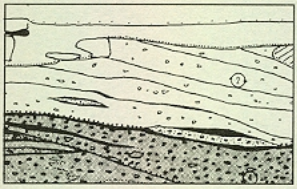

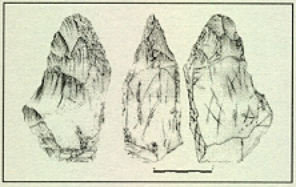

THE HUMANIZED MINERAL WORLD: Towards social and symbolic evaluation of prehistoric technologies in South Eastern Europe

edited by
Tsoni Tsonev and
Emmanuela Montagnari Kokelj

ERAUL 103

Études et Recherches Archéologiques de l'Université de Liège
Liège-Sofia, 2003

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TECHNOLOGICAL CYCLES IN THE PREHISTORIC BALKANS

Tsoni TSONEV*

The present workshop explores the extremely ancient and varied archaeological record of prehistoric Balkans. It outlines the theoretical and practical framework, which, in its basic assumptions, shapes our thinking of it starting with the relation between biological and cultural evolution. For example, our understanding of the appearance of an early Middle Palaeolithic Levallois (Levallois-like) facies in the cave Kozarnika, northwestern Bulgaria, can now be based on new theoretical background. The fact that our genome has remained unchanged for several thousand years, while our cultures underwent fundamental changes, suggests that the major part of the evolution of social systems is no longer biologically but culturally based. Humans had the chance that animals never had with the possibility of their societies evolving over much smaller time scales than animals. With the same body we can change our cultural habits. Humans do not need to wait for death and a very low mutation rate of several generations to evolve. The rapid evolution of its parts constitutes the superiority of human social systems over animal systems.

All this means that such an early appearance of Levallois-like technique should not surprise us neither with its early age, nor with its unusual context. Human choices follow, relate mutually and outdo the process of natural selection. It may be studied at an empirical level and appears in different forms: linear vs. non-linear selection, threshold selection, uniform vs. locally distributed, etc. Since the dynamics of human behaviour is running on smaller time-scales, this largely eliminates biological selection through an already structured population. Within this framework humans appear not as isolated individuals but as cooperators that aim to fulfil common tasks. From this point of view prehistoric techniques may be considered as common tasks of human groups set to reduce the risk of living in risk-prone environments. Hence, the next assumption is that the degree of technological complexity would depend largely on risk-avoidance strategies. The distribution of high-quality, long-distance imported flints in the Gravettian cultural levels of Temnata cave, Iskar gorge, in northern Bulgaria suggests exactly this. The high risk of hunting dangerous animals such as horses had to be counterbalanced by hunting less dangerous species, by choosing the most appropriate 'broken terrain' within the Iskar gorge, and by applying the best raw materials for making tools. It is possible to distinguish three distinct features of these past human strategies. In the first place, it is the resilience of Upper Palaeolithic and Mesolithic communities to cope with harsh and risk-prone environments. Their longevity of occupation points to an inherent robustness of these past communities, their attitudes and ways of life. The second one is the repeated evidence for similarity of various risk-avoidance practices. The third is the remarkable variability of the overall systems and the way they invariably reflect detailed local knowledge of topography, distribution of resources, etc.: prehistoric people knew from observation exactly how to maximise the efficiency of their subsistence strategies, and how best to move and settle within the terrain.

If we have a closer look at these features we shall see their mutual interdependence. The term 'broken terrain' fixes attention upon resilience in terms of depletion of resources: over-hunting, overgrazing, shifts in water supply regimes, etc. The idea of resilience is closely related to the overall similarity of risk-avoidance practices. This means a reduced risk through an increased technological complexity, increased importion of high-quality materials, the use of appropriate landscape for capturing animals, water, etc. The third feature suggests that no matter how diverse the risk-reducing practices may be, the calculated chances of success of each strategy remain almost the same.

We may expect greater variability in the values assigned to different resources: fish, shellfish, salt, hunting, flint outcrops, etc. by Mesolithic/early

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Neolithic populations in Trieste karst area. By 'random access to constant food and other resources' I mean that the probability of access for exploitation of a given resource for each individual of a group at any time is equal to 1. The probability of depletion of that resource is equal to 0. Thus the caves settled both by Mesolithic and Neolithic groups may be considered as stable points of reference in the landscape. With the aid of DTM created with GIS, it is easy to calculate the mean distance from a cave-site to different resources. Our expectations would be that human groups followed the rule: the more distant the resource – the more valuable it is. Such a strong link can be described as an exponential relationship. From this follows that the value calculated for each resource would depend on the number of sites equidistant to that resource, on the maximal distance (10 kms) suitable for a daily walk and performance of a daily work, and on the mean distance to all sites from that resource.

Reducing risk cannot only be achieved through successive hunting and random access to constant food resources. It also depends on the ability of prehistoric people to communicate. Natural landforms become often incorporated into long-distance networks of communication and exchange. A question then might be asked how landscape features and the perception of landscape combine knowledge, embodied skills, narratives, ritual practices, land-use and organization of settlements into a complex notion built through human imagination. Such a complex relationship creates images (metaphors) rich in notions and connotations that remain always ready for explanations. I shall confine myself only to the contrasts visible through mapping artificial landscapes such as tell-sites onto lowlands and uplands. My general supposition is that cooperation and exchange that relies on circulating images (metaphors) standardize norms and values. Geographical horizons widen, and so do the ideas about distant communities. Common images can help establishing a balance of power, can foster exchange and provide a public forum for the social actors. Prominent landscape features are visible for every member of a given community and the narratives, meanings, images, etc. are equally accessible and shared in almost the same way by close and distant communities. For example, alluvial plains with annual renovation of fertile lands create places of stable human occupation. As focal points of human perceptions and human-landscape interactions they dominate the surrounding (satellite) network of settlements. The 'exotic' materials and 'special' artefacts become naturalized into the local notion of fertility through 'monumentalization' of tell-sites. They create the contrast with the flat plain and map onto 'monumentality' of the surrounding mountains. The evidence so far clearly shows that the imported flint varieties found in the tells in Thrace come from directions bordered by mountains: south, north and north-east. At each site only few percentages out of the total amount of imported flints come from the eastern Rhodopes Mountains – upstream the Maritsa river. Long blades, and during the Eneolithic, superblades come from north and north-east. There is no presence of Kaletepe long obsidian blades, known from the PPN in Central Anatolia. This fact undermines the widespread hypotheses of mass migrations of farming communities from Anatolia. What governs this large-scale exchange of 'exotic' raw materials and 'special' artefacts is the naturalization of 'exotic' into the local notion of 'fertility'. In the eastern Balkans this happens through a visual metaphor of matching 'monumentality' of a tell-site with the 'monumentality' of the surrounding mountains and with the 'monumentality' of the flint outcrops that establish multiple analogies between them.

The mismatch of the visual metaphors also reflects different kinds of land-use and a different perception of habitual practices than those in Thrace. The hilly areas and highlands in north-central Bulgaria underwent intensive soil formation during the early and middle Holocene. This caused a much more diversified land-use than that in the large alluvial plain in Thrace. Prehistoric settlements were much more mobile and the settlement patterns we find today consist of overlapping concentrations of dispersed small tells and open-air sites. Unlike the dominant position of the Thracian tells, the horizon of north-central Bulgaria consists of merging curves of small hills dotted with dispersed settlements. Though geographically this region is much closer than Thrace to the high quality flint outcrops, most of these sites have no, or a limited number of imported flints from the northeast. The long blades tend to be shorter than the ones from Thrace and superblades rarely occur.

These are two opposing examples of creating long-distance communication and exchange networks through landscape contrasts. The artificial landscape of tell-sites on the alluvial plains stresses the ideas of 'stable, unchanging' social order. By contrast, the merging landscapes in north-central Bulgaria convey mobility and the tendency for periodic movements and instabilities.

These contrasting landscape metaphors contain together the notion of *local evolution* and the notion of social *reproduction*. The first one implies gradual change within a bounded social system, while the second one implies reproduction within an ever-changing social network. The merging landscapes in northcentral Bulgaria create an image of persistent movement within seasonal and annual cycles of human experience that gradually expands through space. Boundaries imposed on social relations, on

human knowledge, experience and skills are not stable and move constantly. Consequently we can expect that the archaeological record of the merging landscapes in late prehistory shows greater variability and asynchronous alternative appearance of major pottery styles, hunting vs. stock breeding and plant cultivation. It seems exposed to a greater extent to the influence of exogenous factors such as long-distance communication and exchange. Yet, it does not oppose to the bounded local evolution of tell-settlements in Thrace, for example. In this case of particular importance are the issues of (1) how the archaeological record changed and diversified given the strong tradition of cultural continuity, and (2) what makes the archaeological record remain almost the same through time and over such a wide area when there is no central authority to cope with local change. To a greater extent, the answer to these questions is that both change and continuity are seen as endogenous processes. Cumulative cultural growth and change often represent an exponential development through time and uniform distribution through space. This means knowledge, expertise, and skills spreading from individual to individual and passing from one network to another through long-distance communication and exchange. Thus the focus of research shifts from the structure of particular instituted relations and economic values to prehistoric "information technology" and symbolic value ascribed to places and objects. A related aspect is the definition of the factors that make some images (patterns, designs, etc.) more attractive than others. The question is to see how certain 'special' objects deviate from their habitual contexts and develop beyond their original medium and social milieu: prestige objects such as flint superblades, scepters, ritual axes, etc. The limitation of this theoretical framework is to build new approaches and reformulate the old questions, which could empower regional syntheses. The aim is to achieve flexible and dynamic enough models that account for the extremely variable archaeological record in southeastern Europe.

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RAW MATERIALS EXPLOITATION STRATEGY ON THE TERRITORY OF BULGARIA DURING EARLY PALAEOLITHIC PERIOD

Stefanka IVANOVA*

The geographical situation of Bulgaria, in the southern part of the Balkan Peninsula, reflects its crucial position between three continents, a region of extremely favourable natural conditions, abundant flint raw materials and potential for human migration from south to north through the passes of the Rhodopes and Stara Planina mountains. The Bulgarian Black Sea coast is a zone of contact between both northern and southern Black-Sea shores. The Danube River valley links Middle Europe and Balkans and the Black sea coastal zone. These natural factors have always favoured early human migration into the European Continent (Fig. 1).

Joint Bulgarian and French investigations dur-

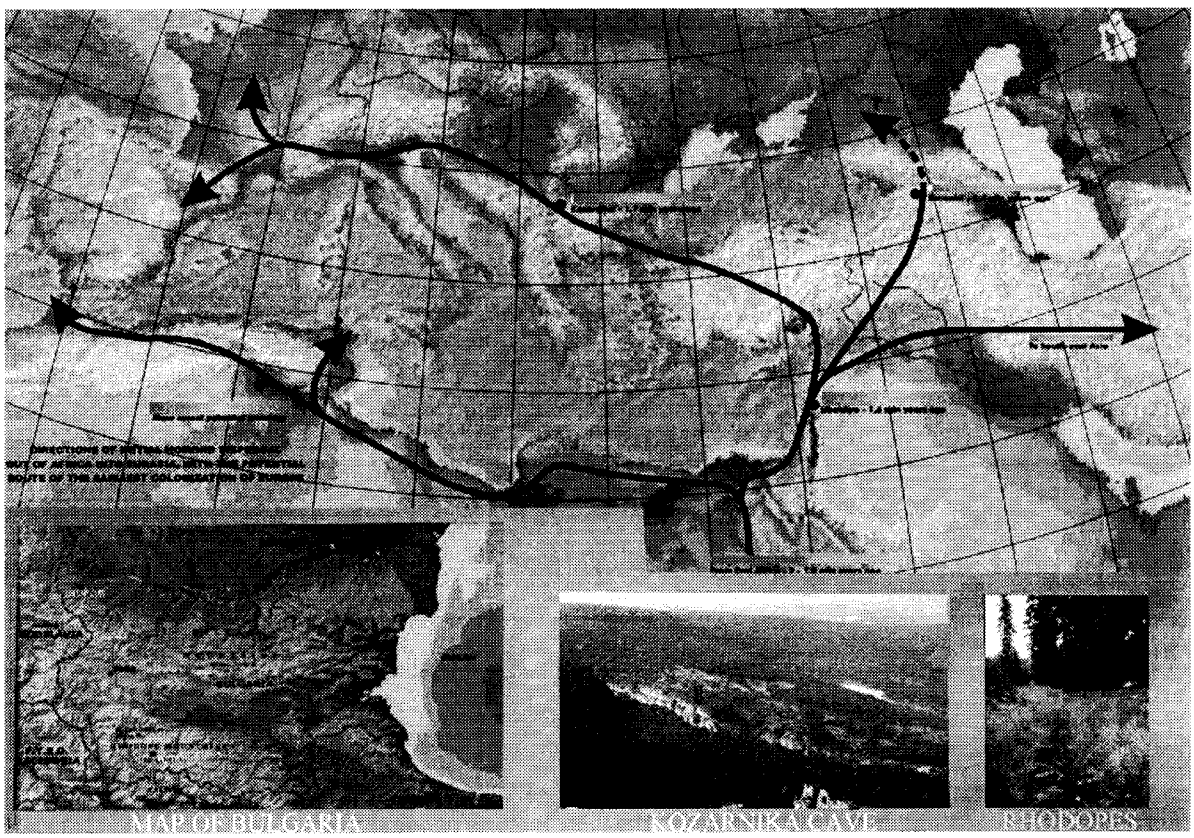

Figure 1. Map of potential routes of the earliest colonization of Europe; map of Bulgaria and localization of Early Palaeolithic sites; view to Kozarnika Cave; view to Shiroka Polyana.

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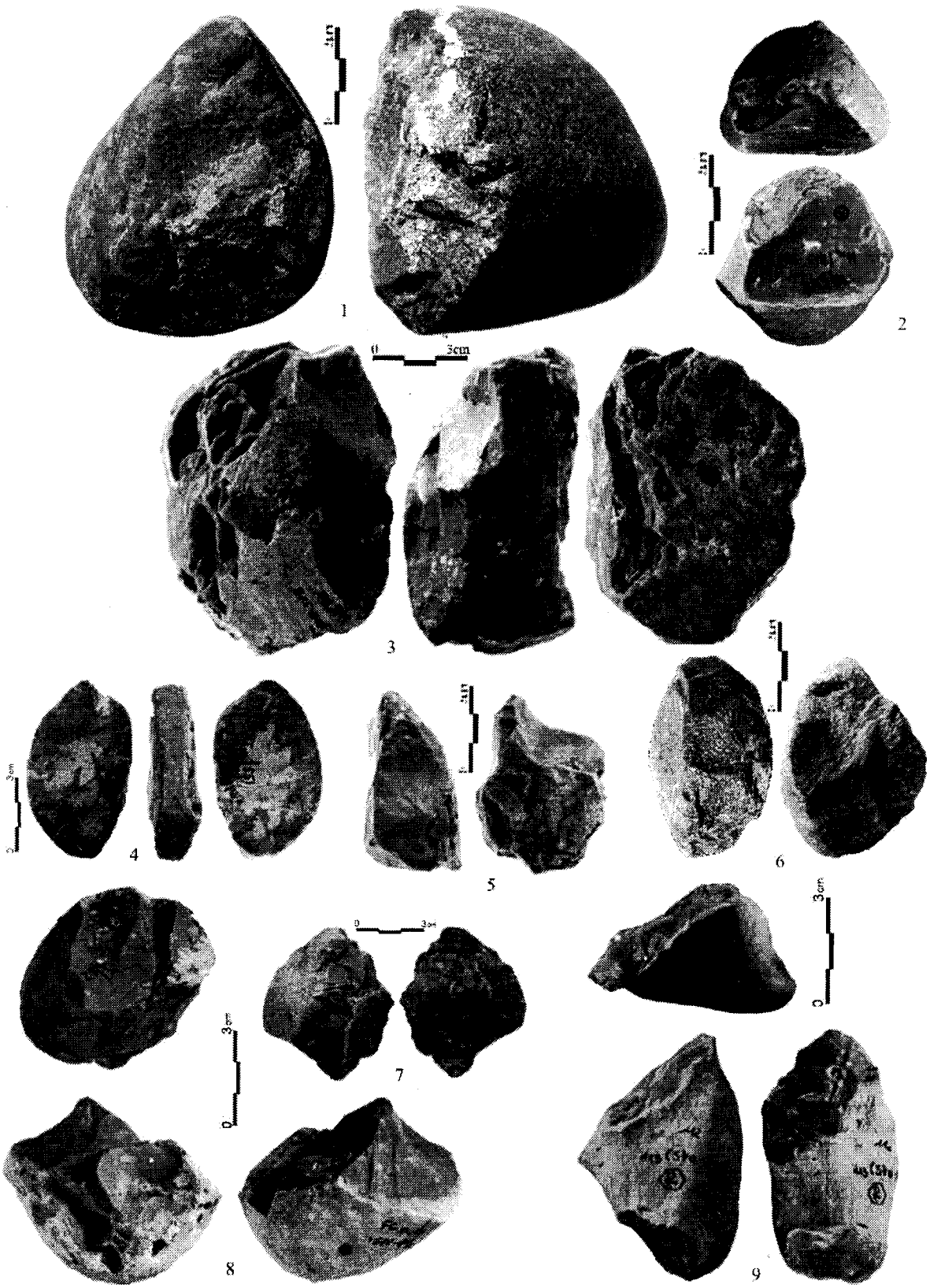

Figure 2. Lower Palaeolithic artifacts - Kozarnika cave. 1, 2, 4, 7-9. Upper part; 3, 5, 6. Lower part.

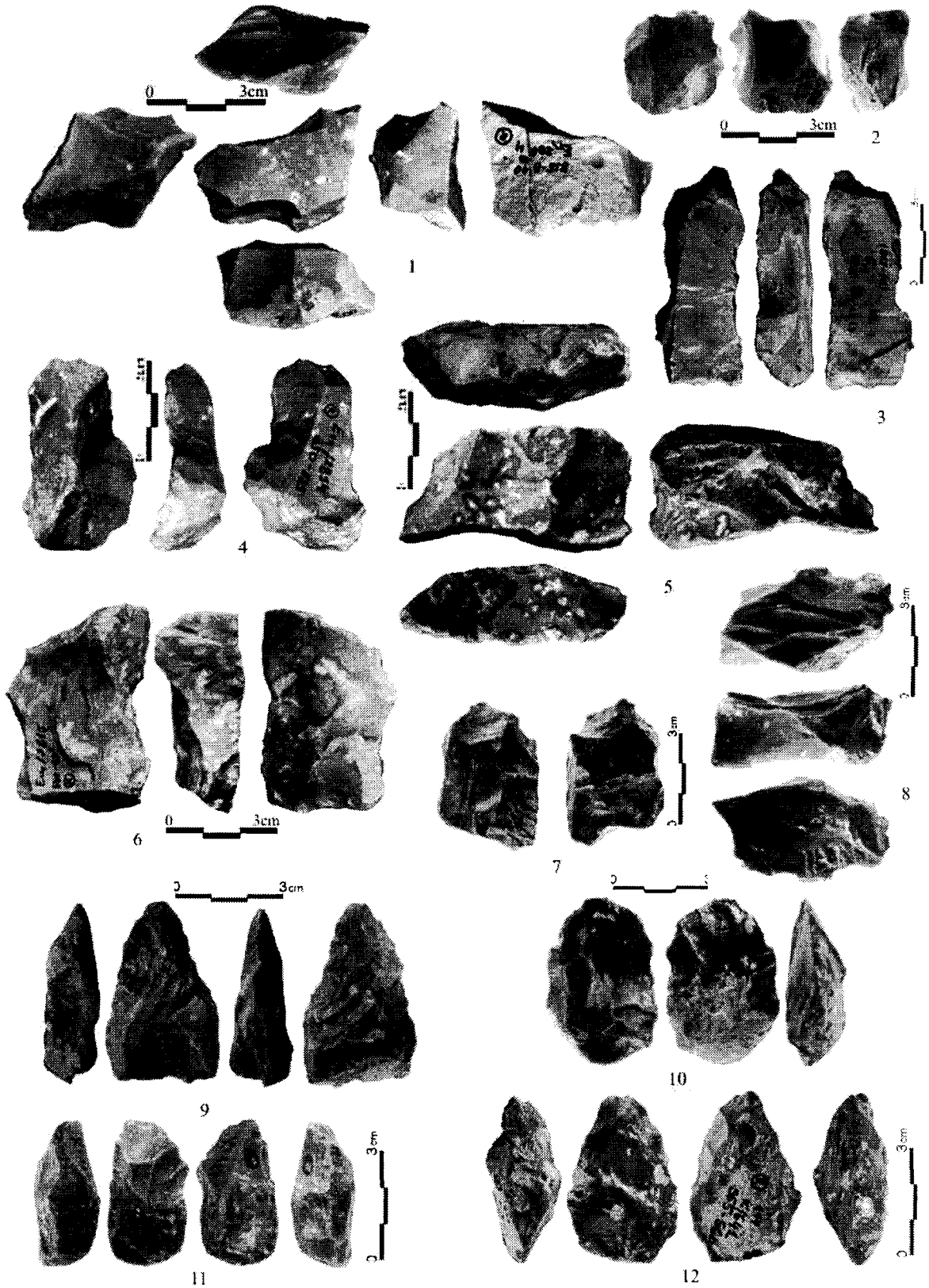

Figure 3. Lower Palaeolithic artifacts - Kozarnika cave. 2, 7-12. Upper part; 1, 3-6. Lower part.

ing the last years revealed much interesting data relating to the earliest traces of colonization of this part of Europe.

