000 - 435.000 yrs).

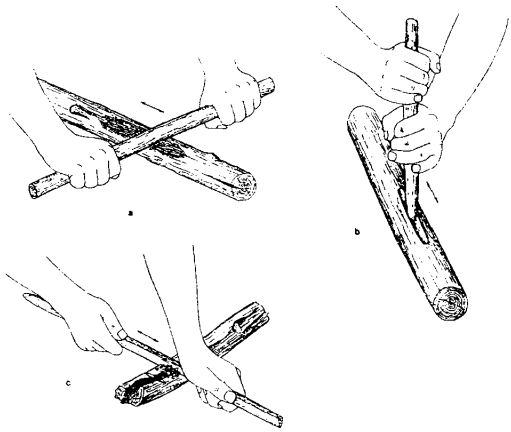
We do not know how long man has known fire or how he began using it. The conventionally accepted explanation derived from a simple association: accidental fire - surprised man. Thunder strikes, forest fires or volcano eruptions were an opportunity to "steal" fire, and then keep it kindling continuously. Yet, how frequent were such opportunities and how long could a fire be kept burning in a humid climate? Was fire "used first" in one part of the world, spreading thensforth, or did the practice begin in different, unconnected, parts of the world? And, in the latter instance, did man in every part of the world have to experience getting a flame from a fire outbreak, or, could he "catch" fire in some other way, apart from a natural cause?

It is possible, however, to associate the use of fire to outbreaks of forest fires etc., in one part of the world, while in another, man began to use fire only when he learned how to make it. Conducive to this perhaps are different myths on the origin of fire. Some say it came from heaven, others, that it was created by man.

The most famous myth, about Prometheus, is dual. In an extensive study on fire, Sima Trojanovic opines, "In addition to the story of Prometheus stealing a flame from Zeus, there is another version, which says Prometheus did not steal the flame, but lit a gentiana twig on Moschilos volcano, on Limnos island, where Hephaestus was thrown from Olympus. The riddle on the origin of fire would then have a more natural explanation. The gentiana he used is quite a high plant, and its dried core is used instead of tinder, because it readily takes spark, and smolders long." Trojanovic goes on, "The Indian word *agni* is identical to the Serbian word *oganj* (fire), and has the same meaning. But in the times of the Vedas, agni became the personification of the most frequently evoked divinity Agni (according to Kun). 'Agni' is the first word in the Vedas, a sign of special respect. According to the Vedas, Agni first descended to earth in the form of lightning, vanishing soon, when Matarisvan (a divinity, like Prometheus) stole him from the heavens, where he lay hidden in a cave, and gave him as a gift to Brgo, the oldest sacerdotal tribe, or Manu, generically - man. In other stories Matarisvan is used as a nickname for Agni, so Agni and Matarisvan come to be the same divinity. Agni is also referred to as Pramati, and Pramati is identical to the Greek Prometheus. The Sanskrit word *Mathanami* means to rub, shake, and Kun derives Prometheus from the same root, as Benfaj did before him, so it may be inferred that Prometheus did not steal a flame from Zeus' altar nor light it on the sun chariot, but drew it out by rubbing, igniting the pramanta. It should be mentioned that pramanta is simply a beam, that *gugas* on striking fire, and philologically derives from the same root as Prometheus." (Trojanovic, S.1990: 26-28)

One observes that in myths, man is more frequently referred to as the creator of fire. However, it would be unfounded to favor myths from another possible origin, namely, taking over flame from nature. A community sees the creator of fire as the one first in possession of this knowledge, but the myths are vague as to whether the fire was taken over or discovered.

We are wont to ascribe human creativity in the remote past to coincidence. However, it is difficult to answer whether knowledge of striking fire came accidentally or after forethought, as the meaning of coincidence is relative. The spark that flies from a flint in the making of a tool and sets fire to the grass is a coincidence. Insight that such a process can be repeated is the result of thought. Making fire with a flint is an intention. Without the spark from the flint, the insight would never have come. A spark without insight would have had no power. And without intention, the spark and



Illust. 1. Methods of fire-making with wood: a - by scraping; b - by rubbing in a duct; c - by sawing (illustrations taken over from Feustal R., 1973, p. 211)

insight would never have created the fire-place. So, whether man came to make fire accidentally or with forethought is unanswerable, as there is no reply to the question whether man first used fire and then made it, or made it first and then used it.

