

Prehistoric flint mining

In the Realm of the Devil



Prof. Jacek Lech studies the later Stone Age, prehistoric flint mining in Poland and Europe, and the history of archaeology

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Thousands of years ago, before technologies for producing bronze and iron were discovered, human communities exploited various deposits of siliceous rocks, which they used to produce tools and weapons. We now know more than 250 flint mines from the Stone and Bronze Ages throughout Europe, including more than 20 in Poland. One of the most impressive is the ancient mine in Krzemionki Opatowskie (Poland)

Among the numerous fields of research on the distant past is the archaeology of prehistoric flint mining, which focuses not only on the exploitation of flint deposits but

also on the systematic mining of such rocks as chert, hornstone, radiolarite, and obsidian. These raw materials played an important role in the culture of Stone-Age communities, and so both the methods of working these rocks and the mechanisms of their distribution from the Palaeolithic to the end of the Bronze Age (some tens of thousands of years ago until about 1000 BC) make for fascinating study. Research into flint mines offers an intriguing glimpse into the practical knowledge and skills of humans back in those ancient times, illustrating the organization and scale of the activities they undertook. The Institute of Archaeology and Ethnology of the Polish Academy of Sciences has for years been among the institutions engaged in researching prehistoric siliceous rock mining in Poland and Europe.

Neolithic flint mines

The first flint mine mentioned in the modern scientific literature is Grimes Graves – a

Michel Woodbury



The present author in the underground chamber at Spiennes (Belgium); flint concretions are visible in the roof, next to a 20 cm scale



Jacob Lech

The shafts at Grimes Graves (England) are the largest. They were dug in Pleistocene deposits and sunk in Cretaceous rock in their lower portions. This is a view from the surface of the Greenwell shaft, 13 metres deep

site in eastern England described in 1695 as the remains of ancient fortifications, but for centuries considered by the local population to be the work of a devil. The true origins of its characteristic post-mining landscape were only recognized in 1870 owing to a spectacular discovery at Spiennes in Belgium in 1867. There, work on constructing a railway line had dug through an extensive plateau, revealing the numerous deep shafts and underground workings of a Neolithic mine. The news of that sensational discovery quickly spread around the world, greatly contributing to the discovery of other similar sites, including Cissubry and Grimes Graves in England, numerous flint mining sites in France, and the Rijckholt - St. Geertruid mine in the Dutch Limburg.

Research in this field was initiated in Poland in 1919 by Stefan Krukowski (1890-1982), the author of important excavations and eminent publications in the interwar period. In 1922, the geologist Jan Samsonowicz (1888-1959), with whom Krukowski collaborated, discovered excellently preserved Neolithic mine field in the village of Krzemionki, Opatów district, which ultimately proved to be the most important relic of prehistoric cultural heritage in Central Europe. Nowadays we know of more than 250 flint mines from the Stone and Bronze Ages throughout Europe, including more than 20 in Poland. Krzemionki Opatowskie remains one of the most magnificent.

From the surface down

Flint mining took various forms, ranging from the systematic gathering of nodules from seashore beaches (Denmark, England), to the exploitation of weathering and moraine clays (shallow pits and open shafts running several meters deep), to shafts sunk through Cretaceous and Calcareous rocks to underground seams of raw material. Siliceous rocks

