ONDRATICE I: EARLY UPPER PALAEOLITHIC TECHNOLOGIES OF QUARTZITE WORKING

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The study of stone tool assemblages dating back to the transitional period from the Mousterian to the Upper Palaeolithic reflects two sorts of changes, typological and technological. The major technological change is the evolution of blade technology, which has the secondary effect of simulating the development of new tool types. The aim of this paper is to present the origin of the Upper Palaeolithic as a technological problem.

During the last few years I have had the opportunity to study the rich stone assemblage from the site of Ondratice I in Moravia. The site has been well-known since the end of the last century for its important industry made from quartzite, flint and radiolarite. Unfortunately, no clear stratigraphic evidence is available. The typological elements distinguished, however, suggest successive settlements of the Bohunician (a transitional industry based on Levallois technology and defined according to the site of Bohunice), Szeletian and probably Aurignacian.

The site is lacated at the source of quartzite raw material, which was worked in this same area. It was not necessary to spare the raw material, as it was abundant, so pieces in different stages of production were often abandoned to be discovered by archaeologists today. Study of these artefacts allows the reconstruction of some working processes used by prehistoric man.

It was possible distinguish two stages in stone tool production :

1) the core preparation stage, represented by the primary worked raw material (17.76 per cent) and by the pre-cores (34.42 per cent).

2) the core exploitation stage, represented by the cores (45.45 per cent) and by their residua (1.38 per cent).

This process results in the production of three series of flakes:

1) with cortical back (21.33 per cent).

2) with prepared surface on the back (71.96 per cent).

3) with deep negatives from previous flake removals on the back (6.71 per cent).

The first, and in part, the second types result from the core preparation stage, and the third type, and in part, the second are the result of the core exploitation stage. Furthermore, a relationship between the type of flake and the type of preparation of its striking platform was observed.

The three series of flakes together with the core residua present blanks suitable for further working, and all types were chosen by prehistoric man for retouch into tools (fig.1). However, slight selection is to be noted: of all flakes of serie 1, only 12.45 per cent were retouched; of the flakes in series 2, 19.86 per cent were selected and 20.34 per cent of series 3 flakes were retouched. This human selection was not, on the other hand, influenced by the degree of striking platform preparation.

The quartzite material was worked by different methods, and from different types of cores :

Types of pre-cores	Number	Per cent
a. Flat pre-cores without ventral preparation	126	32.73
Flat pre-cores with ventral preparation	73	18.96
b. Discoidal pre-cores	26	6.75
c. Pre-cores with lateral crests	28	7.27
j. Globular pre-cores	23	5.97
k. "Scraper-like" pre-cores	24	6.23
h. Pre-cores with upright preparation	35	9.09
i. Pre-cores with frontal crest	50	12.99

Types of cores	Number	Per cent
a. Flat cores	166	33.6
b. Discoidal cores	2	0,4
c. Cores with lateral crests	22	4.45
d. Semi-globular cores	28	5.67
e. Cubical cores	88	17.81
f. Prismatic cores	58	11.74
g. Unprepared cores	66	13.36
h. Cores with upright preparation	35	7.09
i. Cores with frontal crest	29	5.87

The relative proportions of the different types of cores and possible relationship between the pre-core and core stages are presented in fig.2. Although some of the types distinguished are not highly standardized or typical, it is possible to define three main processes of core working :

1. Flat cores

These cores are worked from flat pieces of raw material by preparing a striking platform; sometimes, the ventral face of the core is worked by preparation flakes. Flat cores can be unidirectional or bidirectional. Some of them are identical to classic Levallois cores; the term "flat core", however, is more general and includes not only the typical "masterpieces", but the technological principle as a whole (fig.3: A; 4: 1).

2. Cores with upright preparation

These cores are made from globular pieces by preparing a bow-shaped back, and gradually working into the striking platform. Typically, the back is worked by opposite flakes perpendicular to the orientation of the core. This type of core can be used for production of Levallois flakes, and is present in many Levallois assemblages (fig.3: C; 4: 2).