1 - Early Paleolithic: Kozarnika Cave

Kozarnika cave is situated in North-West Bulgaria. It had been formed in the Jurassic limestones of Belogradchiks anticline, in the northern part of the West Fore-Balkan, close to Danube Valley. The explored cultural levels are referred to Late, Middle and Early Palaeolithic periods (Fig. 1).

Generally, the Early Palaeolithic sequence is divided into two series: an upper part and a lower part. The layers have been dated on the basis of its fauna-composition and paleomagnetic study. The upper part was formed during the period 600 000 – 800 000 (Brunes-Matuyama). Layer 13, corresponding to lower part series, is the earliest layer containing flint artifacts. According to the preliminary results of the last archaeological season, layer 13 can be dated to 1 600 000 years ago.

The upper sequence of the Early Palaeolithic sequence is characterized by different types of scrapers, notched tools, points, retouched flakes, cores and core-like tools. The cores are made of pieces without any, or with some minimal preliminary preparation. Frequently, the operation consists of the separation of one or few flakes from a raw piece. A frequent type is a core with one or several unidirectional strikes on one of the surfaces. Common are cores with multidirectional usage (Fig. 2:1,2,4,7-9; Fig. 3:2,7,8). Some forms with bifacial retouch are of interest too. Some of them are small atypical bifaces (Fig. 3:9-12). Fragments, tools and cores of quartzite pebbles are often found.

The number of finds decreases in the lower series of Early Palaeolithic sequence. Scrapers are rare, the number of pieces with partial retouch increases. Usually pieces of flint have been used without preparation. There are cores with constantly changing striking direction and flaked surface.

The raw material used in all assemblages is local. Flint nodules are oval-shaped and of small to large dimensions. They are distributed in a limestone deposit and through rock fall have been broken into fragments with natural break surfaces. As a result there are a large quantity accidental flakes and pieces. Palaeolithic toolmakers used a wide variety of flint blocks. It is not a particularly good raw material, the flint has planes of weakness and fissures, and unintentional fracturing was a common knapping accident. In connection with this, we use the term unplanned surface (unplanned flake), for the results of an act of knapping in which the blow is deflected by fissures or weakness. Often such kind of artifacts looks like geofacts. It is not always easy to distinguish intentional and unplanned artifacts from unintentional flaking.

A varied approach to flint raw material usage in relationship to the quality of any specific piece is interesting. Pieces have been split along planes, parallel to the surface. Frequently, concretions have been split to segments. Another manner is to strike the concretion on a hard stone. An encircling band, removing the oval surface of the concretion is thus obtained. Striking on the surface of the band, a bigger first flake was separated. A surface perpendicularly crossing the concretion to axis is also utilised. Strikes are delivered almost at the tangent of the circumference of the surface. In this way, a massive point is formed in the central part of the crossing plane of the concretion (Fig. 2: 4,7,8).

Flint artifacts have small dimensions, due to the dimensions and the specific particularities of local raw materials. Single artifacts made of bigger pieces of better quality, as well as of quartzite pebbles, have bigger dimensions.

2 - The Western Rhodopian region

Other Early Palaeolithic sites were discovered in Southern Bulgaria, in the Western Rhodopian region. The Western Rhodopian relief is of a medium character with strongly indented, dense and deeply incised river system. Level ridges 1450-1650 m above sea-level predominate. This region is extremely rich in diverse and easily accessible flint raw materials.

The contemporary relief of the Rhodopes was formed during the Tertiary epoch when tectonic processes stressed and broke up the Rhodope massif and caused eruptions which spread out on its surface in the form of a huge rhyolithic deposits.

A wide development of rhyolitic mantle with linear channels through which the magma has erupted can be noted in the Shiroka Polyana region. The presence of opal and chalcedony plate-like pieces on the surface is derived from this magma activity. This magmatic activity caused a wide occurrence of opal-chalcedonies with characteristic colour and structure. The flat plate-like pieces have different dimensions, some very large. Their surfaces are covered by a cortex and they often split parallel to the surface plane.

Further to the east, flint raw materials appear in the form of siliceous strata. They comprise opal-chalcedonies, generally coloured in black and gray. They are derived from the post-volcanic activity, relating to the penetration of low-thermal hydroxides, rich in silicon solutions, at the contact zone of limestone and rhyolites. As a result of various landslides and a water flow siliceous material has been carried into the valleys. Redeposited material has been noted in many locations in the region. In the proximity of almost

every 'flint site' traces of the testing and preliminary preparation of siliceous raw material left by the early man have been found.

3 - The open-site of Shiroka Polyana

This site is situated on a broad flat ridge 1500 m above sea level where an area of 4 km² is covered by opal-chalcedony fragments and artifacts. The region has little inclination and is cut by micro valleys and widely meandering streams. The artifacts were collected from the areas devoid of their soil cover and from the microvalleys. Concentrations of artifacts were observed which represent the separate occurrences of different technico-typological and chronological traits. The bulk of the collected artifacts refer to Middle Palaeolithic cultures.

Some of the tools (bifaces, bifaces forms, bifacial side-scrapers, bifacial side-scraper knives) testify to the possibility that some of the artifacts could be referred to an earlier phase in the Palaeolithic.

Traces of cortex or natural surfaces are preserved on the bifacial forms. The artifacts have partly retouch bifacial edges. The proximal ends are massive and mostly natural. The points are not well developed. The collection has an archaic appearance with amor-

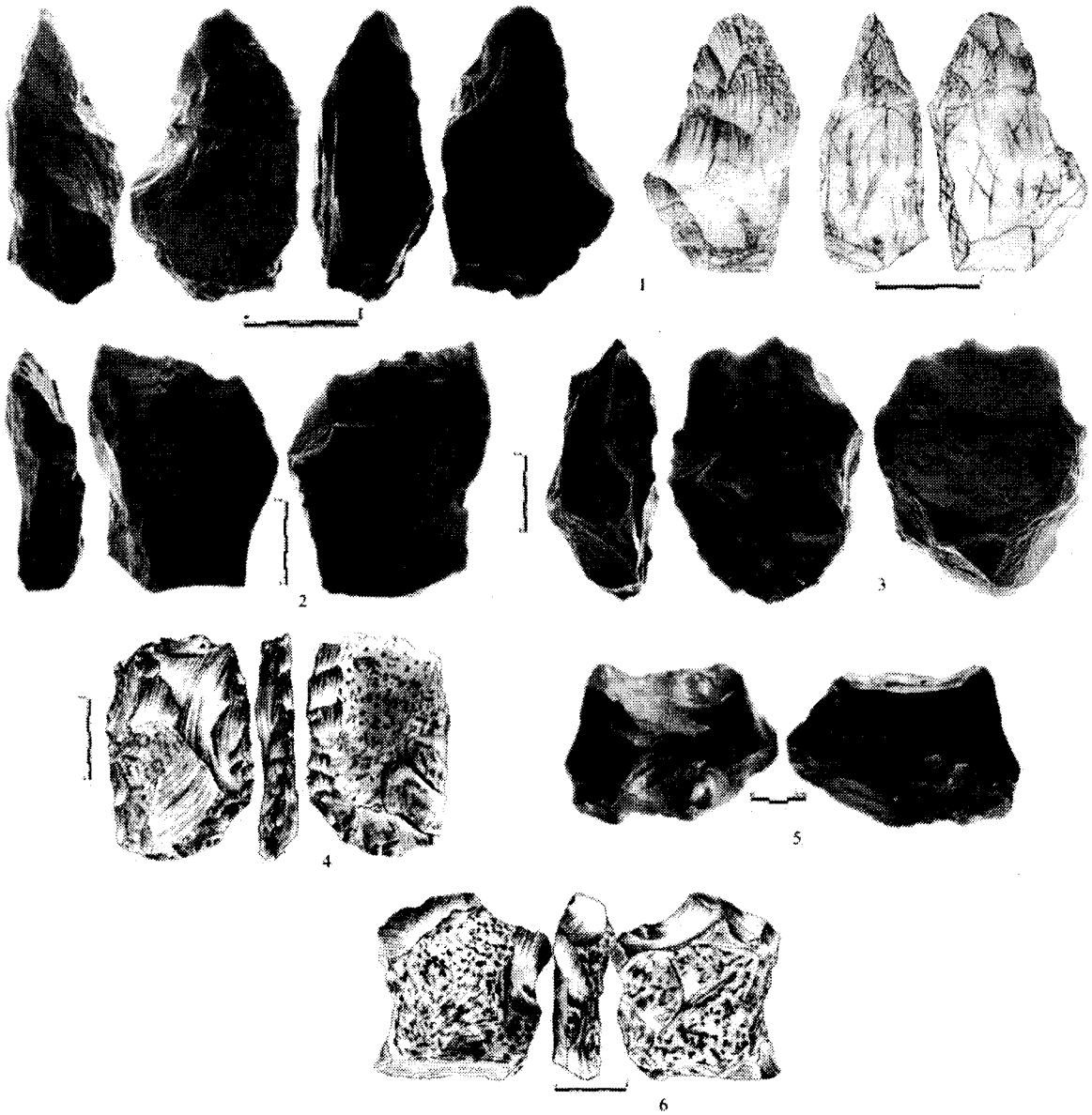

Figure 4. Lower Palaeolithic artifacts from the Rhodopes Mountains - site of Shiroka Polyana.

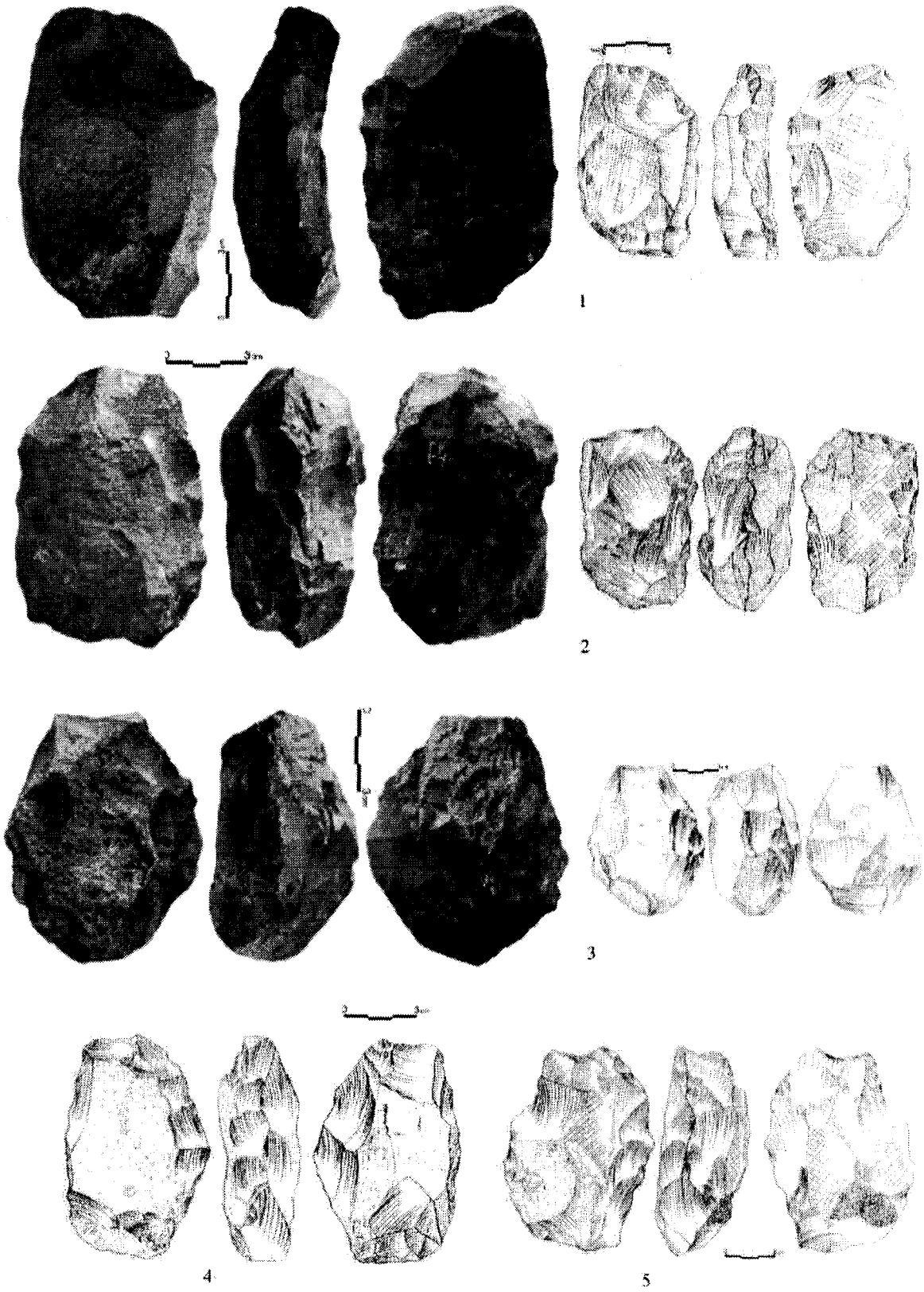

Figure 5. Lower Palaeolithic artifacts from the Rhodopes Mountains - site of Kremenete.

phous specimens predominating.

Only two artifacts can be defined as bifaces (Fig. 4: 1,2). The other specimens include a group of artifacts with flat, covering, bifacial retouch (Fig. 4: 4). Bifacial core-like artifacts form a relatively homogeneous group (Fig. 4: 3,6). The bifacial forms are solid; their surfaces are covered by patina, but without any traces of transportation.

4 - The open site of Kremenete

Kremenete is about 10 km north of the Shiroka Polyana and is situated on a broad flat ridge at about 1600 m above sea-level. The artifacts relate to the sediments underlying the turf layer which comprises weathered materials from the basal rock. The flint blocks dispersed on the surface - the remains of a flint strata - provided a raw material source for the artifact production.

The main part of the collection of more than 1000 specimens has a Middle Palaeolithic character. Of particular interest is a group of artifacts whose techno-typological characteristics differ from the general characteristics of the collection - tools of the cleaver type.

Eleven specimens of different size belong to this group and they are characterized by: elongated flat-oval shape, bilateral reworking of one edge, its opposite side is natural or blunted with single steep retouch scars. Mainly natural or cortical surfaces are available on the artifacts. In some cases single scars testify to the attempt to form flat dorsal and ventral surfaces when the initial fragment is not naturally flat (Fig. 5: 1-5).

The small number of biface forms provide a starting point for a search for significant typological parallels. Yet, we would like to draw the attention towards some typological parallels between the cleavers from Tsona cave in Georgia and Kremenete. The layer with cleavers from Tsona has been attributed to a late phase of the Middle Pleistocene (Lioubine 2002: 87). As there is only relative dating evidence for the sites the bifaces from Shiroka Polyana and Kremenete might fit into the period after 500 000 years ago. After a careful analysis of the available facts this is the dating of almost all Early Palaeolithic sites from Europe.

5 - Tenekien Obor

The site of Tenekien Obor is situated some 20 km east of Shiroka Polyana. There, the hypothesis that the group of artifacts belongs to the early Paleolithic period is supported by their stratigraphic position.

The flint artifacts and raw material occur over or between the pebbles which represent a part of a river terrace lying directly on the bad rock

Probably the small level area where the sondage was made is a preserved fragment of very early Quaternary terrace of Katrandzhi dere river which remained uncovered for a long time after the rapid cutting of the river bed.

The assemblage is scanty and consists of cores, core-likes tools and solid flakes.

The recent investigations into the Early Palaeolithic in the Balkans give ground to consider this region as a zone through which one of the routes for colonization of Europe passed.

There are strong arguments (based on mammalian dispersal from the East) concerning the date of earliest possible migration in Europe. There are indications that during the end of the Pliocene and the boundary Pliocene-Pleistocene a temporary closure of the Bosphorus took place.

The earliest possible migration dates to between 2 – 1.9 Ma (the end of Pliocene). The earliest migration of some mammals from Asia and Europe (Canis, Panthera) is referred to the end of the Pliocene and the border between Pliocene and Pleistocene. The mass migration of Bovids is referred to the Villafranchian. Probably, the first humans groups have entered Europe following the path of the migrating herds to Europe (Spassov 2001).

The early dates for the assemblies of Kozarnika cave and the recent studies on Early Palaeolithic sites in Georgia (Dmanisi), Israel (Ubeidiya) pose the concrete question for a possible corridor in the settlement of Europe: most likely through the Balkans (Fig.1).

For the West Rhodopian Palaeolithic open-side we should mention some peculiarities: the lack of sets of absolute data, lack of stratigraphic context for some of the sites. In most cases the assemblages are few. These "failures", generally concerning the Palaeolithic studies in the Balkan Peninsula are due to the lack of large-scale and financially supported investigations. This has brought for a long time the idea that the Balkans was not one of the migration routes of the first human groups.

Until recently the few bifaces from Greece and Turkey (Kuhn *et al.* 1996; Runnels *et al.* 1993, 1999;Yalcincaya 1981) were not enough to include the Balkans in the region of distribution of some facies of the bifacial traditions. The bifaces from Shiroka Polyana and Kremenete would seem to resolve this problem.

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MIDDLE PALAEOLITHIC INDUSTRIES IN THE CAVE SAMUILITSA II: CORE REDUCTION STRATEGIES

Ivo KRUMOV*

Archaeological research in the Iskar gorge was started in 1920 by the eminent Bulgarian paleontologist and prehistorian R. Popov (Popov 1920). In 1924 he dug several trenches in the Temnata Dupka cave near the village of Karlukovo. The finds (bones and stone tools) were published in 1931 (Popov 1931).

In 1957 the Archaeological Institute and Museum of Bulgarian Academy of Sciences (AIM-BAS) resumed the research in the Iskar gorge. N. Dzhambazov conducted a systematic survey with trenches in a number of caves, the most known of which are Pesht - near the village of Staro selo (Djambazov 1957) and Samuilitsa I and II (Djambazov 1959) near the village of Kunino. In Samuilitsa II (Fig. 1) a num-

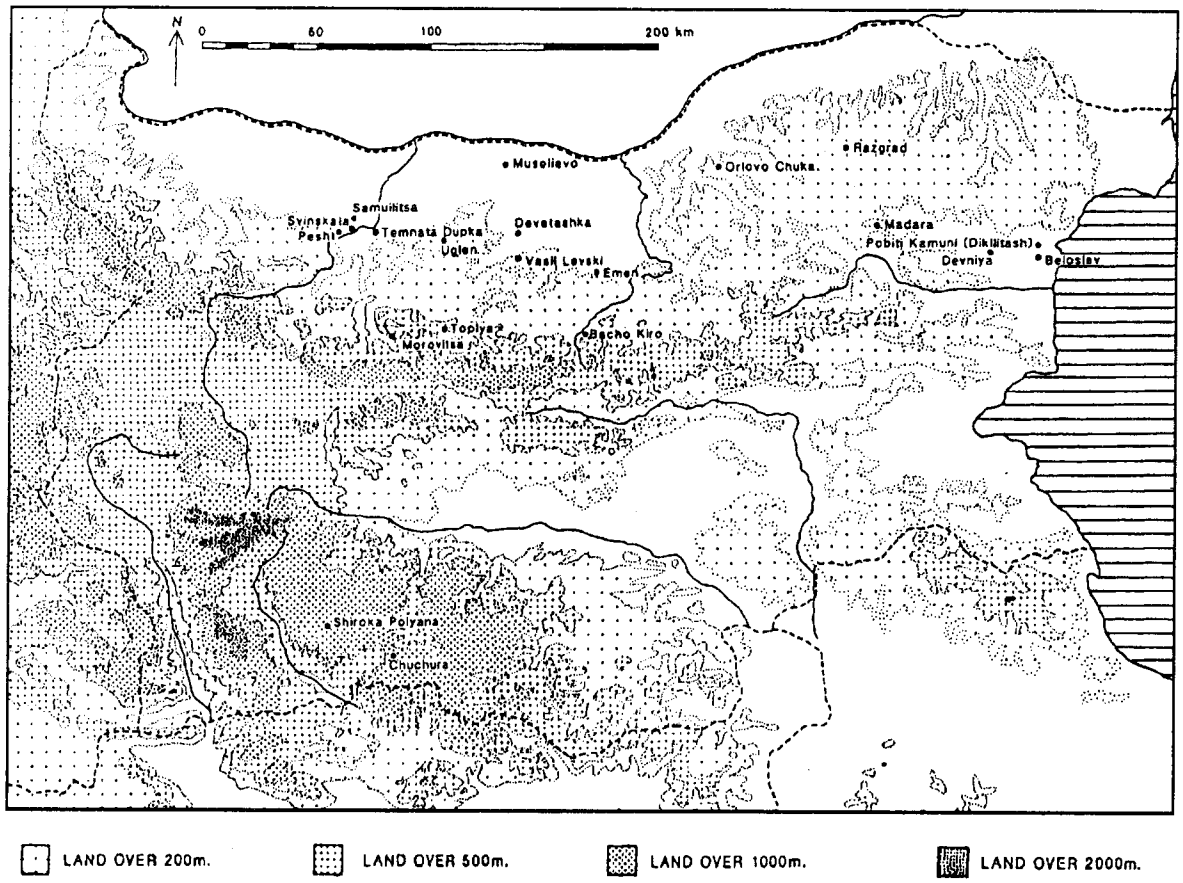

Figure 1. Middle and Upper Palaeolithic sites in Bulgaria.