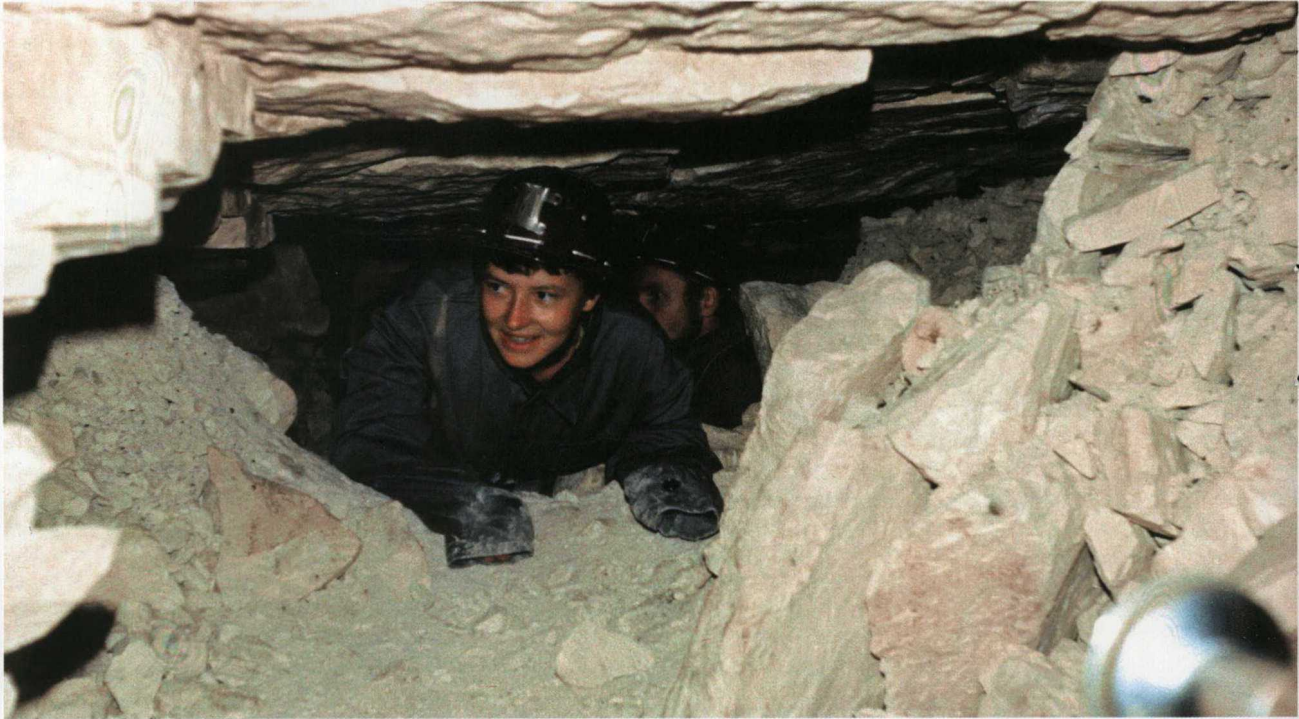
were also obtained from quarries, or much more rarely by digging adits and artificial caverns in the sides of chalky hills or valleys.

Extensive underground techniques developed at the same locations where simpler forms of mining existed. The deepest shafts were sunk down to a specifically targeted flint-bearing level (with nodular- or lens-shaped mineral deposits), without showing interest in higher ones along the way. Some of the shafts at Spiennes were dug down to the 17th layer of flint in the Cretaceous rock, to a depth of 15-16 metres. They were narrow, at 1-1.5 metres wide, and extended to some half a metre below the exploited level. Deposits were mined from below, removing the Cretaceous rock and chipping the large flint concretions off the roof. Rubble was used to backfill abandoned chambers. The area of underground exploitation from the deep shaft at Spiennes is reckoned at 40-50 m². The shafts at Rijckholt - St. Geertruid were like those at Spiennes, but flint was extracted from about half way up the walls of the underground galleries.

The shafts at Grimes Graves reached depths of up to 13 metres and widths of 10 metres. The flint was mined from the gallery floors; the longest of them running 16 metres. The shafts at Krzemionki Opatowskie were shallower, significantly wider than at Spiennes but narrower than at Grimes Graves. At Krzemionki, some of the deposits were exploited using an advanced chamber method, unknown at other European mines, made possible by the hardness of the Calcareous rock and the richness of the deposit. From the shaft bottom, workings linked to a great chamber were dug and then efficiently backfilled, leaving behind only narrow communication galleries between the underground waste heaps. Concretions of decorative striped flint were extracted mainly at floor level.

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The post-mining chambers at Krzemionki Opatowskie were carefully backfilled with limestone rubble and slabs, only leaving narrow galleries connecting shafts to the working faces

Shafts were sunk using various techniques and sets of tools, made of flint, other rocks, or organic materials – flint, antler and stone picks, hammers, antler and wooden levers, wedges and rakes, shoulder-blade shovels. The underground galleries and chambers of all the mines were low in height, at 60–80 cm; the miners working while prone or on their knees. Archaeologists now studying them encounter places little changed since the last Neolithic miner withdrew thousands of years ago.

