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Chipped flints as tools for processing hematite grains. Example from Rydno (central Poland)

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Résumé

Rydno, complexe unique de sites de l'Âge de Pierre entourant une mine d'hématite préhistorique, a livré de nombreux assemblages de silex. Sur un certain nombre d'artefacts, on observe des surfaces et des bords bossués et/ou abrasés. On a effectué des expériences pour vérifier l'hypothèse selon laquelle ces traces d'usure seraient dues au traitement de l'hématite. La première série d'expériences ne confirme pas cette hypothèse.

Abstract

Rydno, a unique complex of Stone Age sites surrounding a prehistoric hematite mine, has yielded many flint assemblages. On a number of artifacts, characteristic battered and/or abraded edges and surfaces can be observed. Experiments have been undertaken to check the hypothesis that these use-wear traces might have resulted from hematite processing. The first series of experiments does not confirm this hypothesis.

In central Poland, in the northern foothills of the Holy Cross Mountains, an unique complex of Stone Age sites surrounding prehistoric hematite mines was discovered already in the twenties[1]. The sites of this complex, called Rydno, are very densely packed on the surface of the sandy-gravel accumulation terrace of the Kamienna River. The downcutting of this terrace is dated to the early Bölling Interstadial. Nearby, there is a hill, the core of which is composed of Triassic sandstones, and covered with fluvioglacial sediments of the Riss glaciation. Within the sandstone there is a lense of conglomerate made of quartz, hematite, chert and sandstone gravel in a dark red clayey matrix. This

(1) The following data on the Rydno site complex are based on R. Schild and H. Królik's monograph (1981).

bed is truncated and outcrops in the slope of the hill within an area measuring some 100 by 30 to 40 m. There, several prehistoric exploitation pits were excavated.

The surrounding site complex covers an area of about 3 square km. The number of the hitherto discovered flint concentrations approaches one hundred. Based on the radiocarbon dating and archaeological materials, the earliest settlement of the area and hematite exploitation seems to be confirmed for the Bölling Interstadial : Hamburgian, Late Magdalenian and the Bromme-Segebro type assemblages have been found there. The majority of sites, however, are connected with the Arch Backed Piece Complex of the Alleröd period and with the Masovian Cycle (also called Swiderian Culture) of Younger Dryas/Early Preboreal Age. The Mesolithic sites, while less numerous, are also present as are the later ones, from Neolithic and Bronze Age.

The hematite exploited at Rydno occurs in the form of gravels and pebbles of a size up to 3 cm in diameter. Some of them are more reddish and the others, being harder, are black in colour. The use of dark red clayey matrix from the bed cannot be excluded when we take into account a relatively small estimated yield of hematite grains from the excavated exploitation units (1894 g per cubic meter – Schild, Królik, 1981 : 63).

There is sound circumstantial evidence indicative of the hematite powdering on the spot. Most of the flint concentrations are contained within oval hollows saturated with the hematite powder. Besides, the hematite grains are to be found in the context of flint concentrations. The pre-war collections from Rydno contain a bulk of stone artifacts that can be thought to show traces of being used in the hematite processing activities : grinding stones, flat abrading stones and pounders. These particular items have, however, no firm cultural context since they were surface findings in most cases.

My immediate interest here is a hypothesis put forward by R. Schild (1967) and stating that chipped flint artifacts also played a role in the hematite processing.

On a number of cores and flakes from Rydno very characteristic battered and abraded surfaces can be observed. This feature is absent in two other Stone Age collections of comparable size (Swidry i Stankowicze) examined in this respect. It is worth saying that S. Krukowski, former excavator of Rydno, tended to couch this aspect of flints from Rydno in fairly normative terms as a special way of core preparation, and he even coined a special name for the industry (oral information from R. Schild).