Perhaps it is more interesting to look into how man made fire rather than how he discovered it.

II Fire-making in Paleolithic and Mesolithic times

In order to reconstruct fire-making methods in early prehistoric times, archeologists use ethnographic data gathered in communities with similar economies and on much the same technological levels. According to their findings, fire was struck with stone, wood and metal (pyrite).

1. Stone

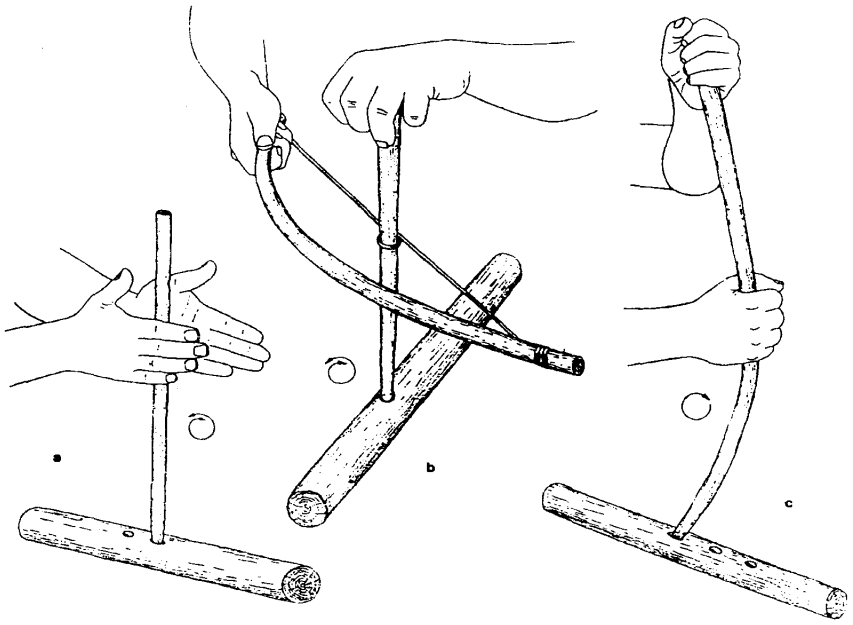
Flint, quartz, quartzite, chalcedony, granite, basalt and other minerals and stone throw out sparks when struck.. The sparks are readily caught with inflammable materials such as dry grass, moss, plant fibers, hair, feather etc. But, however inflammable a material may be, it takes skill and patience to strike a fire. This method was used until recent times.

2. Metal

The use of pyrite has been recorded in the Magdalenian culture at the Chaleux site, the Mosterian habitat Grottee de la Hyene and the Mesolithic sites Star-Carr and Duvensee. Sparks are thrown out by beating a stone on a pyrite, and vice versa. Pyrite is still used among peoples in the north pole.

3. Wood

Archeological literature presents four ways of striking fire with wood: scraping, rubbing in a duct, sawing and rotating.



Illust. 2. Methods of fire-making by rotating wood
a - with a straight rod; b - with a bow; c - with a rod bent like a bow
(illustrations taken over from Feustal R., 1973, p 210).

a. Striking fire by scraping:

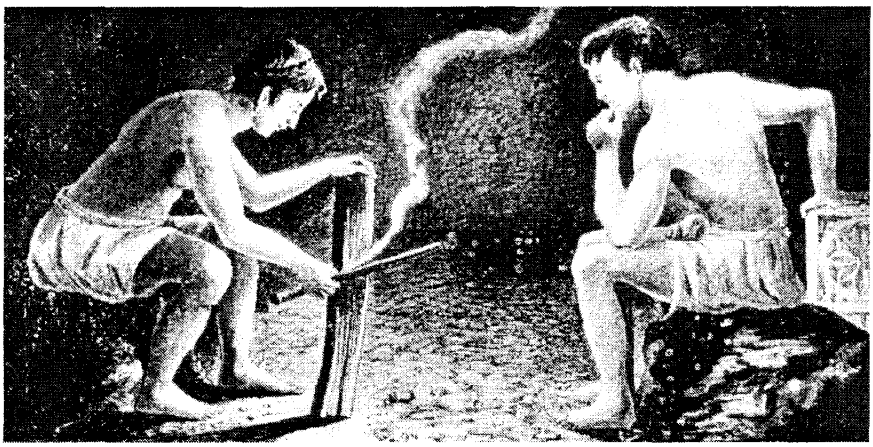
Passive wood, hard and dried well, is lightly flattened on the upper part. Active wood is softer, also well dried, narrow and rounded. Grating the active wood over the passive wood is done in the direction back and forth, pressing hard, until the fine dust of the shavings glows hot when an inflammable material is brought close. Charred stains appear on the active wood due to intense heat developed by friction (picture 1-a).