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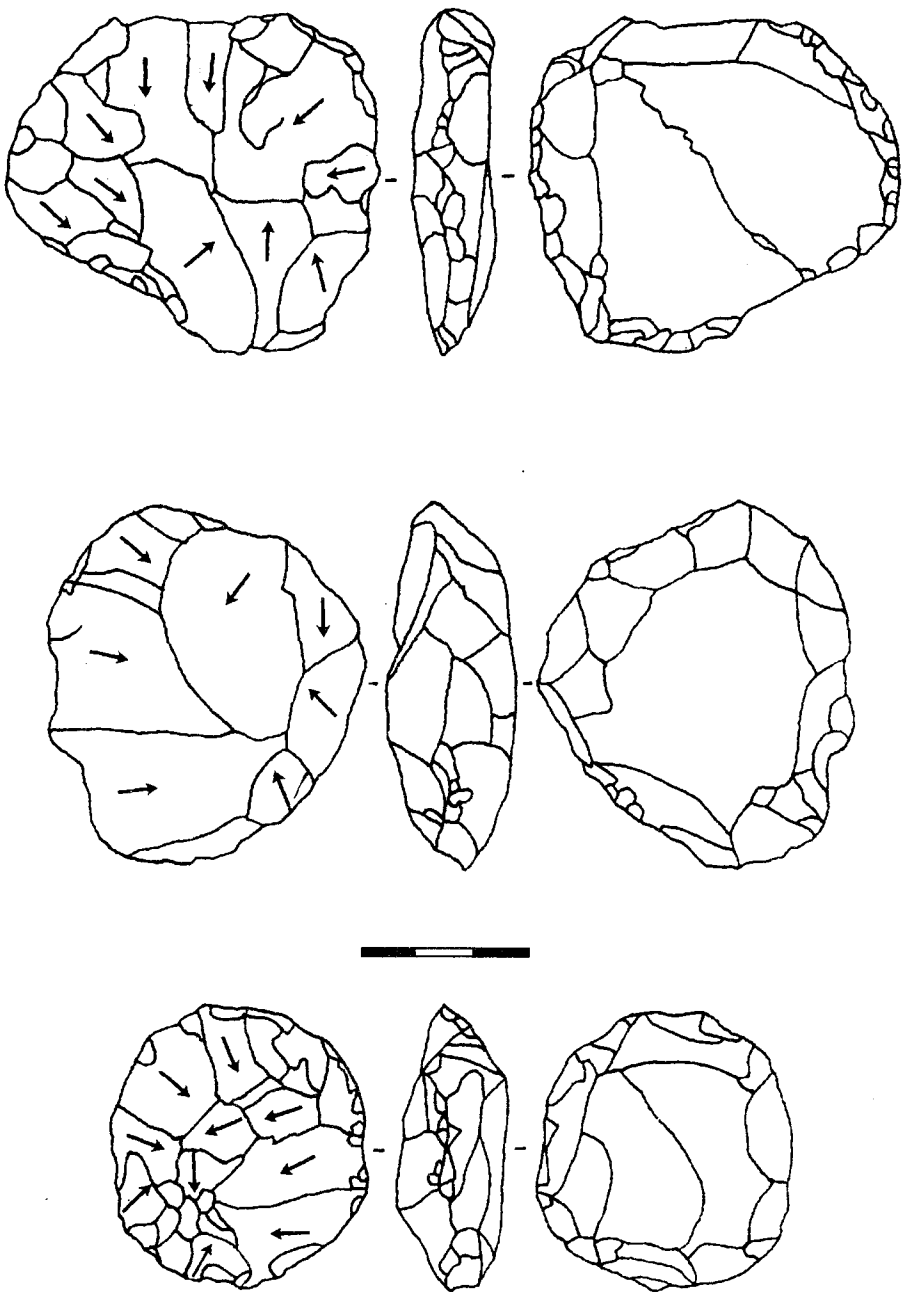

Figure 2. Levallois cores - Centripetal method.

ber of lithic assemblages from the Middle and Upper Palaeolithic were found. Because of the lack of well-controlled stratigraphy of the excavations a more detailed study of the Palaeolithic sequences was impracticable.

In 1980 N. Dzhambazov (Djambazov 1981) published a more detailed study of the stone and bone material found in Samuilitsa II. Cores (Levallois, discoidal, unidirectional cores, be-directional cores etc.), tools which are typical for the Middle and Upper Palaeolithic, as well as debitage (flakes and blades) were described. Unfortunately, after his publication

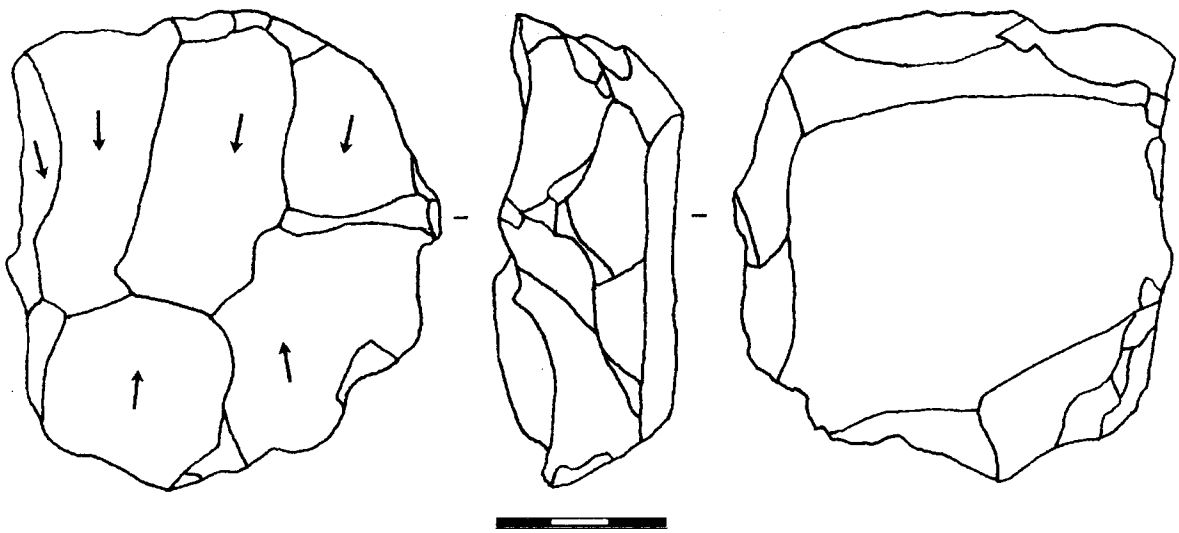

Figure 3. Levallois cores - Method unipolar.

the cores remained inaccessible for a long time. Only a few years ago the latter were recovered from the depot of AIM - BAS. At the beginning of 1980's N. Sirakov (Sirakov 1983) analyzed and published only part of the collection (the cores were not accessible) excavated by N. Dzhambazov, consisting of Middle Palaeolithic tools and debitage. Ts. Tsonev prepared his PhD dissertation on the morphology of Middle Palaeolithic side-scrapers and verified the side-scraper reduction model (Dibble 1987, 1995) on materials from Samuilitsa II cave and from Okiennik and Ciemna caves in Poland (Tsonev 1990; Tsonev 2001). From 1984 to 1994 a research team from Bulgaria (AIM - BAS), Poland (Yagiellonian University - Cracow) and France (Bordeaux University I) began archaeological excavations in the Temnata Dupka cave

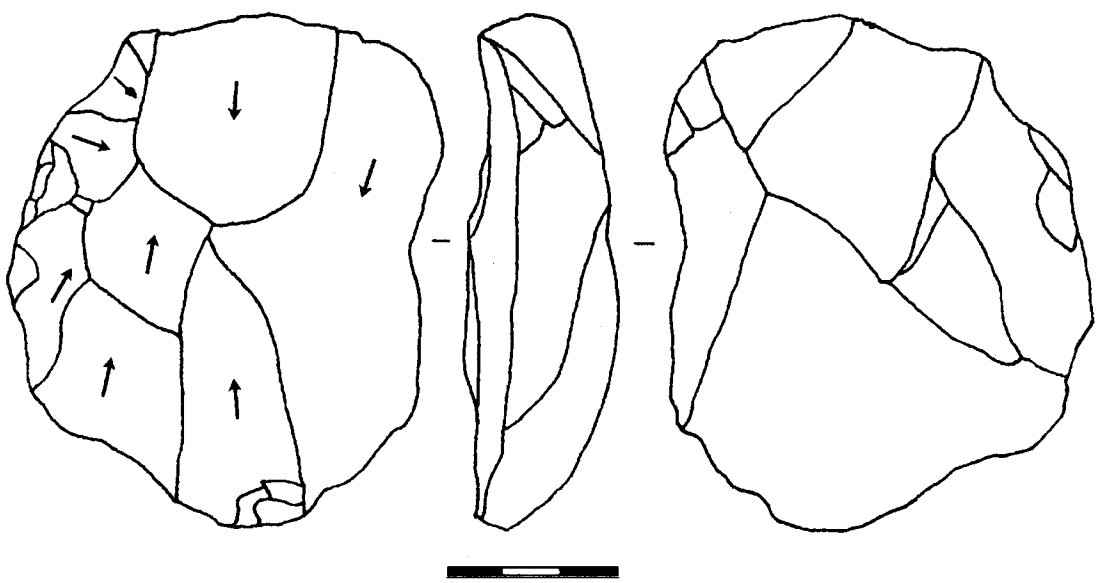

Figure 4. Levallois cores - Method unipolar.

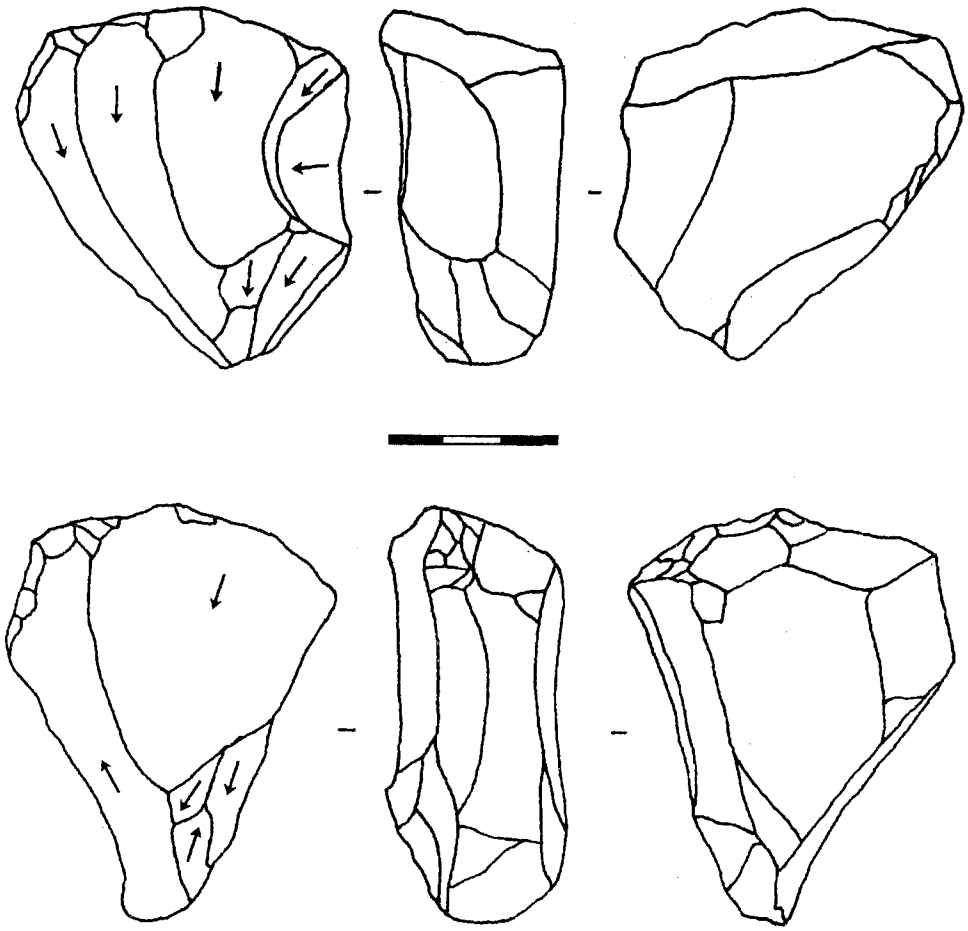

Figure 5. A-C. Levallois cores - Method unipolar.

and the Prohodna karst tunnel. The aim was to expand the already existing knowledge and apply an interdisciplinary approach to the interpretation of the new results. This led to a reconstruction of the paleoenvironment in the Karlukovo karst (Sirakov 1992). Since 1998 some research was conducted by S. Ivanova (Ivanova *et al.* 2000) in the Skandalna cave and by Ts. Tsonev in the Samuilitsa I cave. In the Samuilitsa I cave sediments had been extensively disturbed by human activities in the past and archaeological finds had no clear *in situ* context.

Samuilitsa II cave had been formed in the Maastrichtian limestone. The petrographic analyses in the region of the cave made by Pawlikowski (Pawlikowski 1992) showed a presence of three layers in the Senonian horizon rich with flint nodules. The first horizon is 4-5 m thick and contains grey flint concretions (type C). A layer, which is thick 1-2 m follows. It is characterized by dark-grey flint concretions (type B). The last third layer is 2-3 m thick and contains flint concretions (type A). It could thus be established that the area around the cave was the main source of the raw material used by the inhabitants of the Temnata Dupka cave. During the archaeological research at the Samuilitsa II cave N. Dzhambazov registered a concentration of archaeological material. N. Sirakov (1983) studied the tools and debitage and I studied the cores in my MA thesis (Krumov 1999). As a result the following corrections of the stratigraphy of the assemblages could be made. Two stone artefact assemblages were differentiated: a lower and an upper part. In the lower part Middle Palaeolithic cores predominated, whereas in the upper part a tendency towards an increase the Upper Palaeolithic cores was observed. Another reason for differentiating these two complexes was the dating from the Groeningen laboratory of 42 000 BC. The dating was on was on charcoal, taken from a section, which was preserved from

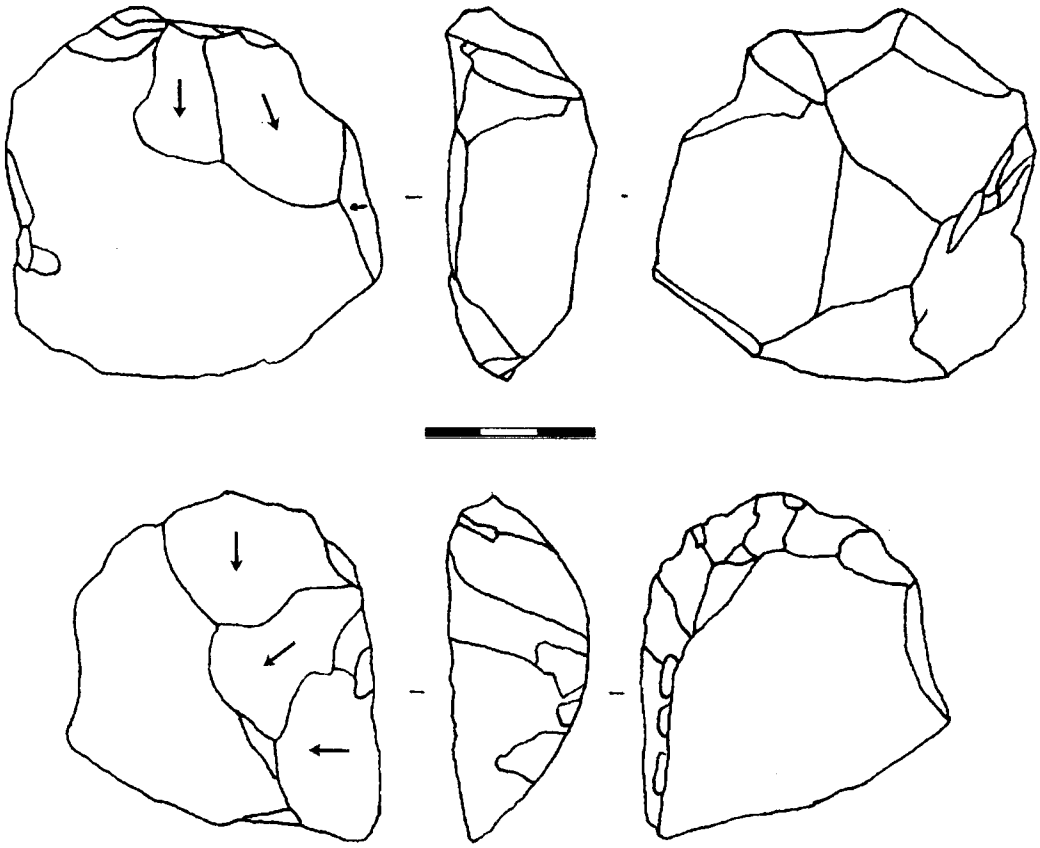

Figure 6. Pre-Levallois cores.

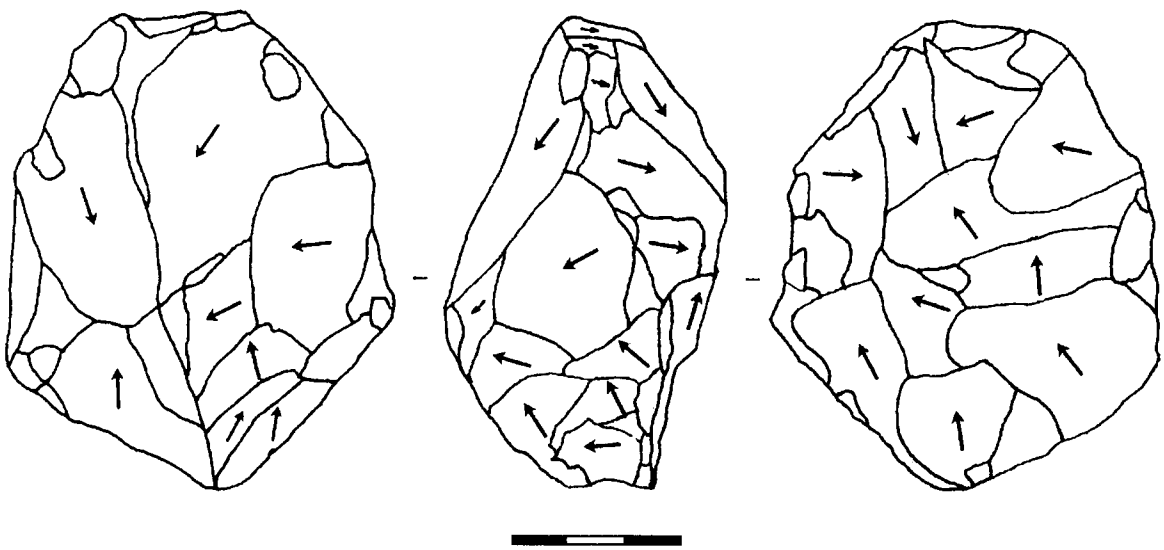

Figure 7. Discoidal core.