The flint materials from Rydno that were available to me comprised the pre-war collections and our current findings there. I selected the specimens on which wear traces were visible with the naked eye. As to the raw material of artifacts, a mined variety of so-called chocolate flint predominated. There were a few specimens, however, of erratic flint. Therefore, to avoid problems with confusion of natural abrasion with man-induced damage, I have examined only traces that were situated on industrial surfaces. It should be also emphasized that many flints from Rydno bear wind polish, but it can easily be distinguished from the traces we were interested in. Overall 24 items (17 cores and 7 flakes) with 39 working edges or surfaces were chosen (fig. 1 ;

position	description	number of working units	range of edge angle	mean edge angle	range of length (cm)	mean length	range of width (cm)	mean width
Edges of flaking surface and preparation crest	a	10	65-120	92	0,55-4,2	2,35	0,05-0,3	0,17
	b	4	80-95	90	1,9-5,5	3,6	0,15-0,5	0,28
	c	5	80-120	106	1,0-3,0	2,0	0,3-1,2	0,56
Edges of striking platform	b	5	80-100	88	1,2-3,5	2,36	0,4-0,7	0,56
	c	6	60-110	91	1,3-4,0	2,6	0,4-1,0	0,6
Any flat or domed surface	b	3						
	c	6						
a) abraded	b) abraded and battered			c) battered				

Table. 1.

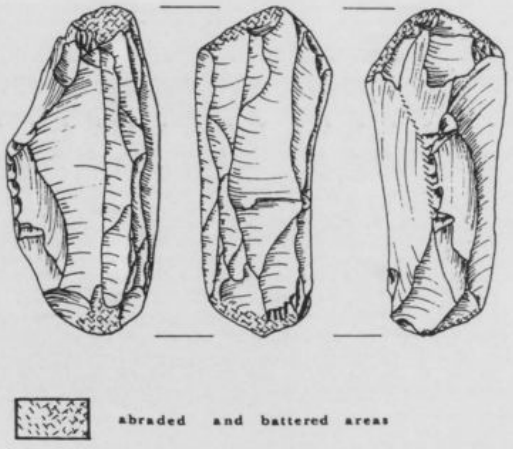
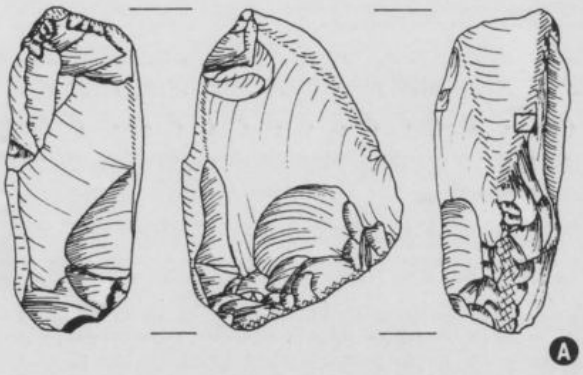
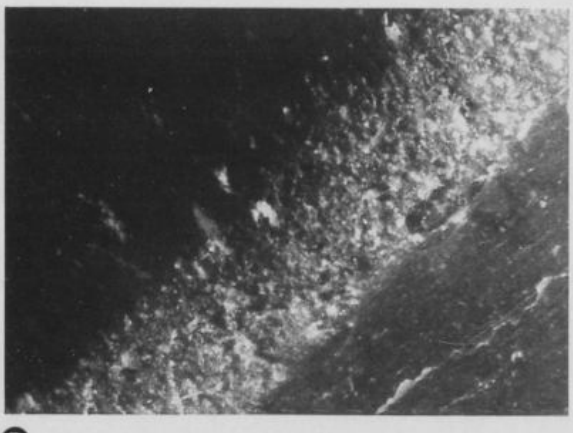


Fig. 1. Core from Rydno (scale 3/4).

fig. 2 : A ; fig. 3 : A ; fig. 4 : A). Most of the cores are the very characteristic cores of Masovian Cycle. The length of artifacts varies from 2 to 7 cm. Presence of wear traces on the dorsal face of flakes, as well as partial obliteration of traces on some cores by further exploitation, indicates that those cores could have been used as tools and as cores simultaneously. The position and description of examined traces are presented in table 1.