b. Striking fire by rubbing in a duct:

A narrow duct several centimeters long is made in a passive round log. The rubbing is done with the top of a narrow and rounded rod, pressing hard, back and forth (picture 1-b). It takes less than a minute to kindle the scrapings.

c. Striking fire by sawing:

Similar to scraping. In this case, active wood is sliced lengthwise on both sides to make a sharp edge for grating. A cleft is made in the passive wood and a stone is wedged in to keep the width. The crack is filled with



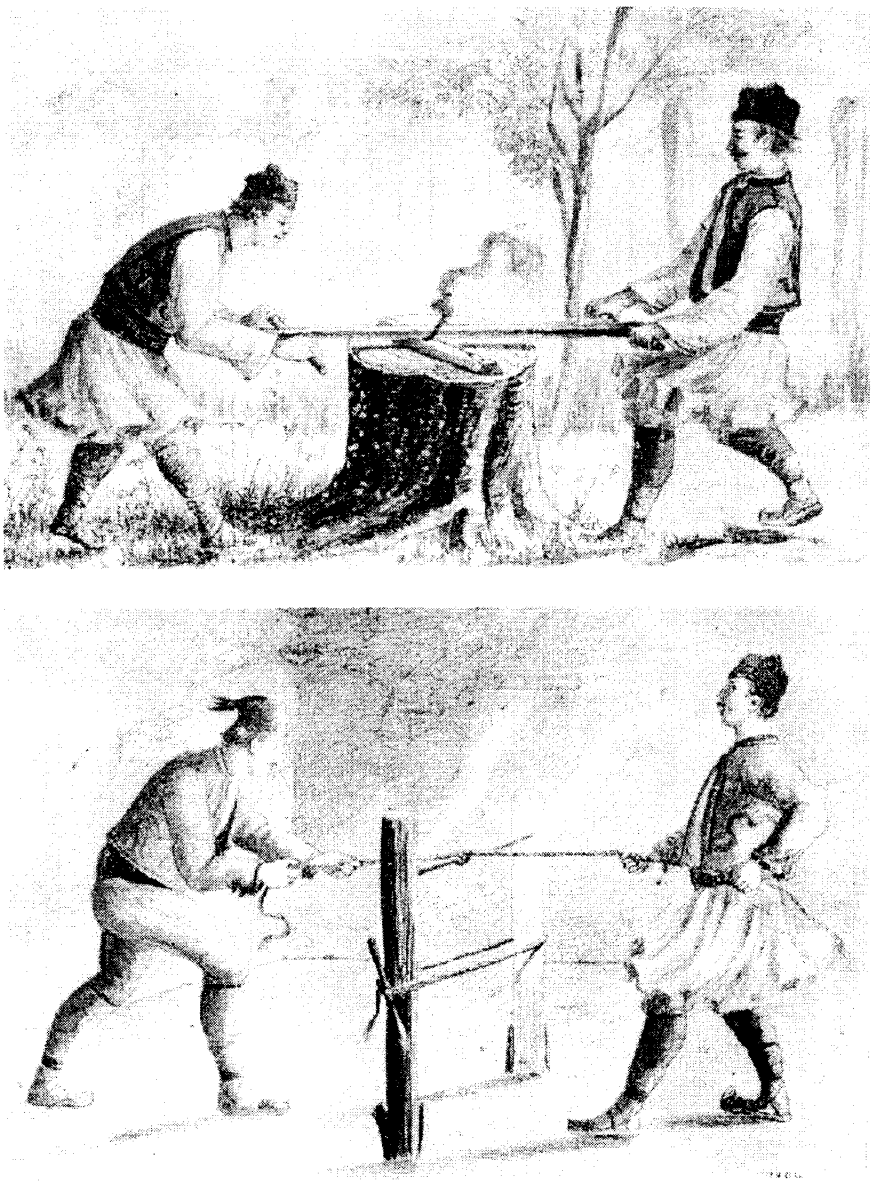
Illust.3. Live fire ritual: crawling through a tunnel; Illust.4.Striking fire by the muškara and zenskara method (illustrations taken over from Trojanovic S., 1990).

inflammable material on which the glowing scrapings fall. Fire starts in a few seconds (Picture 1-c).