Dzhambazov's excavations and the date approximately marked the border between the two complexes and thus the main division between Middle and Upper Palaeolithic. In the chipped-stone complexes mentioned above six groups of cores were distinguished: Levallois cores (Fig. 2-5), proto-Levallois cores, pre-Levallois cores (Fig. 6), micro-Levallois cores, discoidal cores (Fig. 7) and semi-discoidal cores. The Levallois technique predominated. The use of different methods of exploitation: centripetal, unipolar, bipolar techniques is a feature of the Levallois cores. The Levallois cores were prepared mostly for flakes and more rarely for blades and points. The Levallois nodules were made by the use of a hard hammer.

The stone assemblages from the Samuilitsa II cave are without a clear stratigraphic context and because of this a comparison of the artefacts with other assemblages in of Bulgaria (and other regions) is more general. From a techno-typological point of view this collection has analogies with Middle Palaeolithic material from the Temnata Dupka cave (Kozłowski *et al.* 1989), the Bacho Kiro cave (Drobniewicz *et al.* 1982), and with the open-air Palaeolithic sites of Muselievo (Sirakova & Ivanova 1988) and Shiroka Polyana (Ivanova 1992). In the complete stone assemblage (including the debitage and tools) three industries can be distinguished:

-typical Mousterian (until 50 000 BP)
-typical Mousterian with a Levallois phase, which includes leaf-point forms (between 50 000 and 45 000 BP)
-developed Mousterian with a Levallois phase but without leaf-point forms (44 000 - 40 000 BP; probably the transition Middle-Upper Palaeolithic).

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LA SYMBOLIQUE EN TECHNOLOGIE

Marcel OTTE*

1 - La technique est vitale

L'utilisation d'outils n'est pas le propre de l'homme : les chimpanzés taillent des baguettes, des oiseaux brisent les œufs à l'aide d'un galet, les loutres cassent les noix sur leur ventre. Certains comportements sont transmis d'une génération à l'autre, telles les pratiques de chasse chez les loups, la fuite chez l'antilope, les jeux chez les félidés. Ces séquences gestuelles font donc partie d'un apprentissage, elles ont elles-mêmes évolué, autant chez l'animal que chez l'homme. Dès lors, la différence réside dès les origines, dans la complexification croissante du message culturel au point que depuis longtemps déjà notre espèce disparaîtrait rapidement si elle ne disposait plus que de son anatomie, dépourvue de l'équipement technique transmis par la culture. Le comportement compensatoire aux déficiences physiques, au moins depuis le départ des zones forestières, fonctionne comme un facteur naturel : sélectif et coercitif. Au mieux il peut être acquis, au plus l'individu dispose des chances de survie. Notre bagage culturel prolonge en quelque sorte notre évolution anatomique à laquelle elle tend progressivement à se substituer. Désormais, avec l'outil, l'humanité met la nature à son service, renversant ainsi l'ordre suivi depuis l'origine de la vie. En d'autres termes, tout nus nous sommes certainement l'être le plus vulnérable qui soit mais par la technologie, nous nous glissons sous les glaces de l'Arctique et nous marchons sur la Lune.

2 - La technique est un choix

Cependant, la technologie des peuples traditionnels manifeste aussi brillamment, non un simple équilibre particulier avec leur environnement, mais beaucoup plus une série de choix posés dans la gamme de ce qui fut potentiellement réalisable. Ce choix implique le respect de traditions, transcrites sous des règles et des interdits, débordant aussi sur le plan moral, car ce qui est conforme est "bon", et ce qui distingue est "diabolique". Nous pouvons ainsi "extraire" le culturel de ce qui reste biologique dans les activités, décoder cette organisation qui agit comme un filtre entre la nature et nous, afin de comparer les "spectres" culturels ainsi manifestés, soit au fil du temps, soit à travers l'espace. Alors peut-on distinguer ce qui ressort de l'inertie historique, c'est-à-dire porté par la tradition, de ce qui relève de la convergence propre à l'esprit humain : la hache, le moulin, l'écriture furent "inventés" d'innombrables fois.

3 - La technique distingue

Si, par exemple, on considère l'habitat, source de protection, autant thermique que symbolique, il reflète autant les modes d'adaptation aux climats, provoquant les convergences que les composantes culturelles particulières telles que le statut, le clan, le prestige, voire l'histoire du propriétaire (Fig. 1). Les agencements techniques contiennent, en eux-mêmes, le message véhiculé par la tradition. Celle-ci se reconnaît, se conforte par sa pérennité, par sa répétition qui l'isole à la fois des propriétés naturelles proposées par l'environnement et des réponses fournies, aux mêmes besoins, par d'autres traditions, désignées alors comme "étrangères". Par cette différence même, le groupe se définit au travers des contrastes ou des oppositions. Les qualités du bien et du mal s'y trouvent ainsi fondées, dans la foulée du "conforme" ou de "l'altérité".

4 - La technique rassure

Pour une bonne part, ces traditions nous échappent, car elles étaient exprimées par la parole, dans l'abstraction du récit. Pourtant, ce qui se trouve justifié par les explications mythiques se reflète aussi très largement dans les enchaînements gestuels, parfois inconsciemment, et se trouve directement transmis jusqu'à nos yeux d'observateurs, venus d'ailleurs ou de

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Figure 1. Construite pour la protection thermique et sociale, la maison porte en outre de nombreuses références symboliques extérieures, à vocation clanique, historique ou cérémonielle. Elle entre ainsi dans le message public, exprimant un statut, une fonction et des rites renouvelés périodiquement. L'équilibre avec l'environnement reste secondaire, il n'est plus qu'un moyen par lequel s'expriment les messages sociaux (maison Maori, Nouvelle Zélande).

plus tard. Cette distance même nous prédispose à saisir la particularité des techniques, donc des symboles, mis en action avec une netteté nouvelle, inédite, comme des Martiens nous épingleraient bien des singularités acceptées parmi l'habitude la mieux ancrée, précisément parce qu'elle ne requière plus de justification. Parallèlement aux discours "explicatifs" prenant en quelque sorte l'office d'un sermon édifiant, fonctionnent, agissent et se constituent des ensembles complexes de comportements dont les plus tangibles sont curieusement mieux "visibles" que si ils eussent été exprimés verbalement par les artisans eux-mêmes. Qui se préoccupera de savoir pourquoi il y a des véhicules dès lors que nous les utilisons tous les jours ? De telles évidences ne se démontrent pas, simplement elles se vivent.

5 - La technique identifie

Ces singularités apparaissent avec le temps ou l'espace, spécialement révélatrices de messages nondits, imprégnés d'habitudes, reconnus comme légitimes et ainsi nous proposent comme un squelette de la pensée collective dont elles transmettent les valeurs. Cette manière de catégoriser l'univers en le transformant relève finalement de l'aptitude à le comprendre. C'est une série de "manières" acceptées par un groupe, à la fois pour interpréter la nature en la soumettant aux lois humaines, mais aussi, dans son prolongement, il s'agit de structurer sa propre société, par rapport à cet univers mythique. Nous retrouvons ainsi, comme en négatif symétrique, l'équilibre définit par la pensée à l'ordre des choses, qu'elles soient techniques, sociales ou religieuses. Les ustensiles, les armes, les moyens de transport ou d'habitat restituent en trois dimensions, une pensée purement abstraite jusque là. Les règles sociales s'inscrivent dans les réalisations matérielles, elles y constituent un "langage technique" employant son propre code où se trouvent rassemblés des messages portant sur l'efficacité, l'harmonie, le clan ou la classe sociale. L'archéologue est alors un "décodeur" des signes culturels dissimulés sous les choix techniques et leurs réalisations (Fig. 2).

6 - La technique symbolise

Les techniques les plus élaborées se conforment avec finesse et intimité davantage aux options

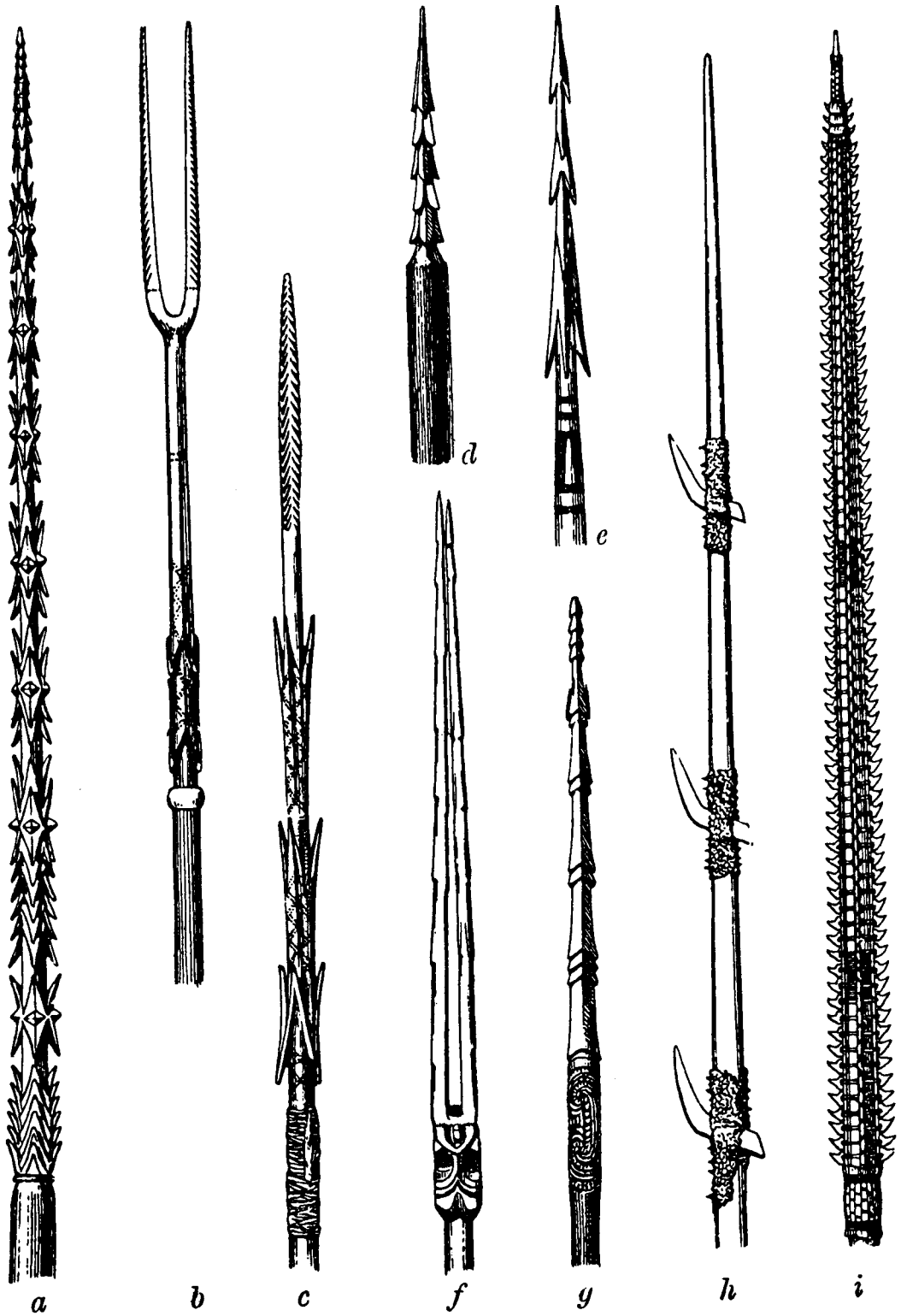

Figure 2. Des armes aussi universelles que les pointes de traits barbelés, à fonction identique (chasse aux poissons), permettent néanmoins de distinguer, d'une façon très fine et très fidèle, les différentes traditions des îles du Pacifique. Une "loi" non écrite sert de code par la manière d'agencer les éléments techniques, à fonctions équivalentes : pénétration et rétention. Dans un contexte archéologique, aucun de ces messages ne subsisteraient car ils sont essentiellement faits de matières végétales (a : Samoa; b,c : Niné; d : Hawaï; e : Caroline, fg : Nouvelle Zélande, h et i : îles Gilbert).

Figure 3. Comme arme universelle, l'arc apparaît et fut réinventé à d'innombrables reprises. Mais ses dimensions, comme ses matériaux et ses divers emplois expriment des choix culturels particuliers. De la même façon, l'utilisation de l'arc, arme à longue portée et à grande précision, participe à d'innombrables récits mythiques car elle offre à l'homme l'extension de son emprise sur les lois naturelles (chasseur Ainu).

Figure 4. La pointe, soigneusement élaborée, rassemble à la fois le prestige crée par le long investissement consacré à sa fabrication et la valeur symbolique retombant sur son possesseur. Plus aucune utilisation technique ne peut être réalisée par de tels assemblages si fragiles. Gommes, textiles, coquilles, liens, hampe ne servent qu'à présenter l'objet symbolique, à l'investir d'une série de messages complémentaires à la pointe mais, toujours, extérieurs à son utilité originelle (pointe de lance en obsidienne, Iles de l'Amirauté).

symboliques qu'aux aptitudes. En préhistoire, la chaîne opératoire la plus longue place, par exemple, le débitage par pression entre l'intuition d'armer un trait par microlithes adaptés à la chasse en zones forestières et l'enchaînement complexe de gestes préparatoires dans le choix de la tige et la préparation de l'arc (Fig. 3). Ce long "discours" reste hautement culturalisé tout au long de son parcours jusqu'à la désignation individuelle du gibier à abattre et du chasseur prévu pour le faire. Toute phase est réglée par les lois religieuses qui autorisent ou interdisent tel événement. La simple armature de trait qui nous parvient finalement ("pointe de flèche") fut le produit de tout ce message dont elle transmet une partie du code (tel le débitage par pression et la silhouette découpée du microlithe).

7 - La technique incarne

Les longues combinaisons de concepts mécaniques agencés atteignent le stade de "phrases" à syntaxe subtile comme dans un récit. Elle peut être adaptée à toute nouvelle forme de situation sans altérer leur sens ni leur souplesse. Ces aptitudes sont parfois remarquables, malgré l'absence de contexte sur des "pièces maîtresses" devenues totalement inutiles, tant elles sont élaborées, et d'ailleurs restées intactes sur tout leur contour initial fragile. Ces armes incarnent

alors uniquement des valeurs symboliques liées soit à la fonction première de l'outil réel (la hache du pouvoir) (Fig. 5) soit à la difficulté surmontée tel un défi technique. A ce point, l'impression globale ne peut se décoder car elle combine les différents aspects et crée cet effet esthétique trouble où se mêlent les valeurs symboliques et les morphèmes dont l'artisan a pu jouer (couleur, matériau, silhouette, lumière, texture).

8 - La technique innove

Si l'outil est emmanché, de nouveaux critères mécaniques sont ouverts à son usage : force, angle, durée sont ainsi augmentés et mis au service de la volonté humaine, déjà intégrée sous forme de règles et de styles. Chaque invention commence par effrayer car elle bouscule la norme et requiert un rééquilibre de l'ensemble du système technique où elle était incluse, avec les fonctions sociales dont sa mise en action remet le partage en cause. La société peut admettre l'innovation et "évoluer" mais elle peut aussi la rejeter et disparaître progressivement. L'aptitude à intégrer l'innovation technique constitue en soi la trace matérielle de la sensibilité de son esprit. L'outil lithique, finalement abandonné, ne sera plus alors que le squelette de l'outil effectif (avec son manche) enchaîné lui-même dans une répartition des tâches telle que la société se maintient dans ce milieu mais qu'elle peut s'y développer davantage encore selon les innovations adéquatement intégrées.

9 - La technique hiérarchise

De beaux exemples sont fournis par les pointes solutréennes, témoignant d'une extrême aptitude technique, elle-même employée comme critère d'une esthétique de l'"exploit" et qui, ainsi, exprime au plus haut degré les valeurs collectives, répercutées de façon exagérée, spectaculaire, mythique. On dispose aussi d'exemples de pointes lithiques, jamais utilitaires dans les Iles pacifiques : extrêmement fragiles, elles symbolisent pourtant la force, par le message social codé mais non dans sa réalité active. Ce genre de dérive cognitive décale le message et de ce qui fut technique, seul le sens demeure (Fig. 6).

10 - La technique sacrifie

Avec les premières machines, on voit se multiplier ce genre de phénomène : la flèche sera vite intégrée aux mythologies car elle atteint les cieux, maîtrise la vitesse, incarne la justice. La transformation d'énergie mise au service de l'homme augmente son assurance : il étend d'autant les limites de sa volonté et de sa conscience. A la fois adaptée à la forêt comme arme rapide et précise, elle offre aussi une relation "personnalisée" avec le gibier car ce seront tels individus qui seront prélevés sur le gibier arrachés à la nature ("sacrifiés") au profit de l'humanité. Les techniques nouvelles manifestent ainsi une ambition supérieure. Chez les prédateurs actuels l'éducation et la transmission de l'arc, effectuée dès l'adolescence joue le rôle de marqueur ethnique, d'un statut ou d'un rang. Sa maîtrise structure davantage la société qu'il ne sert à la prédation. Il est le signe d'une humanité toute puissante et l'emblème d'un rang où l'adolescent vient se placer (Fig. 3).

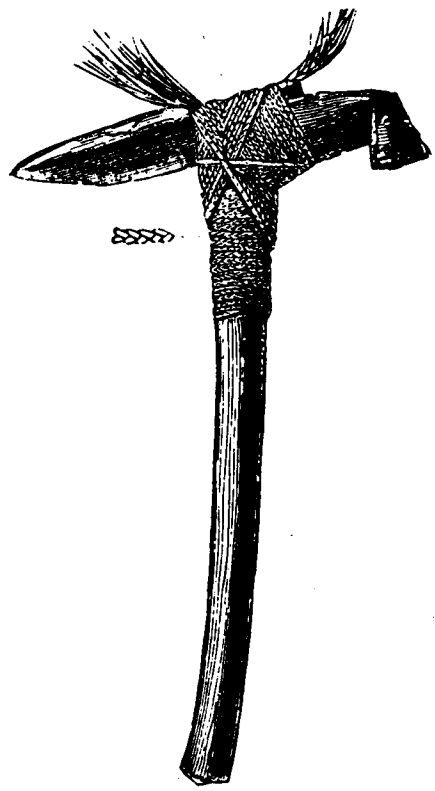

Figure 5. La lame de hache, retrouvée dans un contexte archéologique donnerait peu du symbole qu'elle incarne sous sa forme emmanchée, dans ses décors, ses accessoires et le "chapeau" qui la protège par l'arrière. Elle est devenue un instrument magique qui transforme la réalité environnante selon la volonté de l'esprit. Cette emprise s'accompagne de sacralisation du geste correspondant à la gravité de sa fonction. En quelque sorte, la hache agit au nom de l'humanité, contre la nature (herminette en pierre du groupe de Tahiti).

11 - La technique embellit

Par ailleurs, des armes polies, soignées, régulières, symétriques, accompagnant les défunts ne furent jamais utilisées : leur tranchant est resté intact.

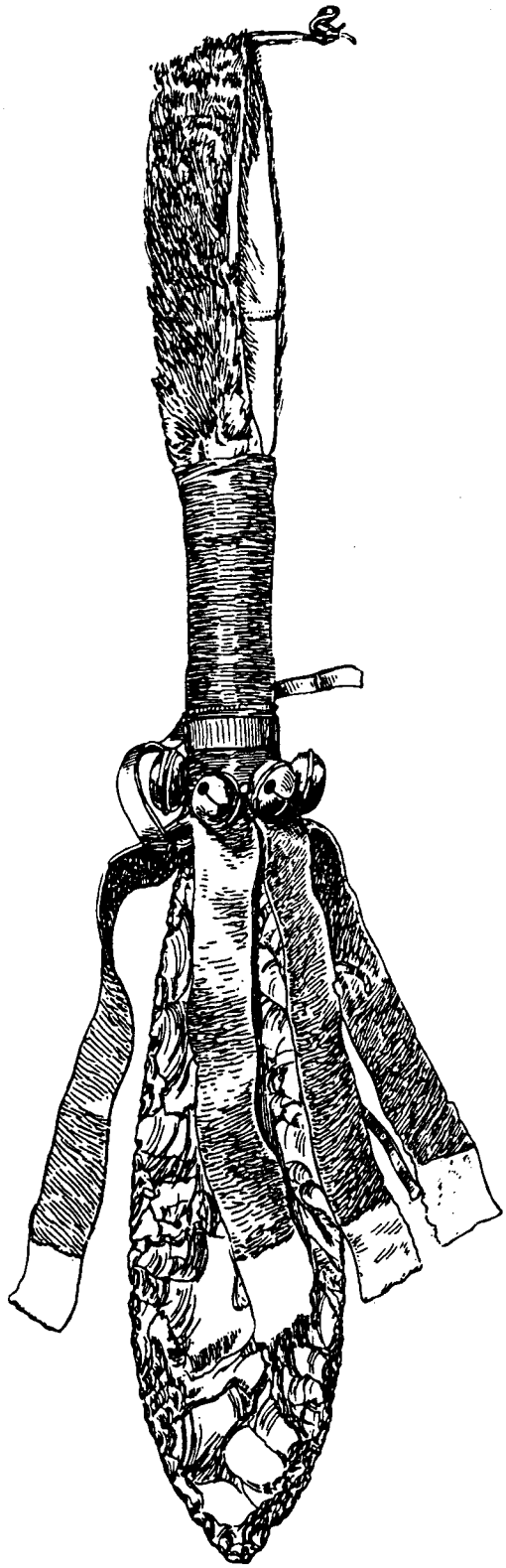

Figure 6. La pointe foliacée bifaciale est identique aux exemplaires paléolithiques européens : elle implique un long processus technique pour sa réalisation et reflète des stéréotypes de pensée rigoureux. Pourtant, maintenue ainsi dans une gaine végétale et enrubannée, elle prend une valeur de bien de prestige qui la distingue des autres outils. Ces "messages" ajoutés désignent l'objet pour sa seule valeur, hiérarchique et magique (lame emmanchée, Colombie Britannique).

