The Use of Iron Pyrites for the Creation of Fire.

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Introduction

Archaeology has shown that iron pyrites was used for fire-making in prehistoric Britain at least as early as the Mesolithic era. Iron pyrites, a flint striker and a fungus tinder were found together during the excavation of the Mesolithic site of Star Carr in Yorkshire (Clark 1954, 1972). Three finds of iron pyrites in association with flint strike-a-lights have been made from Bronze Age sites in Scotland: Flowerburn, Ross-shire (Mackenzie 1885), Hoprig, Cockburnspath, Berwickshire (Hardy 1889), and Cist 3 of the Bronze Age cemetery at Aberdour Road, Dunfermline, Fife (Close-Brooks et al. 1972). Iron pyrites have also been found associated with some form of flint striker in several Bronze Age burials in England. Nine such finds are listed in Evans (1872, 1897) and discussed in more detail in Mackenzie (1885): Lambourne Down, Berks; Angrowse, Cornwall, Elton Moor, Green Low and Dove Low, Derbyshire; Crosby Garrett, Westmorland (chert rather than flint); Brigilmiston, Wilts; and two from Rudstone, Yorks. Mackenzie also lists a find from Tynside Farm, near Minto, Roxburghshire (1885), and Evans one from Basingstoke Station, Hants (1897). Subsequently, another example was reported by Fox (1959), and Clarke (1970) lists another 12. There may well be others.

As far as I know, the only instance where a tinder has been found in association with iron pyrites and a flint striker at a prehistoric site is at Star Carr. Having read that report in 1983, I decided to prove that the system actually worked.

Practical Experiments

Since the end of 1982, I had been experimenting with 'Flint-and Steel' fire making, including finding and proving various tinders (Cave-Browne 1987). This work gave me a base from which to work with iron pyrites. A suitable nodule of the ore was bought from a 'rock shop' in Edinburgh, and I knapped a reasonable copy of the Hoprig strike-a-light (the original is exhibited at the National Museums of Scotland, Queen Street, Edinburgh). My first successful attempt at fire making with iron pyrites and flint was made on 23.12.1983, and it took me 20 minutes of hard work to get a spark to catch! The tinder I had been using was beech 'punk' that had been partly charred.

I soon realised that the sparks from iron pyrites (a) did not travel as far as those struck from steel, and (b) were not as hot. Therefore, the production of the sparks needed to be closer to the tinder.

Tinders

A tinder is any highly inflammable substance that will not explode. A 'primary' tinder will catch fire from a spark and continue to smoulder on its own. It needs to be of a softish material that will hold the travelling spark. A 'secondary' tinder can be blown into a flame easily once a glowing primary tinder has been placed with it, but which will not catch fire from a spark. Examples of primary tinders, available to people in Britain in the periods that are being considered are:

1. 'Punk' or 'Touch-wood'. This is wood that has become rotten by the action of a fungus on the dead tree. I have found that punk from elm, beech, alder, willow and birch all work well, with perhaps elm punk being the best. The trees mentioned are all indigenous to Britain. Where punk is used unpowdered it accepts the spark best if it has already been charred. Powdered punk works well, but is not so easy to transport. It is possibly the best material for experiments. Punk is found wet and spongy; and should be dried very well before use as tinder.

2. 'Amadou'. This is the type of tinder which was found at Star-Carr (Clark 1954). It is made from the tree-fungus Fomes fomentarius, now sometimes called Unguina fomentaria because it resembles a horse's hoof. At present it is usually found growing on birch trees in central to northern Scotland, but would appear to have occurred at least as far south as Yorkshire in the Mesolithic period. The bark of the fungus is grey, thin and very hard. The only part of F. fomentarius useful for tinder is the soft, pale brown, corky layer ('flesh') immediately under the bark. The spore tubes that form the bulk of the fungus, are useless for tinder.

To prepare this tinder, first remove the spore tubes until you reach the soft 'flesh', which is seldom more than 6 mm thick (what you now have resembles a quarter of a globe). Either soak this item for two days or boil it for c. 2 hours. With care the thin, hard bark can now be chipped away from the flesh with a sharp blade: the natural sharp edge of a strong flint flake will work quite well. Remove the part of the flesh that had been attached to the tree. Now start gently pounding the flesh that remains with a smooth fist-sized pebble, using another smooth rock as an anvil. Gently stretch the flesh with the fingers until it resembles coarse chamois leather. Dry it gently as too much heat hardens it. Char that part that will receive the first sparks, having first made ready a suitable air-tight container in which to extinguish the smouldering amadou.
Figure 1. Nodules of iron pyrites found with flint strike-a-lights from Bronze Age burials: above, Flowerburn, Ross-shire (Mackenzie 1885); below, Rudstone, Yorkshire (Evans 1872; Mackenzie 1885). Scale 1:1.

Figure 2. Iron pyrites nodule and associated flint artefacts from Bronze Age burial at Hoprig, Berwickshire (Hardy 1889). Scale 1:1.
3. 'Charred linen'. By the Bronze Age, flax was grown and charred linen cloth would have been a third possible tinder.