At the site of Ondratice, the same principle of preparation of the back was applied to laterally flattened cores with a marked frontal crest. This type is specialized for blade production and is very effective, especially with the quartzite raw material. Cores with frontal crests are well known from the recent periods of the Upper Palaeolithic (Magdalenian: H.Kelley, 1960; G.Bosinski and J.Hahn, 1973). Thus, a transition from a Levallois to an Upper Palaeolithic core type can be observed (fig.3: D; 4: 3).

3. Other core preparation processes

The other processes are not highly standardized and are often influenced by the form of raw material available. Most of the types have elongated forms intended for blade production and shorter forms for making flakes. However, the cores often could not be completely knapped, due to the low quality of the quartzite raw material. Thus, careful preparation could influence the course of future flaking, although some cubic and prismatic-shaped pieces of raw material were exploited without preparation. One standard type of preparation is a core with lateral crests, usually intended for blade production (fig.3:B).

The percentage of cores suitable for the production of Levallois flakes is 43.36 per cent. 23.68 per cent of the studied cores were intended for blade production (of. I lam = 20.7).

It is to be noted that the Levallois technique greatly influenced the whole technology. Furthermore, a relationship

between the Upper Palaeolithic core with frontal crest, specialized for the blade production, and the core with upright preparation typical of Levallois assemblages was observed. Genetical connections between blade technology and Levallois technology have been suggested several times in the literature (F.Bordes, 1958, 1972); the industry from Ondratice demonstrates this relationship on concrete material.

DISCUSSION

It is interesting to study the appearence of Levallois technology in Central Europe with respect to the great significance we ascribe to it in the process leading to the beginning of the Upper Palaeolithic.

The present state of research suggests the disappearence of the Levallois technology together with the Acheulean culture at the end of Rissian. From the end of the Eem interglacial, the place of Acheulean was taken by the Micoquian, a culture technologically based on bifacial flat retouch and irregular cores (G.Bosinski, 1967). Since the presence of the Levallois technique can be noted in the neighbouring regions at about the same time (France, Balcans, Dniestr valley), it is probable, that it was the mighty complex of Micoquian-like and Charentian-like cultures of Central Europe restraining its further extension. However, several assemblages based on the Levallois technology can be observed even during this stage: Königsaue A-C, Balve IV, Krakow-Zwierzyniec, Krakow-Sowiniec, Subalyuk.

At the beginning of the Upper Palaeolithic, a cultural horizon based on Levallois and blade technology extended in Moravia. Stratigraphically, it is related to the site of Bohunice and to its radiocarbon dates (40.173 + 1200; 41.400 + 1400 - 1200; 42.900 + 1700 - 1400; K.Valoch, 1976). Furthermore, the site of Lisen-Ctvrte (K.Valoch, 1962) and an important occupation level from Ondratice I are to be related to this unit, and the connection with the recently re-published materials from the Kacak-cave in Bohemia (J.Fridrich and K. Sklenar, 1976) is not to be excluded.

This Moravian industry, named as Bohunice type or Bohunician, is characterized by a Levallois and blade technology, important percentage of Mousterian types (side-scrapers, points) and Upper Palaeolithic types (end-scrapers mainly flat on blade or flake, burins) and, sporadically, leaf-points. In might be contemporaneous with some Mousterian assemblages, the Altmühlian in South Germany and the Preaurignacian in Jabrud.

From the point of view of later evolution it is important that the continuity and gradual disappearence of the Levallois technology has been observed in numerous Szeletian and Aurignacian assemblages in Moravia (K.Valoch, 1973, 1974).

In conclusion, the data collected suggest a hypothesis accentuating the significance of the Levallois technology in the process of development of the blade technylogy and formation of the Upper Paleolithic culture.

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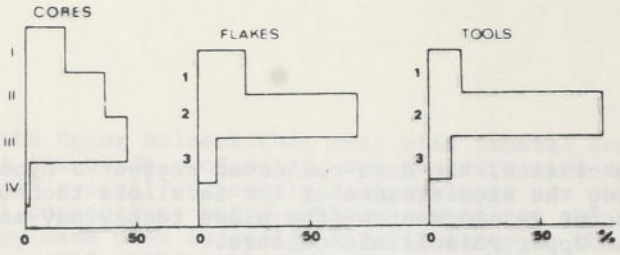

Fig. 1. Quantitative relations within the working process. Left: cores of I.-IV. stage. Centre: flakes of 1.-3. Right: tools on flakes of 1.-3. series.