En contrepartie, leur silhouette est référentielle à leur fonction matérielle que chacun perçoit par simple analogie à l'outil réel, mais est alors sublimée par leur beauté même, comme excessive pour un vrai usage. Sa valeur symbolique fut lentement acquise au fil du polissage, inutile quant à l'efficacité, mais accordant à la forme toute cette densité qui fait passer de l'outil à l'image et le charge de la seule fonction symbolique, encore liée à sa forme et à sa puissance mais non plus à son emploi.

12 - La technique codifie

La symbolique technique conduit tout autant à l'expression du prestige qu'au langage des formes, telle une valeur ajoutée par la société à l'objet. Ainsi, les roches d'origines lointaines, précisément rapportées pour leur étrangeté et leur difficulté d'acquisition, vont compléter le code symbolique de l'outil : d'inutile, il devient prestigieux et se trouve partenaire dans un jeu social où jamais il ne quitte totalement les divers champs sémantiques auxquels il se réfère : fonctionnel, symbolique, prestigieux. Le message est ainsi codé "en strates" qu'il nous revient de décaper, à plusieurs millénaires de distances. D'autres fois, cet investissement consiste dans la durée de la réalisation, l'habileté technique requise, le temps, le travail, la maîtrise qui s'y trouvent concentrés. De surcroît, les décors y sont associés tels des dessins, des signes ou d'autres matériaux, organisés en autant de "morphèmes" disposant d'un langage propre : manches décorés, ligature, feuilles, pailles ou en plumes, disposées selon les termes de passage des cérémonies pour agrémenter, d'une connotation sociale personnalisée, le signe particulier que résume tout outil humain face à la nature : la marque d'un esprit en action constante.

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LE GRAVETTIEN EN BULGARIE DU NORD : NIVEAU IVB DE LA GROTTE KOZARNIKA

Tsenka TSANOVA*

La recherche présentée ici consiste en la seule couche bien stratifiée et datée du Gravettien moyen en Bulgarie.

Cette étude ne se limite pas à l'étude typologique, mais pousse plus loin l'interprétation de l'ensemble lithique et met en œuvre l'analyse technologique qui permet de reconstituer le schéma du processus technique global et les chaînes opératoires.

1 - Position géographique du site, description topographique du site historique des recherches

La grotte Kozarnika a été découverte en 1931 par Rafaïl Popov (Popov 1933), elle est située dans le nord de la partie occidentale des Prébalkans, près de la plaine danubienne, à environ 3 km du village de Gara Orechets (district de Belogradtchick) et à environ 30 km de la frontière serbe.

La grotte Kozarnika située à une altitude de 481 m s'ouvre vers le Sud, sur le versant Nord de la vallée d'un affluent de la rivière Skomlia dans les escarpements calcaires d'âge Jurassique supérieur de l'anticlinal de Belogradtchick sus-jacents à des formations conglomératiques (Fig. 1:A et Ferrier, *in* Guadelli et Sirakov 2002).

Les fouilles, toujours en cours dans la grotte, commencèrent en 1996 dans le cadre de la coopération bulgaro-française (Institut de Préhistoire et de Géologie du Quaternaire - Université Bordeaux I et Institut et Musée d'Archéologie – Académie Bulgare des Sciences, Sofia), dirigée par J.-L. Guadelli (CNRS) et N. Sirakov (AIM-BAS, Sofia).

2 - Datations et provenance de l'ensemble lithique IVb

Les dates absolues 14C (sur bois végétal) pour la séquence du Paléolithique supérieur de Kozarnika sont comprises entre 19 770 +/- 270 BP (Gif 10674) – pour les occupation les plus récentes, et 43 600 +/- 1200 BP (Gif A 101051) – pour les occupations les plus anciennes.

Le niveau archéologique IV b, situé dans la couche géologique 4 est daté de 26 120 +/- 120 BP (GifLSM 10677) [Fontugne, Tistérat-Laborde, *in* Guadelli et Sirakov 2002].

Le matériel lithique, objet de cet article provient d'une surface de 16,5 m² [1], du secteur I (Fig. 1:B), carrés F3 à F8, G3 à G8, H3 à H8. Sa position altimétrique par rapport aux niveaux de profondeur se situe dans les décapages de -397 cm jusqu'à -415 cm.

La séquence du Paléolithique supérieur comporte du Gravettien supérieur (niveaux 0I, I, II et III), du Gravettien moyen (niveaux IVa, IVb, V et VI), du Kozarnikien initial à lamelles à dos à retouche inverse (niveau VII), et du Paléolithique supérieur ancien, non encore déterminé (couche 6/7).

3 - La matière première locale

Dans toute la séquence de Kozarnika la matière première est d'origine locale.

Dans le dépôt primaire (calcaire du Crétacé inférieur), aussi dans les parois de la grotte, on trouve la matière première sous la forme de nodules aplatis.

Dans les dépôts secondaires on retrouve des blocs, des fragments gélifractés et patinés.

L'une des spécificités de ce silex est qu'il est tectonisé et pour cette raison les ensembles de Kozarnika présentent des groupes de fragmentation primaire très importants.

Cependant au Paléolithique supérieur, la matière première est plus variée et une partie (environ 10%) est d'origine mésolocale.

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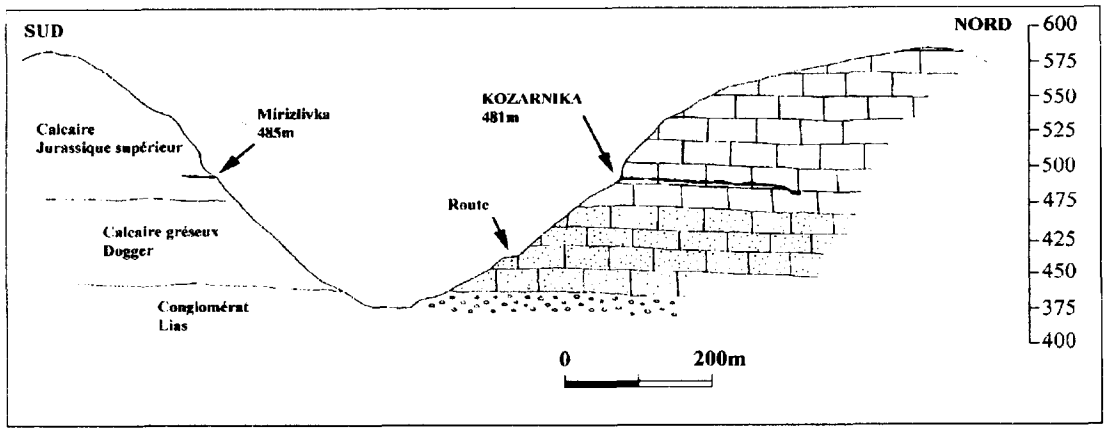
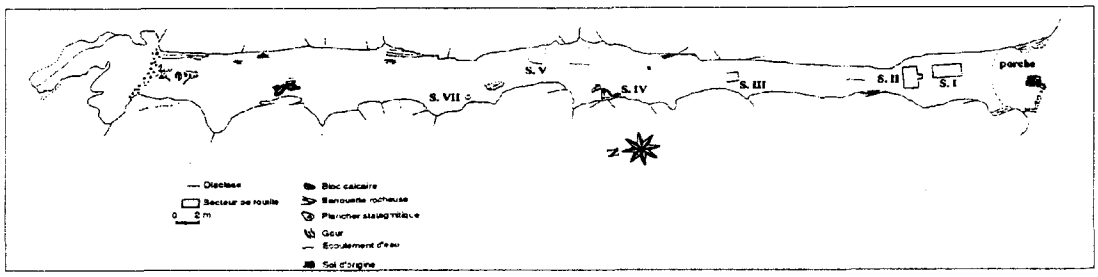
[1] 1,5 m² sont exclus de la surface totale fouillée à cause du sondage de test effectué en 1994 par S. Ivanova.



A



B

Figure 1. Kozarnica - A. coupe géologique (d'après C. Ferrier et J.-Cl. Leblanc 1997);
B. topographie de la grotte (d'après C. Ferrier et J.-Cl. Leblanc 1998).

4 - Caractéristiques générales de l'industrie

L'ensemble lithique du niveau IV b de la grotte Kozarnika est constitué de 5498 artefacts. La plus grande partie sont des produits de débitage (93,2%), suivis par les nucléus (3,8%) et les outils (3%).

4.1 - Les nucléus

Les nucléus ont été faits sur nodules (29,4%), pièces de la fragmentation primaire ou sur plaquettes gelifractées (18%) et sur éclats (15,2%).

Les nodules ont été décortiqués et mis en forme sur place, le plus souvent dans une optique de débitage laminaire (Fig. 2:1,2). Ce débitage se fait en majorité sur une surface de débitage rectiligne à partir d'un plan de frappe, plus rarement à partir de deux plans de frappe opposés et selon un schéma d'exploitation de la partie longue et étroite vers la partie large (Fig. 3 :4). La préparation des nucléus bipolaires (Fig. 3:3) à lames plus étroites est plus précis (Fig. 2:4). La mise en forme des nucléus à lames et lamelles est effectué par crête latérale ou postérieure.

Nous observons aussi des modalités de débitage semi-tournant ou tournant (Fig. 3:5,6).

Un entretien régulier du plan de frappe est effectué par reprise totale ou par reprise partielle.

La préparation des nucléus a lieu dans la plupart des cas (nb 24) par l'aménagement d'une crête postérieure (Fig. 2:3) surtout pour les nucléus unipolaires dont le plan de débitage est situé sur la partie longue et étroite du support. Les nucléus unipolaires à plan d'enlèvement situé sur la partie large du support sont préférentiellement préparés par crête latérale (Tsanova, 2001, tabl.8 Annexe).

Une autre modalité de débitage est exécutée à partir d'une plaquette gélifractée ou pièces de la fragmentation primaire (Fig. 2:5) dont l'exploitation a été effectuée de la partie longue et étroite de la plaquette vers la face la plus large.

La troisième modalité d'exploitation des nucléus est le débitage d'éclats, qui ont fourni des lamelles (Fig. 3:1,2). Il s'agit d'un débitage sur la tranche du support dont la mise en forme est minimale :

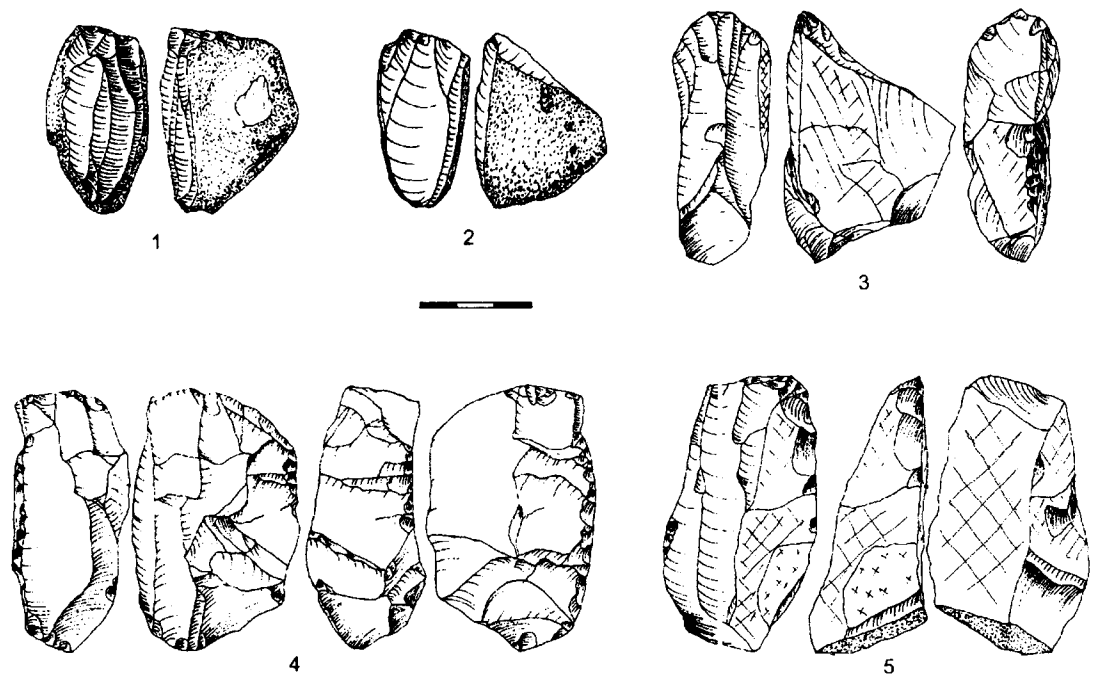


Figure 2. 1-5. nucléus.

plan de frappe majoritairement lisse et crête centrale discontinue (Fig. 3:A-C).

Des stigmates technologiques sur certains nucléus à lames et à lamelles - régularité des nervures, plan de frappe incliné et un angle de bord d'environ 60° - indiquent qu'ils étaient débités au percuteur tendre.

4.2 - Le débitage

Dans le groupe du débitage, les éclats (38,5%) sont prédominants par rapport aux lames (18,6%). Les produits de débitage corticaux sont représentés, aussi bien pour les éclats que pour les lames. Les éclats et les lames de la phase de plein débitage de la chaîne opératoire témoignent de la fréquente exploitation des nucléus à un plan de frappe. Les produits de remise en forme des nucléus (les tablettes de ravivage de plan de frappe) montrent une tendance au raccourcissement des nucléus, probablement lié à la correction de l'angle de plan de frappe. La mise en forme, ou la remise en forme, des nucléus à lames et lamelles a été effectuée pour la plus grande partie par crête latérale ou postérieure. Les lames et lamelles à talon linéaire, à bords parallèles, à section triangulaire et à profil rectiligne sont typiques de l'industrie IVb de Kozarnica. La plus grande partie des lames sont fragmentées (53,9%) ; les fragments proximaux sont dominants (22,9%).

Le reste du débitage se distribue de la façon suivante : petits éclats (18,6%) ; fragments indéterminés et cassons (15,5%) ; fragments d'éclat (4,9%) ; éclats de retouche (3,7%) et chutes de burin (0,2%).

4.3 - Les formes retouchées

Dans la catégorie des outils, les plus abondantes sont les pièces à dos (22,9% du taux total des outils). Le reste des formes retouchées sont : des grattoirs, des burins, des perçoirs, des lames retouchées, des pièces denticulées et à encoche, des pièces tronquées, des outils "mixtes", des racloirs, des pièces foliacées et des pièces esquillées.

Les grattoirs (12,1%) sont fabriqués sur éclat ou sur un support allongé. Les fronts sont classiques : semi- abrupts, rarement abrupts (Fig. 3:7-12).

Les burins (4,2%) sur troncature retouchée sont les plus abondants (Fig. 4:1-6) et tous sont préférentiellement réalisés sur des éclats.

Les perçoirs (8,4%) sont fabriqués à partir d'éclats. Les exemplaires asymétriques sont typiques.

Les lames retouchées(15,7%) portent des négatifs unipolaires. Les retouches sont abruptes ou

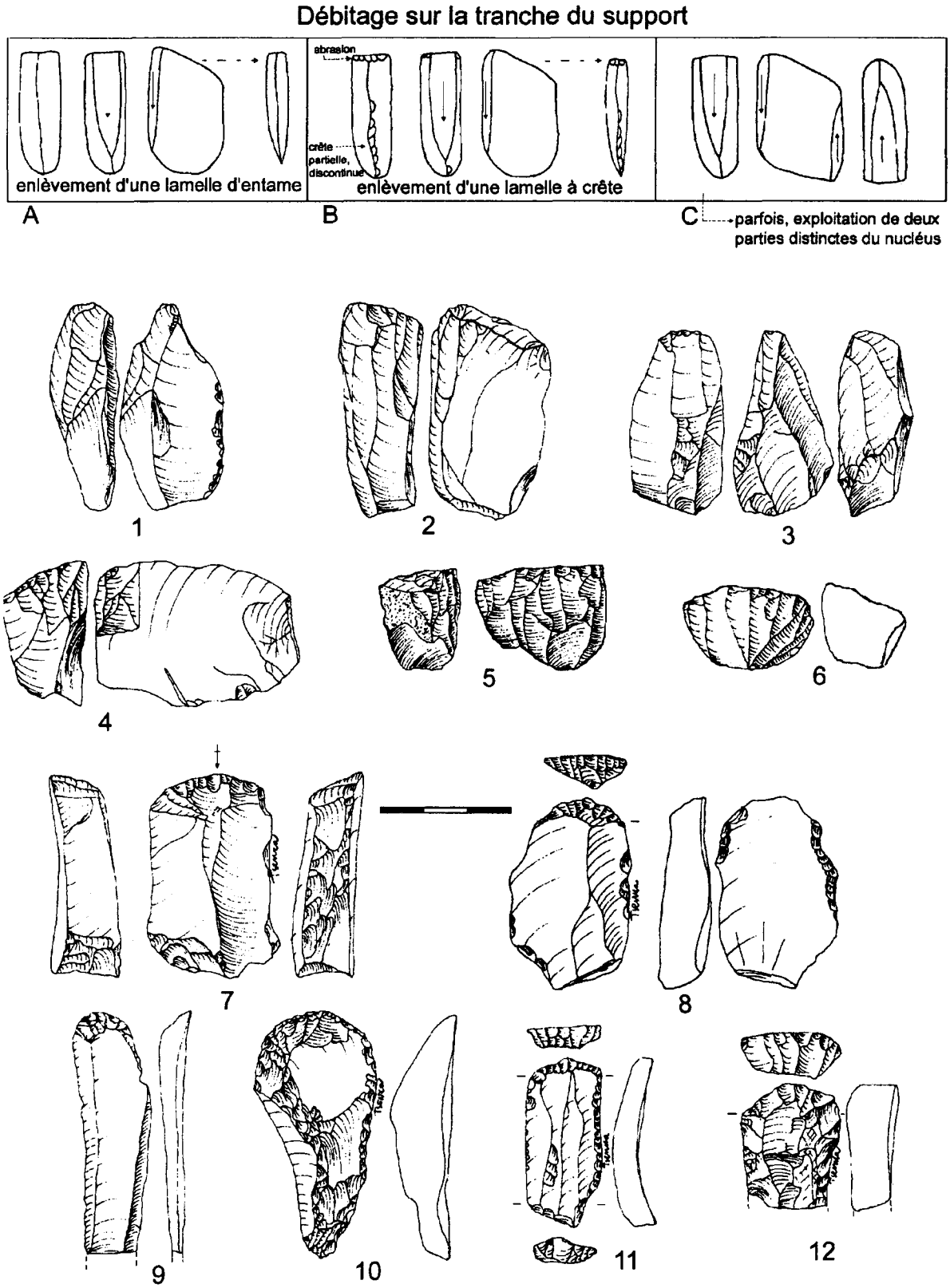


Figure 3. A-C. Schéma opératoire : débitage sur la tranche du support; 1-6. nucléus; 7-12. grattoirs.

semi-abruptes, inverses, plates ou denticulées.

Les pièces denticulées et à coche (13,9%)

Les éclats denticulés portent des retouches situées sur un ou deux bords latéraux ou sur le bord transversal. Les pièces à encoche sont en général sur lames et les coches sont latérales.

Les pièces tronquées(11,4%) sont en majorité sur éclat à troncature oblique ou droite, abrupte.

Le groupe des outils "mixtes" (7,2%), fabriqués sur des plaquettes gélifractées ou de gros éclats englobe trois sous-groupes :

Les pièces à enlèvements burinants (nb 6) sont à un bord latéral recoupé.

Les pièces émoussées reprises (nb 2) possèdent les attributs des outils multiples: bord transversal tronqué, front arqué à la moitié par une retouche semi-abrupte, retouche denticulée sur les bords latéraux.