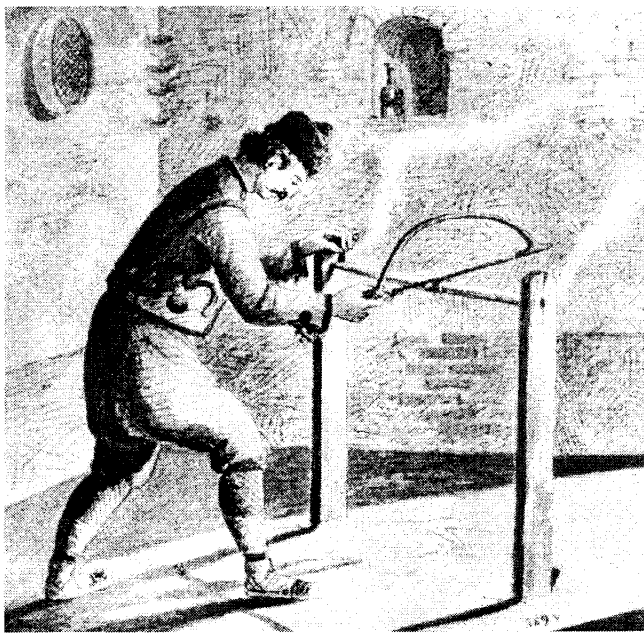
d. Striking fire by rotation:

This is done in three ways:

- a rod is placed perpendicular to a horizontal log, and rotated in semi-circles between the palms. The log must be of hard, well-dried wood. The rod must be of softer wood, with a sharp end. A hole is made in the passive wood which is filled with fine scrapings. If the air is dry, the scrapings may start to glow in less than 30 seconds (picture 2-a).

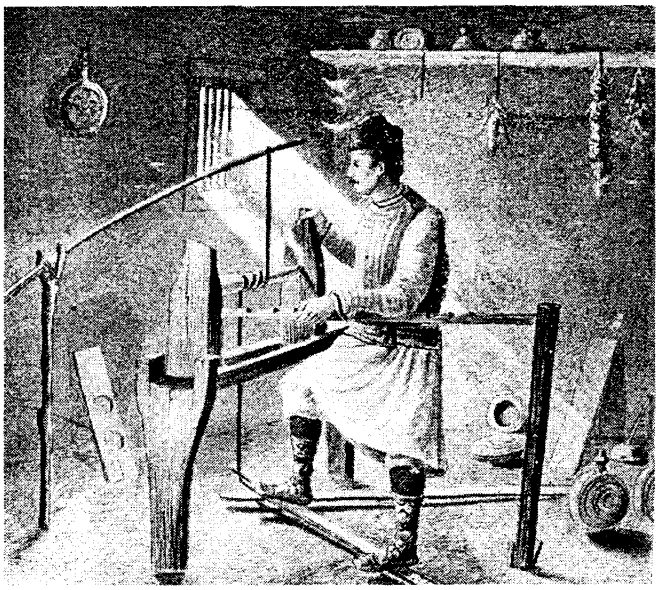


Illust. 5,6 Striking live fire
5. The muškara and ženskara method; 6. The kolenika method (illustrations taken over from Trojanovic S., 1990).



Illust. 7, 8 Striking live fire (illustrations taken over from Trojanovic S., 1990).

7. The fiddle-bow method;



8. The lathe method

- a rope is bound around a rod and tied to the ends of a slender stick bent like a bow. Rotation is carried out by pulling the bow across in alternate movements. The upper end of the rod is pressed hard with the hand to intensify the friction. (picture 2-b).

- a rod bent like a bow, narrowed in the lower part, is held in both hands and rotated in full circles (picture 2-c).