The quartzite material was worked by different methods, and from different types of cores:

Types of pre-cores	Number	Per cent
a. Flat pre-cores without ventral preparation	126	32,73
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h. Pre-cores with upright preparation	35	9,09
i. Pre-cores with frontal crest	50	12,99

Types of cores	Number	Per cent
a. Flat cores	106	33,4
b. Discoidal cores	2	0,4
c. Cores with lateral crests	22	4,4
d. Semi-globular cores	28	5,6
e. Cubical cores	88	17,81
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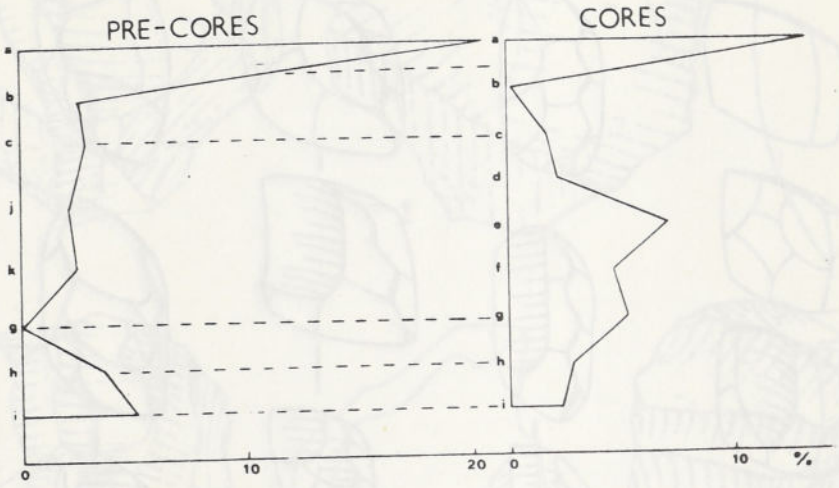

Fig. 2. Percentages of different core types in the pre-core and core stage. a - flat cores; b - disocidal; c - with lateral crests; d - semiglobular; e - cubical; f - prismatical; g - non-prepared; h - with upright preparation; i - with frontal crest; j - globular; k - "scraper-like".

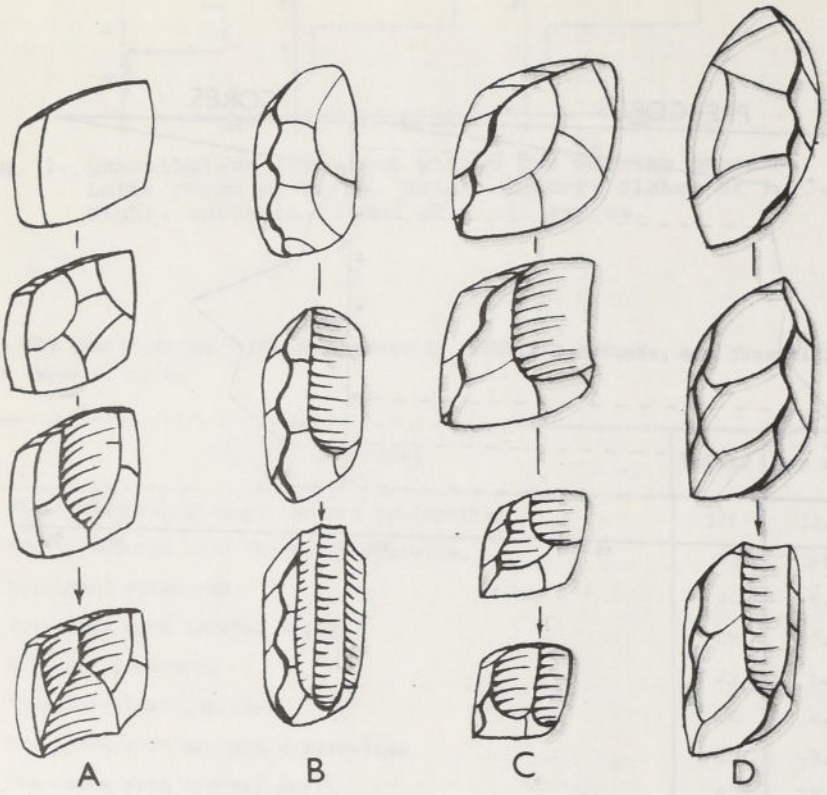

Fig. 3. Types of working processes. A - flat cores; B - with lateral crests; C - with upright preparation; D - with frontal crests.