L'état de fraîcheur de ces pièces indique qu'elles proviennent peut-être des couches sous-jacentes du Paléolithique moyen récent ou du Paléolithique supérieur ancien.

Pièces "ébauchées" (nb 4).

Pièces foliacées (1,2%) : une pointe à retouche semi-plate et bord convergent et une autre pièce foliacée bifaciale, très émoussée, façonnée par retouche couvrante qui appartiennent aux couches sous-jacentes (Tsanova, 2001 : 13-14).

Les racloirs (1,8%) sont sur éclats. Ils sont retouchés par retouche directe et semi-abrupte.

Pièces esquillées (1,2%): dans les deux cas il s'agit plutôt de débitage car sans doute elles ont produit des lamelles.

4.4 - Formes diagnostiques - Pièces à dos (22,9%)

Pointes de type Kozarnika (nb 7)

La distinction de cette catégorie de pointes a été effectuée après la détermination de certaines différences technologiques et morphologiques. Les pointes de Kozarnika rentrent dans le domaine de variabilité des pointes de La Gravette et des micrograveltes présentant de fines retouches d'amincissement sur la face inférieure, près des extrémités.

Les pointes de Kozarnika se distinguent des autres pointes du Gravettien par les particularités suivantes:

La retouche

1. Les dos abattus des pointes de Kozarnika (Fig. 4:7-16) sont toujours semi-abrupts et directs, à la différence des pointes de La Gravette dont la retouche est toujours abrupte et dont le bord abrupt est situé "*presque toujours à droite*" (Lucas 2000).

2. La retouche d'amincissement des pointes de Kozarnika est située parfois sur la partie proximale de la face ventrale ou parfois sur la totalité ou bien sur le bord entier où la plus grande partie de la face ventrale est retouchée et porte une retouche semi-couvrante (Fig. 4:13).

La morphologie

1. Les bords ne sont pas rectifiés comme sur les pointes de La Gravette, mais ils sont courbes.

2. Le support est toujours plus large pour la pointe de Kozarnika (Fig. 4:7-16), que pour les pointes de la Gravette (Fig. 4:17-19).

Autres caractéristiques

La section des pointes de Kozarnika est toujours triangulaire ; le profil est souvent rectiligne et parfois légèrement torse.

La retouche est généralement bilatérale, mais dans deux cas, la retouche est située sur un seul bord. Sur toutes les pointes, la retouche d'amincissement est présente et parfois elle est semi-couvrante.

La morphologie des bords est convexe.

Sur toutes les pointes de Kozarnika le talon et le bulbe ne sont plus visibles, parce que la retouche de la base est bien développée.

Les pointes gravettiennes (nb 5)

Les pointes gravettiennes sont toujours fabriquées sur des lamelles étroites (Fig. 4:17-19). Trois pointes sont de section triangulaire et deux sont à section trapézoïdale. Presque tous les exemplaires sont de profil rectiligne sauf un à profil convexe. Dans tous les cas, le bord abattu est semi-abrupt, bilatéral sauf une pointe où la retouche est unilatérale. Les bords sont rectilignes, mais un exemplaire a des bords légèrement convexes. Toutes les pointes sont fragmentées: trois fragments sont distaux et deux sont proximaux.

Lamelles à dos tronquée (nb 6)

C'est l'une des variétés que D. de Sonneville-Bordes et J. Perrot distinguent: "*lamelle à dos tronquée à l'une des extrémités plus rarement aux deux*" (de Sonneville-Bordes & Perrot 1956 : 554).

Toutes les lamelles ou microlamelles tronquées à dos sont réalisées sur un support étroit. Les sections sont exclusivement triangulaires et les profils sont rectilignes. La majorité des retouches sont bilatérales, semi-abruptes (rarement abruptes), parfois inverses et rasantes. (Fig. 4:20-22).

Lamelles à dos (nb 15)

"*Pièces à dos rectiligne, sur lamelles souvent fragmentées, à retouche abrupte ou semi- abrupte, directe, mais aussi inverse ou croisée*" (Demars & Laurent 1992 : 106).

Les lamelles à dos de Kozarnika sont réalisées sur support lamello-microlamellaire étroit, à section triangulaire ou trapézoïdale et profil rectiligne. Les retouches sont bilatérales ou unilatérales, semi-abruptes (rarement abruptes) et toujours directes (Fig. 4:24-31).

Parmi les pointes de Kozarnika et les pointes gravettiennes (nb 20), les fragments proximaux sont les mieux représentés (nb 7). Une telle proportion éle-

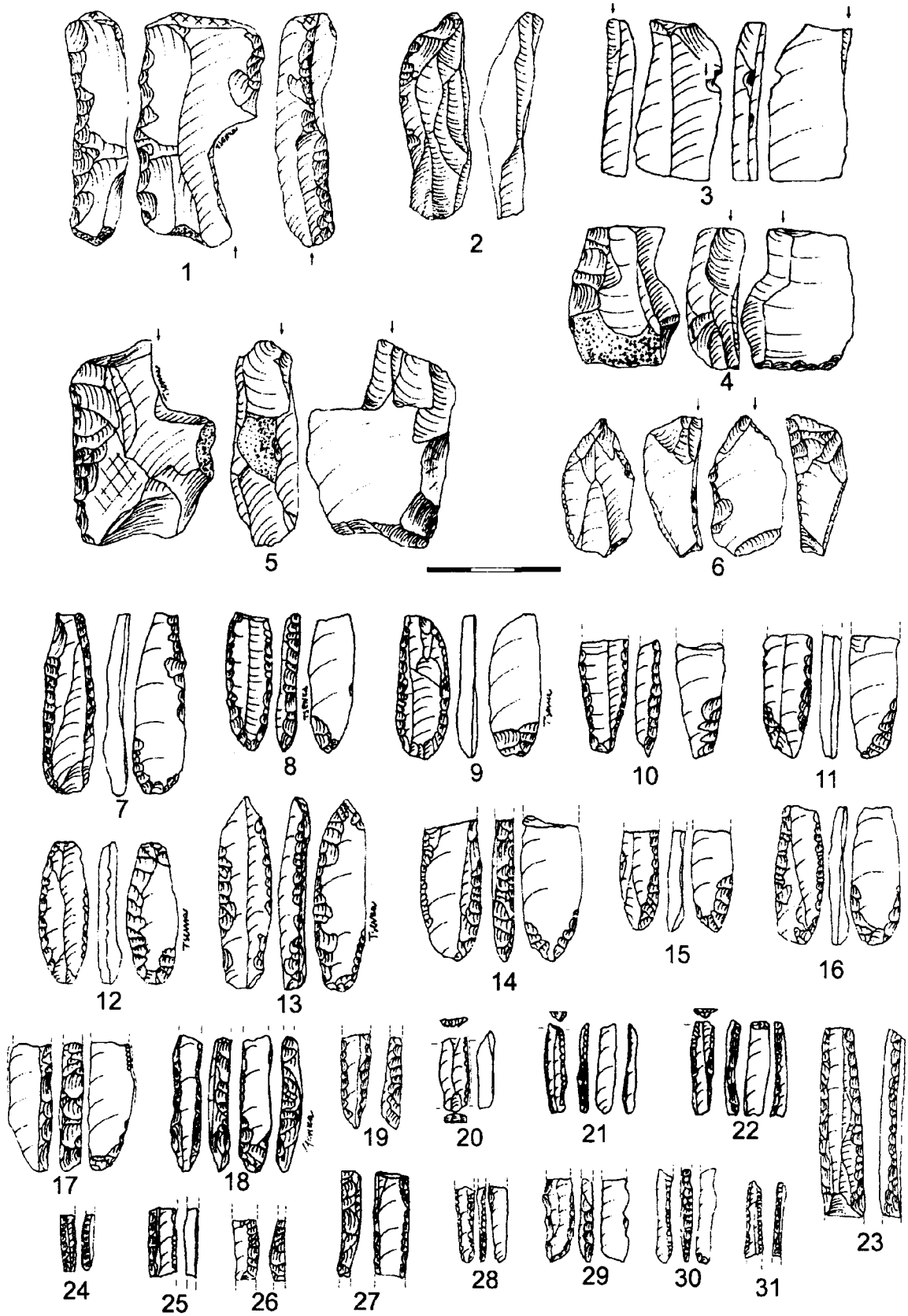


Figure 4. 1-6. burins; 7-16. pointes de type Kozarnica; 17-19. pointes gravettiennes; 20-23. pièces à dos tronquées; 24-31. lamelles à dos.

vée, peut indiquer une utilisation comme projectile car c'est le plus souvent la partie proximale de la pointe cassée qui a été rapportée sur le site, attachée à la hampe (O'Farrell 1996).

Trois fractures de "projection" ont été identifiées selon la classification de Fischer (Fischer *et al.* 1984) : fracture en charnière (Fig. 4:23), fracture en flexion, ébréchure secondaire.

5 - Conclusion

L'étude de la chaîne opératoire globale a permis de conclure que toutes les grandes séquences des processus techniques d'exploitation des roches dures sont représentées dans le niveau IVb. Par conséquent le déroulement de la chaîne opératoire s'est effectué sur place.

Les résultats de l'étude de l'utilisation de la matière première (étude à revaloriser) et l'analyse métrique de lames et de lamelles (Tsanova 2001) montrent qu'il y a peut-être eu fabrication de "supports à emporter" (terminologie au sens de Pelegrin, Karlin et Bodu 1988). Certains nucléus aussi ont pu être débités à l'extérieur de la grotte.

Le nombre réduit des éclats de retouche montre que la zone fouillée correspond à un atelier de taille, où les supports n'ont pas été retouchés.

Fonction du site de Kozarnika

L'épaisseur du niveau gravettien IVb est d'environ 15-17 cm. Cette épaisseur est surestimée à cause du processus post-dépositionnel de cryoturbation. Ainsi, ce niveau pourrait correspondre probablement à une "installation épisodique" (terminologie au sens de Otte 1981).

La présence de toutes les phases de la chaîne opératoire indique clairement un site orienté vers l'activité de la taille du silex. Par ailleurs, la variabilité des outils lithiques (grattoirs, burins, perçoirs) montre aussi la présence d'activités domestiques, comme on peut les rencontrer dans un site d'habitat. Les outils gravettiens comme la pointe de Kozarnika et les pièces à dos sont considérés comme liés aux activités de chasse.

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CONTRIBUTION AU DÉBAT SUR L'ORIGINE DE L'AURIGNACIEN : PRINCIPAUX RÉSULTATS D'UNE ÉTUDE TECHNOLOGIQUE DE L'INDUSTRIE LITHIQUE DE LA COUCHE 11 DE BACHO KIRO

Tsenka TSANOVA* et Jean-Guillaume BORDES*

Résumé

L'industrie lithique de la couche 11 de Bacho Kiro est connue pour avoir été interprétée comme une origine possible de l'Aurignacien, sur la base d'une analyse essentiellement typologique de l'outillage. Ce travail présente les principaux résultats d'une étude techno-typologique de la majeure partie des objets lithiques de cette collection. Le débitage est de type Levallois, selon un schéma parallèle, uni ou bipolaire. Les supports recherchés sont essentiellement des lames qui, après avoir été retouchées surtout en grattoirs, ont quasi systématiquement été redébitées jusqu'à exhaustion, selon des méthodes très variées (Kombewa, Kostienki notamment).

Cette étude montre que d'un point de vue économique, cette industrie se distingue effectivement du Paléolithique moyen sous-jacent. En revanche, d'un point de vue des traditions techniques, il semble qu'elle soit plutôt à rattacher au Moustérien. De l'ensemble des traits techno-économiques mis en évidence, rien ne nous semble devoir être rapproché des phases les plus anciennes de l'Aurignacien.

1 - Problématique

La couche 11 de Bacho Kiro constitue une référence constante dans les nombreux débats concernant la transition du Paléolithique moyen en Europe et au Proche-Orient. En effet, il a été proposé qu'elle constitue l'origine possible de l'Aurignacien ou tout au moins la trace d'une des plus vieilles manifestations de ce technocomplexe (Kozłowski, 1993; Kozłowski & Otte, 2000). D'abord qualifiée avec prudence de Bachokirien, industrie présentant certains traits aurignacoïdes (Ginter & Kozłowski, 1982), la couche 11 de Bacho Kiro a ensuite souvent été attribuée l'Aurignacien *sensu stricto* (Delporte, 1998; Djindjian, 1993). Certains auteurs ont mis en doute cette interprétation, en se basant sur le manque de formes caractéristiques de l'Aurignacien typique (Rigaud, 2001; Lucas & Rigaud, à paraître; Zilhao & d'Errico, 1999, 2000).

Cette discussion se base sur une comparaison avec l'Aurignacien ancien tel qu'il est défini dans le Sud-Ouest de l'Europe. Or, il apparaît de plus en plus clairement qu'il existe, autour de la Méditerranée, un faciès aurignacien au moins aussi ancien que l'Aurignacien ancien "I", souvent qualifié d'Aurignacien archaïque (*e.g.* Bon 2000; Kozłowski & Otte, 2000). Comme le remarquent ces auteurs, la comparaison du Bachokirien avec l'Aurignacien archaïque reste à effectuer dans le détail.

Aborder de telles questions passe avant tout par une caractérisation chrono-culturelle plus précise du Bachokirien. Dans ce travail, nous proposons de mieux le définir par une étude techno-typologique de la couche 11 de Bacho Kiro. L'objectif de cette approche est la caractérisation des modalités et des objectifs du débitage du silex qui constitue cette série (pour des exemples de méthode d'analyse identique à celle que nous avons mise en œuvre ici, voir Pélegrin, 1995; Bon, 2000). Ce travail présente une première approche essentiellement qualitative, dont les développements sont intégrés à une thèse (Tsanova, en cours).

2 - Présentation du site et des données connues

La grotte Bacho Kiro est située dans la partie centrale de la Bulgarie du Nord, sur le versant septentrional de la chaîne balkanique. Le site se trouve dans une grande salle ouverte sur la vallée au débouché

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d'un vaste réseau karstique creusé aux dépends de calcaires crétacés. Après avoir été sondé par D. Garrod et R. Popov (Garrod, 1939), le gisement a été repris entre 1971 et 1975 par une équipe internationle. Ces fouilles, conduites selon des méthodes modernes sur plus de 60 mètres carrés, et dont le produit a été étudié par une équipe pluridisciplinaire, ont permis de faire de Bacho Kiro un site de référence pour les Balkans. Les données que nous présentons dans ce paragraphe sont un résumé de la publication monographique de ces fouilles (Ginter & Kozłowski, 1982).

Au sein de l'importante séquence archéologique du gisement, il existe un fort contraste entre les industries des couches du Paléolithique moyen (14 à 12) et celles du Paléolithique supérieur (couches 11 à 4). Les premières se caractérisent par l'utilisation de roches locales (galets de quartz et de basalte notamment), la production d'éclats et la présence de débitage Levallois. Les secondes sont nettement leptolithiques, laminaires, le silex y est quasi exclusif, et est importé sous forme de supports débités hors du site.

Pour la couche 11 en particulier, il n'y a pas d'évidence de l'utilisation de la technique Levallois ni d'autres techniques moustériennes. D'après l'étude des rares nucléus et des lames non retouchées entières, le débitage est laminaire, unipolaire, de type Paléolithique supérieur. L'industrie a livré des lames à retouche écailleuse "aurignacienne", des lames appointées, des grattoirs parfois épais, à museau ou atypiques, des pièces esquillées, burins de types variés, quelques fragments de lamelles à retouche fine (tableau 1). Il n'y a pas de grattoirs carénés typiques, de burins carénés, de lames aurignaciennes classiques et de lamelles Dufour, ni de pointes à dos et de pièces foliacées. Deux dates ont été obtenues au sein de cette couche :

- 14C classique, sur charbon de bois : > 43 KY BP (GrN 7545), (Mook, in Ginter & Kozłowski, 1982).
- 14C AMS sur os : 38 500 ±1 700 BP (OxA-3213), (Hedges *et al.* 1994).

Type d'outils	nb	%
Grattoirs	87	13,0
Burins	29	4,3
Troncatures	32	4,8
Lames retouchées	273	40,9
Perçoirs	20	3,0
Pièces esquillées	62	9,3
Lames à retouche esquillée	8	1,2
Lames denticulées	24	3,6
Eclats retouchés	92	13,8
Racloirs	8	1,1
Raclettes	7	1,4
Lamelle à retouche fine	13	1,9
Pointes Font-Yves	4	0,6
Outils « mixtes »	3	0,4
Outils à retouche plate	3	0,4
Racloir	1	0,1
Pointes de type Paléolithique moyen	2	0,3
Total :	**667**	
Fragments d'outils	62	
Chutes de burin	45	
Pseudo micro-burins	10	

Tableau 1. Bacho Kiro, couche 11 : décompte des principaux types d'outils de la couche 11 de Bacho Kiro (d'après Kozłowski *et al.* 1982).

3 - Données technologique sur la série lithique de la couche 11

La collection étudiée correspond au matériel actuellement entreposé au Musée Archéologique et au Musée National Historique de Sofia. Le reste de la collection, qui sera ultérieurement analysé, est conservé au Musée archéologique de Gabrovo. Le tableau 2

Catégories techno-typologiques	Kozlowski *et al.*, 1982	Matériel étudié	Part de la série étudiée
Nucléus	18	13	72%
Pièces retouchées	783	659	84%
Lames non retouchées	270	152	56%
Eclats non retouchés	1874	399	21%

Tableau 2. Bacho Kiro, couche 11 : comparaison du nombre de pièces étudiées par rapport à l'ensemble des pièces recueillies lors de la fouille 1971-75.

	Non retouchés	Nucléus	Quelques retouches	Retouchés	Fragments d'outils	Total retouchés	Total
Indéterminés	152	7	42	78	45	165	**324**
Chutes de burin	38		4		1	5	**43**
Eclats	399	6	111	65	8	184	**589**
Eclats laminaires	8		9	12		21	**29**
Lames	144		110	162	12	284	**428**
Total	**741**	**13**	**276**	**317**	**66**	**659**	**1413**

Tableau 3. Bacho Kiro, couche 11 : décompte général de l'industrie étudiée, et répartition de la retouche en fonction des supports.

montre que la série considérée contient la grande majorité des pièces les plus significatives d'un point de vue techno-typologique : nucléus, outils, lames brutes. Nous n'avons pas pris en compte les petits objets issus du tamisage, et qui n'avaient pas été extraits lors des études précédentes. Cependant, un bref regard sur quelques sacs de refus de tamis pris au hasard nous a permis de constater l'absence de contradiction avec les objets examinés. Nous considèrerons que ce matériel est représentatif de l'ensemble des vestiges lithiques recueillis dans cette couche lors de la fouille, et publiés dans la monographie.

L'ensemble lithique de la couche 11 nous semble homogène, tant d'un point de vue techno-typologique, qu'en ce qui concerne l'état de surface des pièces (patine, lustre et ébréchures des tranchants sont moyennement marqués).

Nous évoquerons ici surtout les aspects peu décrits dans la monographie (schémas de débitage par exemple) et ce que l'amélioration des connaissances nous permet de préciser (techniques de taille par exemple).

Le tableau 3 montre la structure générale de la série étudiée et la répartition de la retouche en fonction des supports.

3.1 - Schémas de débitage

Le premier caractère de cette série – sur lequel nous reviendrons - est l'importance de la réduction qu'a subie la très grande majorité des artefacts. La lecture technologique est ainsi considérablement gênée, particulièrement en ce qui concerne la reconstitution des schémas de débitage.

De plus, la quasi-absence de débitage sur place, et l'importation massive de supports déjà débités hors du site (dont on peut supposer qu'ils ont fait l'objet d'une sélection) sont des aspects qui expliquent la grande rareté des pièces "techniques". Ces dernières, souvent déchets de taille (crêtes, accidents divers), sont très informatives pour la reconstitution des méthodes de taille. C'est en particulier le cas de nucléus (n=13). Concernant ces derniers, on peut noter cependant les points suivants :

- Tous montrent des négatifs d'enlèvements détachés au percuteur dur ;
- Des treize pièces présentes, six sont sur éclat, et sept sur support indéterminé ;
- La morphologie générale de ces pièces est lenticulaire aplatie. Les surfaces de débitage sont implantées sur leur(s) face(s) large(s), et non leur tranche.
- Le schéma diacritique est dans cinq cas bipolaire, quatre cas unipolaire, et quatre cas indéterminable. Notons que deux pièces décrites et dessinées dans la monographie comme nucléus unipolaires (page 123, fig. 1) sont en fait dans un fragment distal de forte lame outrepassée, révélant l'exploitation bipolaire d'un bloc (n°1), et un éclat de réaménagement de surface de débitage, signant là aussi la gestion bipolaire du bloc concerné (n°2).