Besides these methods, which are believed to have been used in Paleolithic and Mesolithic times, there are several obsolete ways of striking fire with wood that might have been used in the lower and upper Paleolithic. Ancient methods of ignition have been preserved in the „livong fire" ritual, the archaic quality of which links them to the remote past. It is interesting to examine and classify them from the archeological aspect. I hope the following concise synthesis of ethnological data helps archeologists develop a comprehensive view of the many ways of striking fire.

III Living fire ritual

The living fire ritual was widespread in Europe and Asia. The rice spiritual tradition of Serbs have intensively prserved this ritual until recently. In some parts of Serbia it is still performed today as it was for a centuries.

The contents of the ritual, of which there are many variants, goes beyond the context of the paper, so only the main characteristics will be stated.

1. The procedure of the ritual

The ritual is performed to heal or prevent disease in cattle and people, rarely for church holidays or lighting the first fire in a new house.

The act of stiking fire is called extraction, eruption, twisting, building or catching.

Fire is extracted according to the specific directions of a community, by a man (rarely young man or maiden) who must be healthy and honest. He should fast for one week. In some parts the men might be twins, or namesakes, with similar names, or, quite the contrary, have different names that do not appear in the village, or be kinfolk. In Pcinja, the rite is performed by a youth and maiden with similar names form different villages. Before open flame is extracted, all fires in the village must be extinguished, even lamps and pipes. The fire is extinguished with an unbroached bottle of water, wine or brandy.

The time of extraction varies: Friday or Tuesday before sunrise, young days, the last quarter of the moon, i.e. old days, etc. The location is usually on a field, meadow or river bank. A tunnel is dug near the place of extraction, narrow and short, under the earth, frequently under the roots of a tree,

often with a western entrance and eastern exit (picture 3). Two fires with prepared twigs are lit with the extracted flame. One fire is lit at the entrance to the tunnel, the other at the exit, crosswise, or both are lit at the exit, one on the left and the other on the right side. At the entrance, by the fire, stands the male, and at the exit the female, with similar names. In some parts, standing by the fire at the exit are two naked men, or two old women, an old widower and an old widow, males and females with similar names (such as Stojan and Stojanka), two old women with twins of the same or opposite sex, who blacken cattle and men with firebrands when they emerge from the tunnel.

The rite is accompanied by ritual preparations of food on living fire, most often bread crust with onions and lard, bread and gruel which is handed out after crossing the fires. All food is prepared without leavens or salt. Food is made of butter, wheat flour, garlic, with a bit of vinegar, cornel berry buds and tar. The plants gentiana, globe thistles and Jerusalem thorn are also added. In some places, everyone sits to table for a feast with food and wine brought for the occasion.

The living fire is usually left to burn down. When extinguished, it is done with unbroached water or wine. The entrance to the tunnel is covered with sticks, to keep it from getting, as it is a consecrated spot.

The firebrands are crushed and mixed with bran, and given to cattle for health, until St George's Day. Crushed coal blended with butter is used as anointment for injuries. Firebrands are also used to ignite fires on extinguished fireplaces. The protective power of the living fire lasts one year.

2 Types of living fire

There are five types of living fire, depending on the material from which a fire is extracted: wood, stone, iron blaze, glass and thunder flame.

a. Extraction from wood

This is the most widespread method of starting a fire in the world. There are a number of ways to extract fire from wood, and several variants, in Serbian tradition. Different kinds of wood are used to kindle fire, precisely defined, depending on the region. These are well-dried lime-wood, hazel-tree, aspen, willow, hawthorne, pine, spruce, beech and juniper-tree. Tinder (fomitopsis pinocola) is used to catch the flame, with particular care from whatch tree it is plucked.

There are four methods with many variants (described according to the complexity of extraction).

1. The *ženskara*[1] method

Fine scrapings are obtained by strong rubbing two pieces of well-dried wood, which then alight to due heat caused by the friction. The passive wood is called ženskara, and the wood drawn across is muškara. The position and shaping of the ženskara and muškara may vary.

The positions of the ženskara:

- two men hold the ženskara at knee-level in a horizontal position;
- ženskara is in the shape of a round log held vertically (picture 4);
- ženskara is fixed lengthwise in a wedge on the horizontal surface of a log;
- ženskara is nailed horizontally to a log surface (picture 5);
- ženskara is tied and nailed horizontally between two rods jabbed vertically one across the other;
- ženskara is fastened with a rope in the forks of two poles jabbed vertically one across the other.