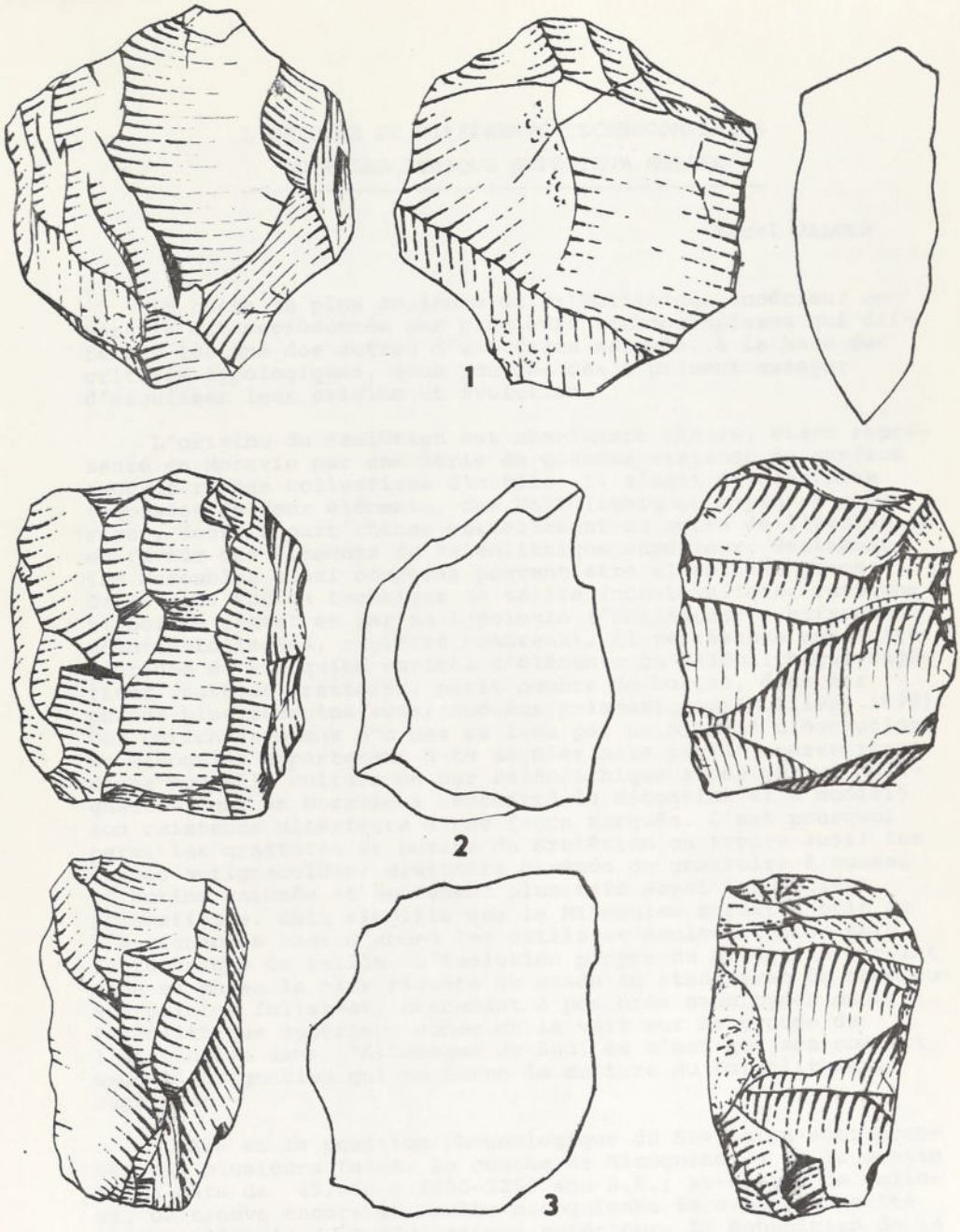

Fig. 4. Types of cores. A - flar core; 2 - with upright preparation; 3 - with frontal crest.