The invasiveness of wear traces and their character suggested an activity using some hard mineral material. To check whether they could have resulted from hematite powdering I ground samples of hematite grains using experimental cores and quartzite sandstone as the grinding slab. The morselling of samples with striking platforms and surfaces appeared to be much less comfortable and efficient than accomplishing this task with a simple stone pounder. It confirmed an intuitive supposition that an edge with an acute or slightly obtuse working angle cannot be very suitable for an activity of crushing grain-shaped material, especially if the edge is slightly convex as was the case on several prehistoric items. The work with edges and small surfaces of experimental flint tools caused an increase in dispersal and a greater loss of hematite than the work with a stone pounder. In both cases the soaking of the hematite grains in water before processing, or adding some water or grease during the work, diminished loss of material and made hematite grains softer and easier to crumble. Only in the final stage of grinding, when hematite was already well morcelled, the work with the flint pounder became more effective. Probably the narrow working surface of the pounder





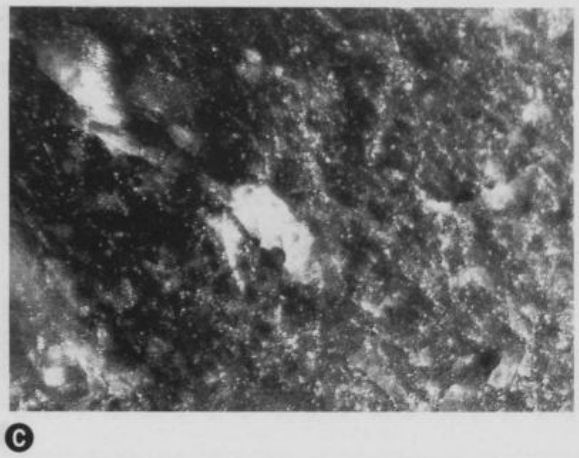
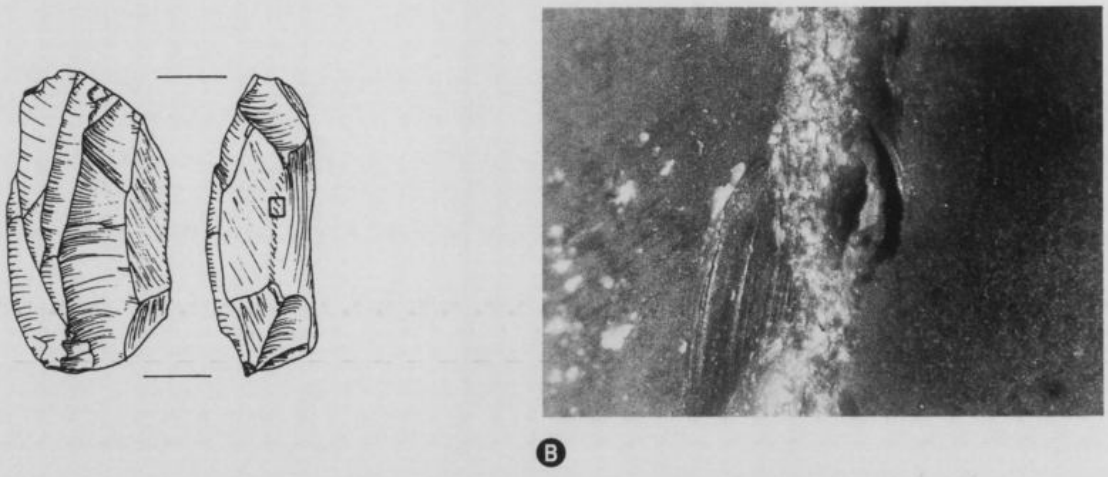


Fig. 2. A. Core from Rydno (scale 3/4). **B.** Used edge at magnification 6,5x. **C.** The same place at magnification 25x.