Shaping the ženskara:

- the surface across which the muškara is drawn is flat;
- a shallow incision is made into which the muškara is placed;
- a hole is made in the shallow groove of a ženskara into which tinder is placed (glowing scrapings dropped on tinder accelerate ignition).

Shaping the muškara:

Two kinds of shaping are applied on the muškara - finishing the surface with which the scraping is done and finishing the ends to improve the hold.

The surface for scraping can be:

- flat
- flat and smoothly finished
- edged to fit better into the groove on the ženskara.

The ends can be:

- without shaping;
- with pieces of wood fastened athwart on both ends for easier hold (picture 5).

Muškara are generally made of dried lime-tree, hazel tree, ash-wood, willow-wood or bilberry, and ženskara either from the same or a different tree from the muškara. There are charred remains on the surface.

[1] Noun derived from adjective *žensko,* meaning female) and, *muskara* (noun derived from adjective *musko* - male)

2. The *kolenika* (beam, winch or spindle) method

According to this method, a horizontal kolenika is quickly rotated, and its ends are set into two holes made in vertically jabbed pieces of wood. Below is an illustration of the use of kolenika in the villages of Podrinje about fifty years ago.

"A dry oak-wood stake is driven deeply and firmly into the ground, in Joševa they call it korać, or pole, and it jutts out about 60 cm, while across, at a distance of 10 to 100 cm, another dry rod - lime-wood, rarely oak-wood, is stuck into the ground, but not so deeply, so that it can be bent and drawn near when necessary. In some places, a dry post from a building is used instead of the first stake or, even better, a beam from a terrace. A shallow hole is made in each stake, about 40 cm from the ground. A lime or hazel-wood beam, commonly referred to as winch or spindle, or long gun, is slightly hollowed on both ends, and fit into those pits. Both stakes are tied with a thick rope beneath the hole, and a spike is thrust under the knot, which one man twists, bringing the stakes together so that the beam remains in position, and that the ends in the pits rub firmly. A rope is wrapped twice around the beam, which is hexagonal in Joseva, round in Belotic, and one farmer holds one end with both hands, and another farmer the other end, and both begin to pull with all their strength, to one side, and then the other, like scraping wood, and farmers call this *gugati*. In doing thus, the tips of the kolenika begin to rub quickly in the holes of the stakes, throwing out scrapings that become so heated they fly out like sparks, which a third person, the one who twists the rope, tries to catch on loose tinder. Sometimes, the ends of the beam are scraped crossways, and soft tinder is stuffed into the notches, some add a bit of gunpowder (of later date), so the sparks set it burning." (Trojanovic, S. 1990: 74-75)

In some parts of Serbia and Montenegro, doors and door-posts are used instead of stakes. The rest of the procedure is the same: a beam is stuck into two holes, one against the other, with a rope bound around it twice, the ends of which are pulled back and forth by two men, and the third moves the door to increase the friction. Tinder is stuffed into the holes, or put into hollows made in the ends of the beam.

The position of a kolenika:

- a kolenika is placed between two vertically fixed stakes of which one is slightly movable (piture 6)
- a kolenika (with sharpened ends) is set upright between two slabs laid flat;

- a kolenika is set between the door-post and the door;

- a kolenika is tied with fiber or nailed between two unfelled trees about one meter apart. A notch is made in the middle of the kolenika over which two men draw another kolenika with a sharpened edge.

Shaping a kolenika:

- the body of a kolenika and its ends are shaped

The body of a kolenika can be:

- round

- angled

The ends of a kolenika can be:

- roundly sharpened and polished without notches or incisions;

- holes are made at the very ends, into which tinder is stuffed;

- the ends of a kolenika are notched, and tinder is put into the incisions.

Ends of a rope tied round a kolenika can be:

- free

- fastened to pieces of wood for easier hold

A kolenika is most often made of hazel or lime-tree, aspen-wood, cornel berry, pine-wood, or juniper-tree. Rotation of a kolenika is called *guslanje* or *guglanje*. A kolenika is 50 cm long, and between three and four cm wide. Stakes used for a kolenika in addition to being hollowed for the ends of the kolenika, may have holes for the tinder, located just above the hollows, touching the kolenika, to facilitate kindling.

The pointed ends of a kolenika remain burnt. This is something to which archeologists should pay attention. A piece of wood with a ponted burnt end need not be a spear the tip of which was hardened by fire, but a piece of kolenika.