Au final, on avancera que la conception volumétrique dont sont issues ces pièces n'évoque en rien un débitage laminaire de type Paléolithique supérieur.

La très grande majorité des supports est fragmentée, particulièrement pour les objets de plus de 4-5 cm dans leur plus grande dimension initiale. Les planches de la monographie ne rendent pas bien comte de cet aspect, car seules les pièces s'intégrant bien dans la liste-type, donc bien souvent les plus complètes ont naturellement été dessinées. En fonction de leur morphologie générale, on peut distinguer deux grands types de supports : les éclats et les lames.

Autant que l'on puisse en juger (leur fragmentation étant un frein à l'analyse), les éclats de taille

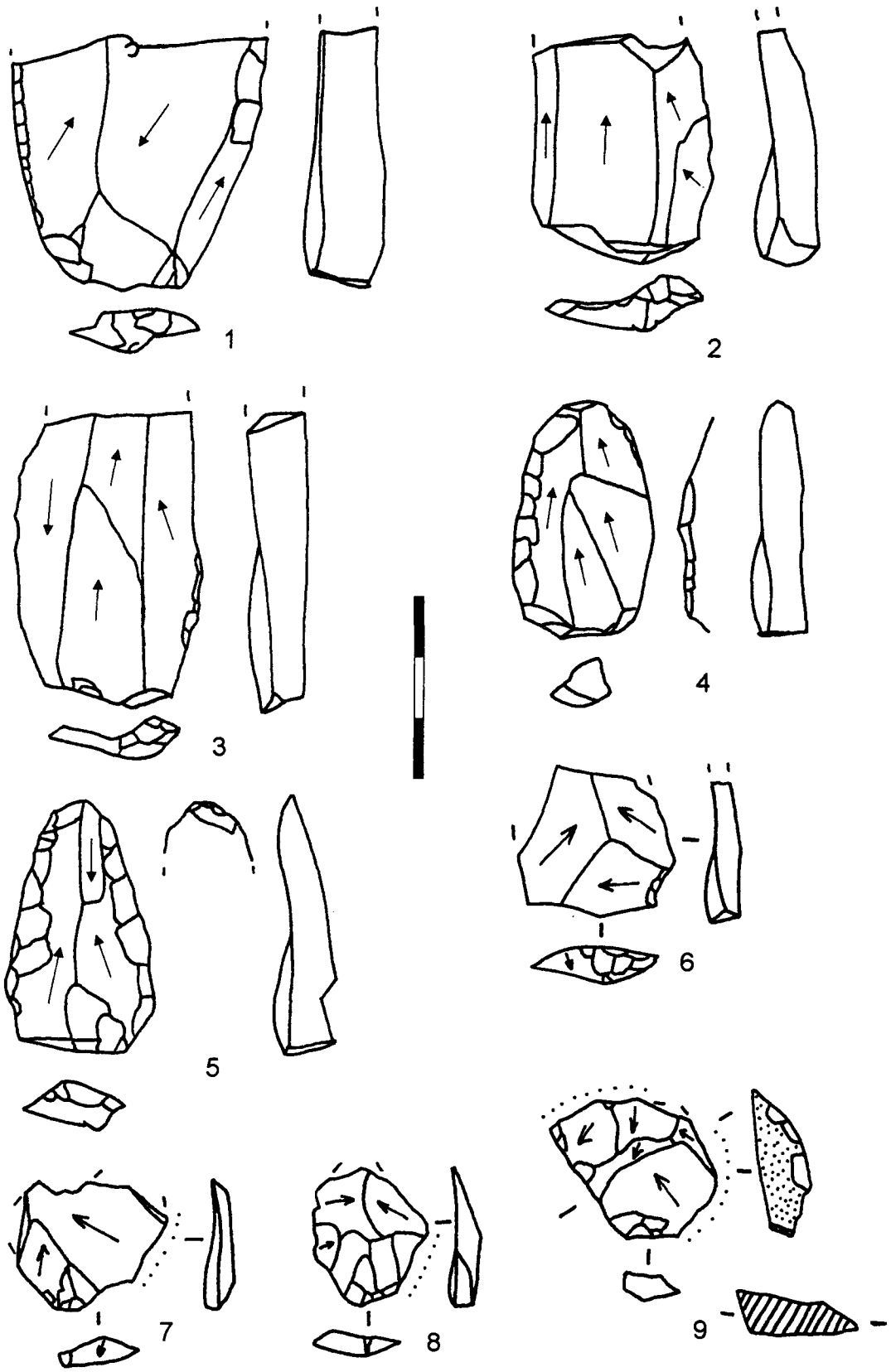

Figure 1. Bacho Kiro, couche 11 - 1-3. fragments de lame; 4. pièces retouchées; 5. pièce de type Kostienki; 6-9. petits éclats Levallois.

Schéma diacritique	nb éclats	%
Unipolaire	97	30,9%
Autre	74	23,6%
Centripète	55	17,5%
Bipolaire	53	17,9%
Convergent unipolaire	32	10,2%
Total	314	100,0%

Tableau 4. Bacho Kiro, couche 11 : schémas diacritiques des éclats.

Schéma diacritique des lames et éclats laminaires	nb lames et éclats laminaires	%
Unipolaire	170	38,2%
Parallèle	127	28,5%
Bipolaire	84	18,9%
Convergent unipolaire	28	6,3%
Centripète	36	8,0%
Total	445	100,0%

Tableau 5. Bacho Kiro, couche 11 : schémas diacritiques des lames et éclats laminaires.

Types de talon	Eclats	%
lisse	127	39,0%
facetté	78	23,8%
dièdre	45	13,7%
écrasé	40	12,2%
naturel	23	7,0%
linéaire	9	2,7%
punctiforme	5	1,5%
total	327	100,0%

Tableau 6. Bacho Kiro, couche 11 : types de talon des éclats.

grande à moyenne (plus de 3 cm) sont de morphologie variable, plutôt parallélépipédique, et montrent fréquemment une nette tendance à l'allongement (Fig. 1:4, 5). Les éclats de forme triangulaire sont rares. Les schémas diacritiques sont eux aussi variables (tableau 4). Il y a de nombreux éclats centripètes (Fig. 1:6-9) ou autres (traces d'aménagements latéraux : crêtes et enlèvements "débordants". Les talons sont majoritairement épais, lisses ou facettés (tableau 6), (Fig. 1:1-5). Parmi les petits éclats (entre 1,5 et 3 cm), on remarque une population de supports réguliers, de morphologie rectangulaire ou arrondie, à talon épais facetté et schéma diacritique centripète (Fig. 1:6-9).

On peut regrouper les lames en deux catégories :

• celles qui procèdent d'un débitage parallèle (uni-ou bipolaire), qui sont donc des lames au sens technologique du terme, regroupent 30,3% des supports (tableau 3). Parmi ces lames, 38,2% sont unipolaires (Fig. 1:2), tandis que 18,9% sont bipolaires (Fig. 1:3; fig 2:5; tableau 5). Il s'agit donc d'un débitage nettement bipolaire, surtout si l'on considère que la fragmentation des supports induit une importante sous-estimation de ce caractère.

• celles qui procèdent d'un débitage non parallèle unipolaire convergent ou qui montrent des traces d'aménagements de la surface de débitage représentent 14,3% des supports laminaires (tableau 5). Ces aménagements correspondent le plus souvent à des enlèvements centripètes, qui dénotent d'une surface de débitage assez plane, et large.

D'une façon générale, les lames ont un profil plutôt rectiligne, et une section plutôt aplatie. Ces deux caractères dénotent eux aussi d'une surface de débitage assez plane et large. Les talons facettés dominent pour les lames de fort gabarit (Fig. 1:1-3), tandis que les talons lisses sont dominants parmi les supports de petit gabarit (tableau 7).

La technique de détachement des supports est exclusivement la percussion directe au percuteur dur (tableau 8), et ce pour tous les types de supports. Les caractéristiques de la percussion directe sont plus nettes sur les éclats et les lames de forts gabarit : le talon est épais, le point d'impact nettement détouré, le bulbe marqué (Pélegrin, 2000). Pour les supports de petites dimensions, et notamment les petites lames, ces caractéristiques sont moins évidentes (d'où la présence de pièces de technique indéterminée), car la faible épaisseur des supports recherchés impose un geste plus tangentiel (moins rentrant). Il s'ensuit un certain nombre d'objets au bulbe peu marqué, parfois même proche d'une lèvre. En résumé, on peut dire qu'il n'existe aucune évidence d'une technique autre que la percussion directe au percuteur de pierre.

A l'issue de ces observations, un premier bilan sur les schémas peut-être proposé : l'ensemble des caractéristiques décrites évoque un débitage de type Levallois. Ce dernier est conduit selon plusieurs modalités, dont il n'est pas possible de savoir si elles sont exécutées sur les mêmes blocs (et donc mises en œuvre successivement) ou bien indépendamment les unes des autres.

La première de ces modalités est de type récurrent centripète, et a fourni des éclats de contour varié, mais non triangulaire. Ces éclats sont de taille très

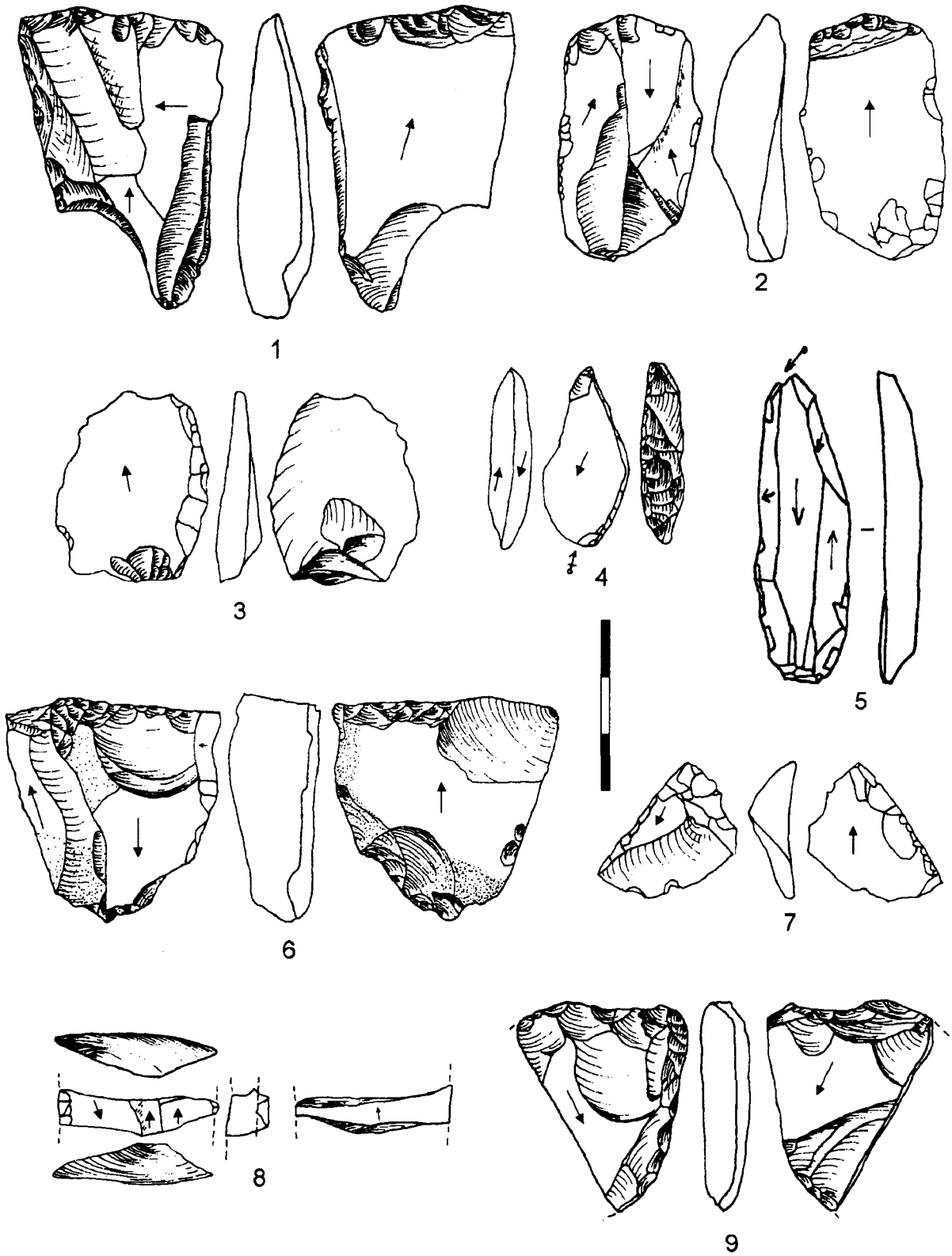

Figure 2. Bacho Kiro, couche 11 - 1, 2. pièces aménagées par la technique de Kostienki; 3. éclat de type Kombewa; 4. chute de burin plan; 5. lame; 6, 9. pièces ésquillées; 7. fragment d'outil; 8 fragment de lame.

Type de talon	Lame et éclats laminaires	%
Lisse	46	28,8%
Facetté	51	31,8%
Dièdre	15	9,3%
Linéaire	8	5,0%
Punctiforme	5	3,1%
Ecrasé	23	14,4%
Naturel	12	7,5%
Total	160	100,0%

Tableau 7. Bacho Kiro, couche 11 : types de talon des lames et éclats laminaires.

Type de support	Dur	Tendre?	Indét.
Chutes de burin	10		2
Eclats	250	2	39
Eclats laminaires	11		7
Indéterminés	66	1	11
Lames	105	3	41
Total	442	6	100

Tableau 8. Bacho Kiro, couche 11 : technique de percussion déduite de l'observation des supports débités.

variable, les plus petits étant de l'ordre de 1 cm de dimension maximale.

La seconde est de type unipolaire et surtout bipolaire. Elle a vocation de produire des lames moyennes à petites (à la limite des dimensions de lamelles).

3.2 - Retouche et redébitage

Au-delà d'une certaine dimension (autour de 3-4 cm), une grande partie des supports est retouchée. Nous employons ici le terme de retouche dans le sens d'une modification des supports, postérieurement à leur détachement. Ce type de modification recouvre de nombreuses modalités, qui n'ont peut-être pas toutes une vocation fonctionnelle. De manière générale, après avoir subi une retouche de type "classique", la plupart du temps directe (lames retouchées, grattoirs), les supports sont intentionnellement fracturés ou redébités selon des méthodes très diverses : selon la tranche des éclats et des lames supports (il s'agit alors de burins, au sens typologique du terme), selon la face supérieure après aménagement d'une troncature inverse (aménagements de type Kostienki, fig. 1:5 ; fig. 2:1, 2), ou encore selon la face inférieure (enlèvements de type Kombewa, fig. 2:3). 421 pièces sont concernées soit plus de 50% des outils. Tous les intermédiaires sont possibles (nombreux exemples de "chutes de burins plans", fig. 2:4). De plus, un grand nombre d'objets peut être classé dans les pièces esquillées (fig. 2:6, 9).

Cette intense réduction des supports (retouche, fractionnement, redébitage, esquillement) permet d'expliquer une grande partie de la variabilité typologique observée par Ginter et Kozłowski (1982).

Plus que le type technologique ou morphologique, c'est la dimension qui conditionne la présence de retouche, redébitage ou encore fractionnement des supports (fig. 2:7, 8). Les pièces plus petites échappent à ce traitement, et semblent dans bien des cas utilisées brutes.

En particulier, les tranchants des petits éclats Levallois ne sont pas retouchés, mais portent des ébréchures marquées (fig. 1:7-9).

3.3 - Un exemple sur la variabilité de l'expression typologique et son interprétation. Les lames appointées : des fragments de pointes moustériennes ?

Parmi les lames retouchées, la série contient de nombreuses lames et des lamelles à retouche directe bilatérale, appointante, interprétées comme des lames appointées et des lamelles de Font-Yves (*ibid.* : 133-134). Or, aucun de ces objets n'est entier (fig. 3:2-11). Par contre, il existe quelques pointes moustériennes entières, alors considérées comme intrusives (*ibid.* : 138, planche X, n°12 et 13, et ce travail, fig. 3:1). Ces observations, et les caractéristiques générales des supports concernés nous conduisent à considérer que ces pièces (les "fragments de lames appointées") sont en réalité des fragments distaux de pointes moustériennes. Ces dernières sont fracturées intentionnellement pour la plupart (fig. 3:1-11).

3.4 - Synthèse de l'analyse

La quasi-absence des premières phases de la chaîne opératoire, ainsi que des déchets et accidents de taille sur le gisement, impose une certaine prudence quand au diagnostic technologique. Cependant, l'ensemble des caractères relevés lors de l'analyse de cette série dénote d'une certaine unité : le concept de débitage des supports massivement importés sur le site est Levallois, selon deux schémas distincts, uni-et bipolaire d'une part, et récurrent centripète d'autre part. Les supports importés – éclats et lames – sont ensuite, pour les plus grands, souvent retouchés (grattoirs et pièces retouchées très variées) et ensuite intensément fractu-

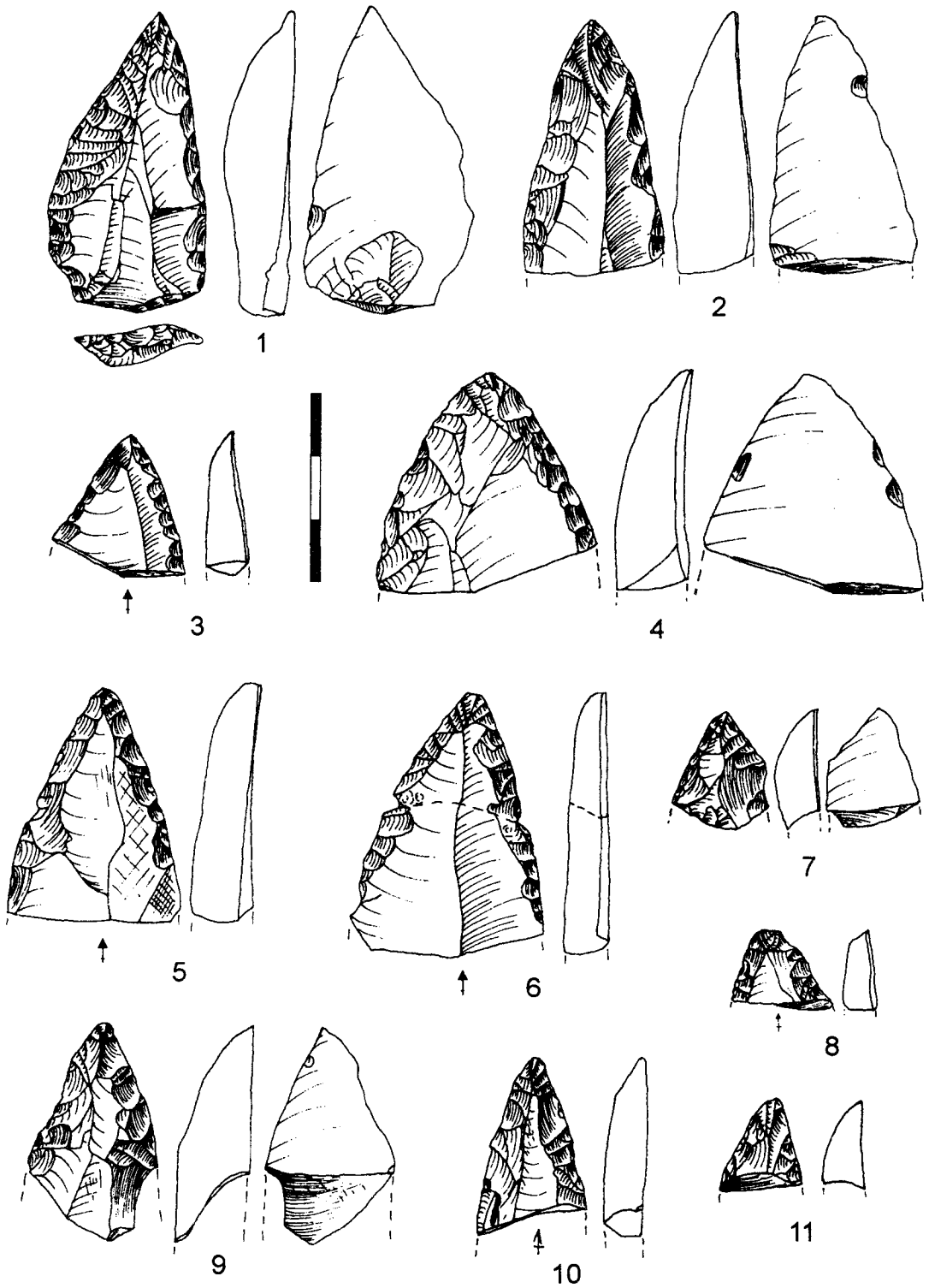

Figure 3. Bacho Kiro, couche 11 - 1. pointe moustérienne; 2-11. fragments de pointes moustériennes.

rés, redébités, et utilisés en tant que pièces intermédiaires (pièces esquillées). Le redébitage recouvre une grande variété de méthodes : Kombewa, Kostienki, burin, et tous les intermédiaires sont présents, tant en termes de conception volumétrique et de morphologie des produits obtenus. Les supports les plus petits (éclats et lames aux limites dimensionnelles des lamelles) semblent utilisés bruts.