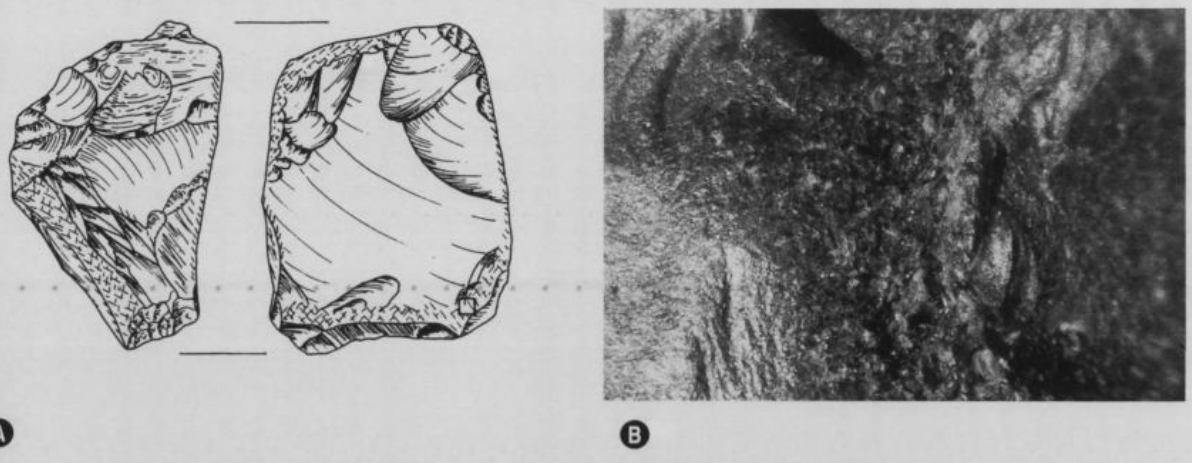
was recompensed by the relatively greater force of this restricted surface applied to the worked material.

The crumbling of grains produced only small chips detached from the ridges. As the grinding proceeded the interscar ridges as well as the whole working edge got rubbed and ground in few minutes of work. It was only strong, aimless



A B

Fig. 3. A. Core from Rydno (scale 3/4). **B.** Used edge at magnification 6,5x.



A B

Fig. 4. A. Core from Rydno (scale 3/4). **B.** Used edge at magnification 6,5x.

battering of the edge against the slab, that produced the pecking and crushing effect so well marked on many prehistoric items. Moreover the abrasion of prehistoric working edges, which are porous and uneven, is difficult to compare with the abrasion of experimental edges, which become smooth and have a well developed polish (fig. 2 : B et C ; fig. 3 : B ; fig. 4 : B ; fig. 5).

Powdered hematite infiltrates the pores on flint surfaces quite easily. Even after washing, experimental tools have pigment particles still adhering. No such residues were revealed on archaeological cores during examination under the microscope. The rest of soil still present on uncleaned tools is reddish. The simple treatment with HCl and

Fig. 5. Experimental edge of striking platform at magnification 6,5x (majority of scars caused by knapping).

NH_4Cl proves presence of iron, but it is impossible to distinguish the soil components from the pure hematite (compare Keeley, 1980 : 172).

Based on this preliminary inquiry I doubt if in fact presented wear traces derived from the hematite processing as the circumstantial evidence suggested.

It is difficult to point to any other functional explanation as to the origin of these particular traces. Discussion with a flint-knapper[2] did not allow to suggest any purposeful activity during the process of knapping which could produce any comparable traces.

For some of the cores (those longitudinal in shape with crushed edges of striking platforms) there exists a possibility that they were used to make stone grinding slabs porous. Examples of such slabs do exist in the collections from Rydno.

Anyway, for the time being, the activity or rather the group of activities connected with the set of conspicuous wear traces on cores from Rydno is still unclear.

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SCHILD (R.), KRÓLIK (H.), 1981.– Rydno, a final paleolithic ochre mining complex. *Przeglad Archeologiczny,* vol. 29, p. 53-100.

(2) Witold Migal from the State Archaeological Museum in Warsaw.