All primary tinders need to be kept totally dry; even the moisture from 'dry' fingers can prevent a spark from catching.

The Stone or 'Strike-a-light'

Flint is the best stone to use with iron pyrites for striking a spark that will travel. The flake of flint should have as sharp and strong an edge as possible. From the illustrations of the Flowerburn set (Mackenzie 1885) and the example from Rudstone (Mackenzie 1885; Evans 1872) it is clear that the actual strike-a-light was of a size that could be held in the hand comfortably (Fig 1). The same is true for the one shown by Hardy in his note on the set found at Hoprig, near Cockburnspath in Berwickshire (1889; Fig 2). However, the set found in Cist 3 at Aberdour Road Dunfermline seems almost too small to handle conveniently, and yet had been much used (Close-Brooks et al. 1972; Fig 3 and accompanying description).

My own experiments have shown that, while any small sharp flake can be used to strike sparks from a fire-steel, a 'natural' sharp edge of flint is too delicate to be used with iron pyrites. For this reason, because of the strength of the blows, the flint strike-a-light needs to be relatively thick and the end used for striking the nodule of pyrite needs to be convex and chipped to form a fairly steep-ended scraper. Even then the process will probably remove small flakes of flint. (It is wise to wear eye-protection).

The conventional strike-a-light, as still produced by Mr Fred Avery in Brandon, Suffolk, has such an edge on the back of the piece, while the edge for use on the fire steel is fairly sharp, but this flint is too short to be held comfortably for use with iron pyrites. I suggest a length of 70-75 mm for this purpose.

The Methods for Getting Fire from Iron Pyrites (The two methods are described for right handed people).

1. Flint on Iron Pyrites.

   a) Hold the nodule of iron pyrites in the left hand in such a way that the finger-tips and the thumb will not be struck by the flint strike-a-light. Make sure that a flat surface of the nodule is facing away from your cupped left hand and towards your right (Fig 4). The nodule should be a half pound to a pound in weight. A strong flint end-scraper would be an appropriate strike-a-light.

   b) Hold the nodule not more than 10 cm above the primary tinder; even closer if possible.
c) Strike down and across the iron pyrites with the convex end of the scraper/strike-a-light many times and quickly.

d) Watch for a spark to 'catch'. This will more easily be seen in shade.

2. Iron Pyrites on Iron Pyrites. In the second method, and this I find is the better one, the main nodule is struck with a second nodule of slightly less weight. The blows should be glancing or the concussion will break the nodules apart. As not all blows will produce accurately directed sparks, many quick blows will produce a satisfactory conclusion sooner.

Once the primary tinder is smouldering transfer it to a handful of secondary tinder and blow gently to establish a flame. The secondary tinders that I have found satisfactory are:-

a) scrapings or shavings of dead wood (ash, pine and alder are the best-a sharp flint flake or scraper can be used to produce the shavings);
b) bracken, crumbled finely;
c) birch bark, the outer, fine paper-like material;
d) juniper bark, the same applies;
e) grass leaves that have dried naturally;
f) sphagnum moss; and
g) oak leaves, and other soft autumnal leaves, again finely crumbled;

You could well have a flame in less than two minutes.

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References


Addendum.
Further comments on the use of iron pyrites for the production of fire

Since the completion of the above article, I have experimented with the use of rocks other than flint for the production of fire from iron pyrites. Having a split cobble of quartzite, I struck the broken face with a nodule of English iron pyrites and found that sparks were produced entirely similar to those struck from pyrite when using a flint strike-a-light. The same effect was produced when the edge of the split cobble was used to strike at the nodule of pyrites. The experiment was repeated with charred linen as the tinder and fire was obtained each time.

On the suggestion of Alan Saville of the National Museums of Scotland, I have also experimented with quartz using English and Scottish nodules of pyrite on both the split surface of a quartz cobble and on the water-worn exterior. In each case fire was successfully obtained using punk as the tinder. This was followed by a successful trial using a small split agate to strike at each pyrite nodule. Finally, I extended the experiment by striking each of the pyrite nodules against the cortex of a water-worn cobble of flint and, using punk for tinder, again met with success. A cobble of basalt was then used with the same result with each of the pyrite nodules.

From the above it appears that a specially knapped flint strike-a-light is not necessary for the production of fire from pyrites. Furthermore, the question can be asked whether the flints found associated with pyrite nodules in Bronze Age burials are, in fact, strike-a-lights, as the nodules of iron pyrites and a suitable tinder are the only fire-making items that need to be carried on the person, both in this life, and perhaps the next.

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FIRE-MAKING BOOKLET: OFFER TO LSS MEMBERS.

Patrick Cave-Browne's booklet entitled Fire-Making. A Survival Skill from the Past published by the Pitt Rivers Museum in Oxford (13pp) is now out of print. However, Mr Cave-Browne has several copies which he has offered to sell to interested people for a price of 75p, which covers the actual costs of the publication including postage.