3. Fiddle-bow (pruglo) method

Ethnological literature records this method of extracting fire separately, though it might be linked to the method of extraction by kolenika. A rope is bound around a horizontal beam, and the ends are tied to a raw, easily bent twig about two meters long, resembling a fiddle-bow. The beam turns with the quick movement of the bow. The method is the same as with the kolenika method. One person is able to strike fire this way, but it is usually done by two persons. The bow is made of a hazel or maple twig (picture 7).

4. The lathe method

This method is of recent date, but we will describe it because it clearly shows the way an open flame is struck. A lathe is used for making objects

from wood. The lathe is shown on picture 8, without the wheel. A wooden (in early times) or iron (more recently) spike is placed on the lathe, on which one side of the beam is placed, and the other end, sharpened to a round point, is put in a whole on the right post of the lathe. Friction is produced when the beam is rotated by turning the lathe, and the scrapings kindle. (picture 8).

b. Striking fire with stone

Drawing open flame out of stone was used less frequently in Europe than out of wood. Kindling fire with a flint was used more often in a non-ritual context. A quartz pebble, called "arrow", is believed to have come from a thunder strike, and is therefore endowed with special powers. It holds an important place in Serbian tradition. The arrow was used less for kindling, and more for other purposes, such as protecting and strengthening the effects of certain forces.

Kindling a fire by beating a pyrite on stone, or vice versa, was not used in the open flame ritual among Serbs, though Serbs knew about pyrite, which was often in the vicinity and easily accessible.

The stone for hitting the flint on which tinder is placed is called a fire-steel.

c. Thunder fire

Used in a small area in Serbia (the Kolubara region). Fire that erupted when thunder struck a tree is considered a gift of God and has as much power as a fire made by man, if not even greater, because it is not accompanied by a ritual that increases its strength. Other open flames are never strong enough for remedies, but only as part of certain rituals. Coal-dust from thunder fire is used as remedy or disease prevention for oxen, rubbed on the horns. This can be performed only by men, in keeping with the rule that only male members of a community extract open flame. Contrary to other open flames, it is all the same which tree is ignited by a thunder strike.

d. Extracting fire with an iron flame

This method, of later date (we are citing it for a more comprehensive survey of all methods of striking living fire), is used sporadically, mainly by Gypsy blacksmiths, who extracted it for the needs of village people. A cold piece of iron on an anvil is hit with a hammer until it glows hot and tinder alights on it. The fire and scraps of iron are believed to have healing powers.

e. Extracting fire from glass

Fire was extracted in this manner in the area of Mount Kopaonik in Serbia. A thick, smooth bottle is filled with water and placed against a wall

at a 60-degree angle, where the sun shines the hottest. Tinder or cotton is put under the bottle where the sun's rays focus.

IV Conclusion

Striking fire with stone or by scraping wood are the oldest methods for striking flame with the instruments described above, because they are simple and produced without extensive preparation. It is difficult to say which method precedes which. The fact that wood is mentioned oftener in myths, and that striking fire with stone is forbidden in some parts, indicates that wood might be older. Of course, wooden tools for striking fire could not have been in use before the experience was acquired of developing heat in the process of friction, which occurs in the making of a tool from wood. Stone and wood are materials easily accessible in the environment, to be used for simple work without any processing, or with little shaping. The development of stone and wooden tools probably took place simultaneously. However, wood is difficult to preserve. The absence of wooden artifacts from early prehistoric times implies that stone was first in use. The oldest fragments of wooden spears, with the tip hardened by fire (!) were discovered in Clacton site (Essex), dating from the Mindel glaciation (476.000-435.000 years), Torralba site (Spain) from the Mindel-Ris interglaciation period (435.000-230.000 years). Wooden tools or recipients were probably in existence much earlier, thus the experience of heat through friction, but it is difficult to discover when the use of wooden instruments for making fire began. With a lot of luck and attention, perhaps archeologists will uncover parts of muškara and ženskara or kolenika with charred stains and traces of friction - sufficient for evidence.

Many questions on the subject of fire yet await answers. Some solutions, or at least a guide for research, may perhaps be found in a careful study of spiritual tradition. Though the subject has been much investigated, the search should go on.

Transated by Dragana Vulićević