Prehistoric mining was governed by three principles: firstly – adapting methods of exploitation to the geological conditions of deposits, secondly – work safety, and thirdly – the extent of demand for raw materials with specific properties. These principles functioned within a wider context of symbolic meanings, beliefs and superstitions. While only hints of these remain, the overall significance of the discoveries is beyond doubt.

Waste heaps, workshops, camps

Above the mined area itself lie the remains of rubble heaps surrounding the shafts, numerous flint chipping-floors, and camps. The heaps were initially 2–4 metres high, depending on the size of the shaft. Nowadays, at best, all that remains are small ring-shaped mounds around the depressions marking the shafts.

The flint chipping-floors are among the most important yet least well studied structures. At the best preserved mining sites, they are found under a shallow covering of earth. They are formed of thousands, tens or even hundreds of thousands of flint flakes, waste fragments and chips, or very rarely preforms (roughouts) of tools at an advanced stage of preparation, the final product of the labour. The objective of such on-site flint working was to reduce the mass of the blanks and semi-finished tools for transport; the labour-intensive further finishing (polishing, smoothing, and hafting) was performed at settlements in another location.

The chipping-floors frequently produced flint blades which served as knives or other tools set in wooden and antler handles, mainly sickles. The discovery of how to produce flint axe and adze blades marked a revolution, replacing axeheads made of other stones. Rising demand for flint axeheads and long flint blades as tools and symbols of prestige, deposited as grave goods and offerings, encouraged the development of subterranean mining in the Middle and Late Neolithic.

Investigation of such workshops yields a host of information about the tools produced, the organization, techniques, and scale of the operations, and the behavior of prehistoric flint miners. An analysis of the production

debris from two chipping-floors at the flint-mine at Saspów near Cracow has shown that some 3500–4000 flint blades – around 100 kg of flint – were taken away from each floor. The largest chipping-floor studied so far at the Grimes Graves mine evidenced 250,000 waste flint fragments, flakes and chips weighing 1220 kg, and proved to be the outcome of producing several hundred axe and adze blades, and discoidal knives. The comprehensive study of such flint workshops will remain an important target of prehistoric mining research in Poland and Europe in the coming decades.

Evidence for camps is the most elusive. What remains are usually just odd fragments of clay pottery, a few flint tools for household use, pieces of charcoal from hearths, and under favourable conditions, the bones of animals representing the remains of meals.

Who and for whom?

The mines were located at various distances from the settlements of the communities which exploited them. Only certain communities engaged in the mining itself. Groups of miners would come in from the closest settlements, numbering 2–3 or even a dozen individuals depending on the accessibility of the deposits, the mining methods used, and the scale of demand. They were led by seasoned specialists (experienced adults or elderly males) – the graves of such specialists have been identified. Leaving aside the simplest forms of mining, the cycle of work usually lasted from several days up to a dozen or so weeks.

Advanced flint mining activity was a periodic undertaking. The flint so obtained, usually in processed form, was an attractive commodity exchanged between settlements and regions, sometimes in multiple directions and covering long distances. Several types of flint mined in the Vistula catchment area were distributed more than 400 km away, the furthest being striped flint from the Krzemionki Opatowskie mine.

When?

The oldest well-documented flint mines are known in Egypt, exploited by hunter-gatherer communities of the Middle and Upper Palaeolithic. Later Palaeolithic mines are also known in Poland (Wołowice, Orońsko, Gojść).

Mining was practiced by the first agricultural communities that appeared in Europe, and their mines have been discovered in Italy, Spain, and Poland. The Defensola “A” mine from the Gargano promontory in Italy dates to the late 6th and early 5th millennium BC, and it demonstrates a rare system of adit mining.

Underground exploitation at Spiennes and Rijckholt – St. Geertruid can be dated to the latter half of the 5th and the 4th millennium BC, and is affiliated with communities of advanced agricultural economies practising animal husbandry on a large scale. Striped flint was mined at Krzemionki Opatowskie in the late 4th and the 3rd millennium. Mining activity at Grimes Graves was concentrated around the middle of the 3rd millennium. The latest of the European flint mines was discovered at the “Zełe” site at Wierzbica, near Radom in Poland, where shafts were dug as late as the end of the Bronze Age, around 1000 BC. ■

Further reading:

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Semi-finished flint
axe blades produced
at Spiennes.
Scale: 10 cm