4 - Discussion

Compte-tenu de ces résultats, les critères nous permettant d'attribuer cette industrie au Paléolithique moyen sont les suivants :

- Le débitage est de type Levallois.
- La technique de détachement des supports recherchés est systématiquement la percussion directe au percuteur de pierre.
- Les types d'outils les plus nets sont les pointes moustériennes (rares parce que presque systématiquement fracturées). Les autres types d'outils (grattoirs ou burins par exemple) ne sont pas clairement identifiables, mais s'inscrivent dans une variabilité très forte.
- La présence de débitage de type Kombewa.

Les critères qui nous permettent un rapprochement de cette industrie avec le Paléolithique supérieur sont les suivants :

- Le choix d'un silex, matière première d'origine non locale, et non des roches d'origine diverse se trouvant dans l'environnement proche.
- Certains types d'outils se rencontrent selon une fréquence qui n'est pas très habituelle pour le Paléolithique moyen (grattoirs, burins, pièces esquillées).
- La volonté d'obtenir des supports d'une grande régularité, et légers, s'exprime tant par la laminarité et le leptolithisme, que par la segmentation spatiale de la chaîne opératoire (importance de la phase de sélection des supports).

5 - Conclusion

L'association de l'ensemble de ces caractères n'est pas à mettre sur le compte de mélanges, car ils sont associés sur les mêmes objets, et s'organisent selon un système cohérent. Si d'un point de vue des traditions techniques, cette industrie nous semble appartenir au Paléolithique moyen, elle semble tout à la fois être la trace de groupes engagés dans des comportements techno-économiques généralement attribués au Paléolithique supérieur. En ce sens, il nous semble que cette industrie puisse être qualifiée de transitionnelle, et rapprochée de complexes tels le Bohunicien en Europe centrale, (Svoboda, 1990) ou encore les industries de Boker Tachtit en Israël (Marks & Reid Ferring, 1988; Marks, 1983), Ksar Aqil au Liban (Azoury, 1986), Üçağizli cave en Turquie (Kuhn, 2002 ; Kuhn *et al.*, 1999). En l'attente de comparaisons plus poussées, l'appellation de Bachokirien pour cette industrie nous semble la plus adaptée. En revanche, la couche 11 de Bacho Kiro ne peut plus, à notre avis, être qualifiée de trace d'une origine possible de l'Aurignacien, car les principales caractéristiques de ce technocomplexe, tant dans son faciès méditerranéen qu'atlantique (Bon & Bodu, 2002), ne se retrouvent pas ici (percussion directe au percuteur tendre, organisation volumétrique du débitage, importance du débitage lamellaire, unipolarité...). On ne peut donc plus, à notre avis, considérer la couche 11 de Bacho Kiro comme un élément de la diffusion de l'Aurignacien en Europe, mais plutôt comme la trace de transformations graduelles qui, partout en Europe, semblent provenir du substrat moustérien.

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FUNCTIONAL ANALYSIS OF THE MICROGRAVETTIAN POINTS AND BACKED BLADELETS OF STILLFRIED/*STEINSCHLÄGERATELIER* - PRELIMINARY RESULTS

Monika DERNDARSKY*

Abstract

This study deals with the functional analysis of the microgravettian points and the backed bladelets from Stillfried/*Steinschlägeratelier*. This site has been regarded as a flintknapper's workshop. The analysis showed that microgravettian points had been used as projectile points and borers, while a few others seem to be unfinished.

1 - Introduction

The Palaeolithic site Stillfried/*Steinschlägeratelier* has always been regarded as the remains of a flintknapper's workshop, producing mainly microgravettian points. In this study I intend to investigate whether this interpretation of the function of the site can be supported or refused by the use-wear analysis of the (micro-)Gravettian points and backed bladelets. General aspects regarding the composition of the finds will also be taken into account.

2 - The Site

2.1 - The excavations

The site is situated on a promontory near the western shore of the river March. The "flintknapper's workshop" was found during the excavations by F. Felgenhauer of the so-called "Westwall", a part of a Late Bronze Age fortification, which was reused in the Iron Age, Roman and Mediaeval times. Stray finds from the Neolithic and Bronze age were also found during the excavation of the Westwall. The Palaeolithic layer was situated just below the upper edge of the loess horizon. The find horizon was ca. 20 cm thick. It was excavated in 1974, 1975, 1977 and 1979. This layer was excavated with trowels and finer tools, the sediment was not sieved. The area of the Palaeolithic site excavated covered ca. 40m². The limits of the settlement area to the east and north were found, but not those to the south and west (Felgenhauer 1980). To the west the Palaeolithic layer had been destroyed by the ditch of the Late Bronze Age fortification. Further to the west, lithic artefacts were, however, found on the surface (pers. comm. W. Antl). Thus, the real size of the Palaeolithic site cannot be estimated. It is possible that only the edge of the site has been excavated. A real "cultural layer", hearths and concentrations of animal bones were not found in the excavated area.

2.2 - F. Felgenhauer's arguments for the interpretation of the site as a flintknapper's workshop specialising in the production of microgravettian points

- The lack of a cultural layer, hearths and bone accumulations
- A large quantity of lithic artefacts
- The high percentage of microgravettian points relative to a low number of scrapers, burins, etc.

He argued that a large number of microgravettian points were broken during production and that others were lost. He did not regard any microgravettian points as having been used.

3 - The lithic find material

The publication by F. Felgenhauer (1980) con-

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centrated on the possible production of microgravettian points and a more general study of other tool types. Because of the limited information so far published, I briefly studied the complete lithic find material to gain an overview of the context in which the microgravettian points and backed bladelets were found. A few of the artefacts from the original publication seem to be missing. Also, some artefacts found in other parts of the Westwall, which the excavator thought to derive from the "flintknapper's workshop", but to be in secondary deposition, are included in the find material and could not now be excluded. The results concerning the general assemblage are thus to be regarded as preliminary.

3.1 - The quantity and size of the artefacts

During this analysis, 1086 artefacts could be ascribed to the site, i.e. an average of only ca. 27 artefacts per m². Among these 18 cores, 20 crested blades/bladelets/flakes were present as well as 9 burin spalls. 131 artefacts showed retouches and/or burin negatives. Most artefacts are rather small (Tab. 1), the lithic material consists mainly of blade and flake fragments. Also, a considerable number of spalls were found.

Most retouched artefacts (Tab. 2) are also narrow, which shows that bladelets or narrow blades were the main blanks used for modifications. The broader blanks were used for producing scrapers and burins.

Length/ width	≤ 10 mm	≤ 20 mm	≤ 30 mm	≤ 40 mm	≤ 50 mm	Σ
≤ 10 mm	234	59	2	-	-	295
≤ 20 mm	206	143	21	-	-	370
≤ 30 mm	62	77	20	5	-	164
≤ 40 mm	16	30	13	4	1	64
≤ 50 mm	4	18	6	-	-	28
≤ 60 mm	5	1	3	1	-	10
≤ 70 mm	-	2	1	-	-	3
≤ 80 mm	-	-	1	-	-	1
≤ 90 mm	-	-	-	1	-	1
≤ 100 mm	-	-	1	-	-	1
Σ	527	330	68	11	1	937

Table 1. Size of the unretouched artefacts (except the cores).

Length/ width	≤ 10 mm	≤ 20 mm	≤ 30 mm	≤ 40 mm	Σ
≤ 10 mm	10	-	-	-	10
≤ 20 mm	27	6	3	-	36
≤ 30 mm	28	8	2	1	39
≤ 40 mm	15	7	3	2	27
≤ 50 mm	5	3	2	-	10
≤ 60 mm	1	2	4	1	8
≤ 70 mm	-	1	-	-	1
Σ	86	27	14	4	131

Table 2. Size of the retouched artefacts.

Available artefacts	Complete	Proximal	Medial	Distal	Σ
Micro-/Gravettian points	15	14	-	2	31
Backed bladelets	3	1	2	2	8
Not classifiable	1	23	7	4	35
Σ	19	38	9	8	74

Table 3. Preservation of the examined backed tools.

3.2 - Raw material of the lithic artefacts

The raw material used at the site consisted mainly of several different varieties of red and green radiolarian cherts. Other cherts and chalcedony occur more rarely, but a dozen or more artefacts of each of the raw materials were found. It cannot be determined whether some of the raw materials have been imported as finished tools, with the exception of one scraper which has been made from an unknown chert. Otherwise, the most likely candidate for import as finished tools is a usually white patinated, yellow chalcedony, which might have been knapped elsewhere. The microgravettian points and the backed bladelets were mostly made of radiolarite, but 10 pieces were made of white patinated chalcedony or flint. This is a rather high number, considering that only ca. 40 artefacts made of these raw materials were found at the site. This can easily be explained by the high quality of the raw materials, but could indicate that some of the microgravettian points were imported to the site.

4 - Analysis of the Gravettian points

4.1 - Morphological analysis

Quantity and preservation of the Gravettian points

The classification of the microgravettian points and backed bladelets can be seen in Tab. 3. Three additional microgravettian points and a fragment published by F. Felgenhauer (1980) were not currently available. As Gravettian points do not only have a point but also often a rounded, and also ventrally retouched base (Bosinski 1987: 34), it was possible to distinguish even some of the proximal fragments.

The high number of the proximal fragments compared with the distal fragments indicates that these artefacts might have been used elsewhere and that only the proximal fragments might have returned to the site within a haft. The low number of complete Gravettian points does not permit the recognition of a bimodal distribution in microgravettian and Gravettian points. The size of most backed points is between 20 and 45 mm (Fig. 1), thus they are nearly exclusively microgravettian points. The size of the proximal fragments is mainly between 10 and 30 mm, which might be the part covered by their hafts.

4.2 - Use wear analysis

Method

All microgravettian points and backed bladelets as well as the fragments were inspected under a low power microscope (Wild M3Z, magnification 6.5-40X). Selected pieces were also examined with an incident light microscope (Wild Metallux 3, 100X and 200X magnification used). The tools were cleaned with water and a mild detergent. The photos taken under low magnification were scanned and

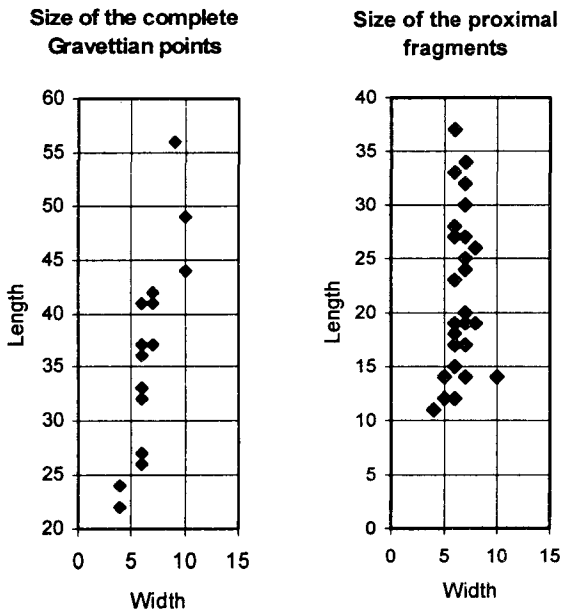

Figure 1. Size of the complete Microgravettian points and of the proximal fragments (in mm).

thereafter processed with Adobe Photoshop 5.0, i.e. I substituted black for the background, modified brightness and contrast to improve the visibility of the features in the images and added a scale-bar.

Preservation of the artefacts

At Stillfried/*Steinschlägeratelier* mostly radiolarian cherts were found, which do not patinate to the same extent as flint (Kozłowski & Pawlikowski 1989). Thus, these artefacts looked fresh, except some green radiolarites, which are lightly patinated, and some weathered, i.e. paler looking (cf. Bäsemann 1987), red radiolarites. Many of the rare flint and chalcedony artefacts, however, displayed heavy white patination. Microscopically, intensive sediment polish, which does not allow distinguishing use on soft, non-abrasive materials, could frequently be detected also on artefacts made of radiolarian chert. In addition, some bright spots occurred, which is especially irritating since radiolarian cherts often acquire only a few polished spots during use situations experimentally (Derndarsky 2001). The dorsal ridges of most artefacts were only slightly rounded, which indicates that the artefacts were only exposed to minor mechanical processes in the soil. The more intensive rounding of some tools might be due to a softer raw material or to more handling of these artefacts.

Possible use of Gravettian points

Unused and broken or lost already during production

According to M. O'Farrell (1997: 73) indications that Gravettian points might be broken or lost already during production are the frequent occurrence of Hertzian cone fractures and unfinished retouch. At Stillfried/*Steinschlägeratelier* most fractures on the microgravettian points and the fragments are bending fractures. Nearly all artefacts have a completely retouched back, only on 5 pieces does the retouch seem to be unfinished. Thus, most microgravettian points here do not seem to derive from this part of the chaîne opératoire. Still, the high number of narrow retouched and unretouched artefacts (Tab. 1-2) might indicate more preparatory work for the production of microgravettian points and backed bladelets.

Gravettian points as projectiles

On 8 artefacts the point or the remaining most distal part was damaged in a way, which indicates impact damage (cf. e.g. Geneste & Plisson 1993; Dockall 1997; Soriano 1998). This includes large step/hinge fractures initiated directly at the tip (Fig. 2a), bending fractures with fluting (Fig. 2b) and burination (Fig. 2c). A number of artefacts used as projectiles might also be hidden among the Gravettian points without visible damage since it has been proved by experiments that not all projectile points get damaged on the impact (cf. e.g. Fischer *et al.* 1984: 27; Odell & Cowan 1986). Even bending fractures might be result of impact but they might also derive from other modes of use as well as from trampling, handling, etc. Another indication for the use of the microgravettian points as projectiles is the high number of proximal fragments compared with distal fragments. It might

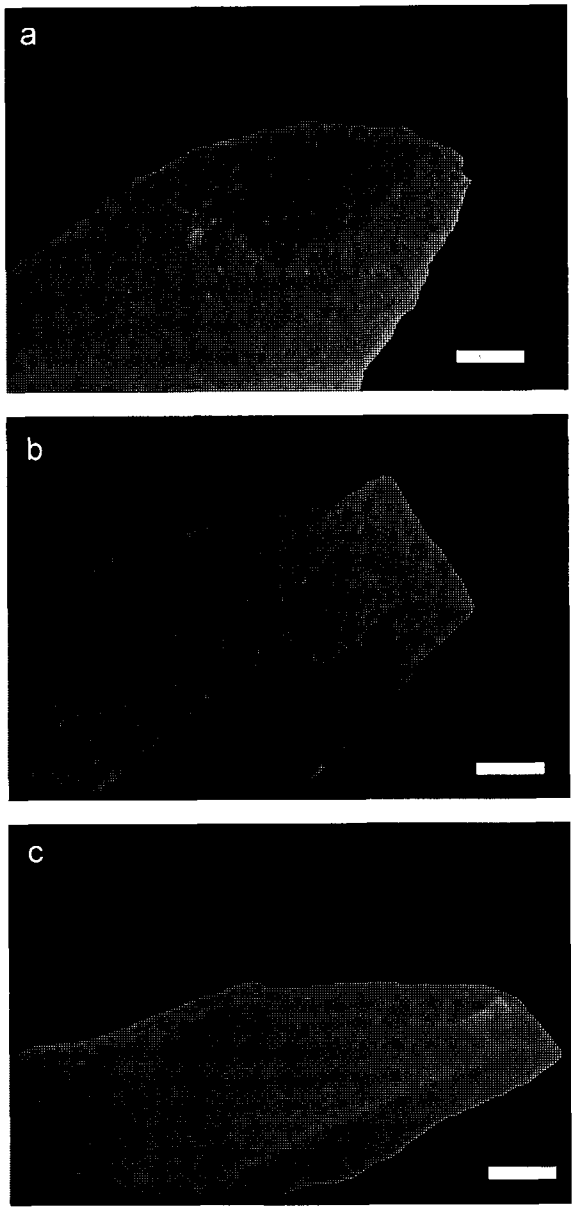

Figure 2. a. Impact scar on Microgravettian point; b. Bending fracture with fluting tip on Microgravettian point; c. Burination on Microgravettian point (Magn.: 25X, scale bar: 1mm).

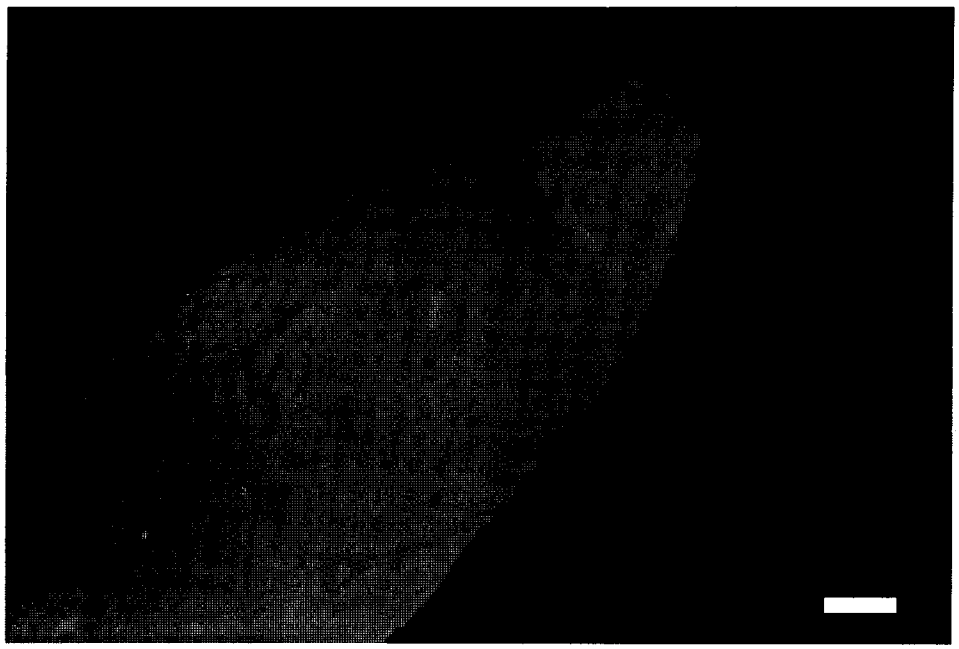

Figure 3. Ventral aspect of Microgravettian point with dorsal retouch on both lateral edges (Magn.: 16X, scale bar: 1mm).

also be argued that the broken tips were not found since they were smaller than the proximal fragments. However, the repeated occurrence of a smaller size of distal fragments than proximal ones still would indicate that the distal part was broken during use (perhaps as borers) and not during production.

Gravettian points as borers

Three artefacts displayed scarring at the distal end (Fig. 3), which might be attributed to boring activities. All of them had a lateral retouch near the point on both edges on the dorsal aspect. The other artefacts with this type of retouch did not display clear use-wear traces.

Gravettian points as knives

Use-wear analyses of artefact samples from Southern France proved that Gravettian points were used as knives (O'Farrell 1997: 44). However, since the microgravettian points and backed bladelets found at Stillfried/*Steinschlägeratelier* are much smaller, they would have been suited only for light cutting duties. Such cutting activities result merely in some edge scarring and slight polishing, which is hard to distinguish from post-depositional traces on archaeological artefacts. A few pieces exhibited edge scarring and polished spots (Fig. 4), which might be ascribed to cutting activities. Still, these artefacts do not necessarily have to be interpreted as knives; the damage might derive from having been used as inserts in the side of arrow shafts.

Resharpened Gravettian points

According to P. Kelterborn (2000) indications for resharpened arrowheads are bends or shifts in the edge outline as well as an impact fracture, which can still be seen under new retouches. Even though a change in the edge outline could be seen on a microgravettian point with a broken tip, it has to be considered that these observations relate to bifacially retouched pieces. On a small artefact with a simple retouch such a shift or bend in the edge outline might just be a coincidence.

5 - Other functional analyses

*5.1 - Larger artefacts at Stillfried/*Steinschlägeratelier

A sample of larger retouched artefacts and unmodified blanks was also selected for use-wear analysis. Clear use-wear traces could be detected on several retouched pieces and burins, which indicates that also larger artefacts were not only produced at the site.

5.2 - (Micro-)Gravettian points at other sites

In recent years several morphological and

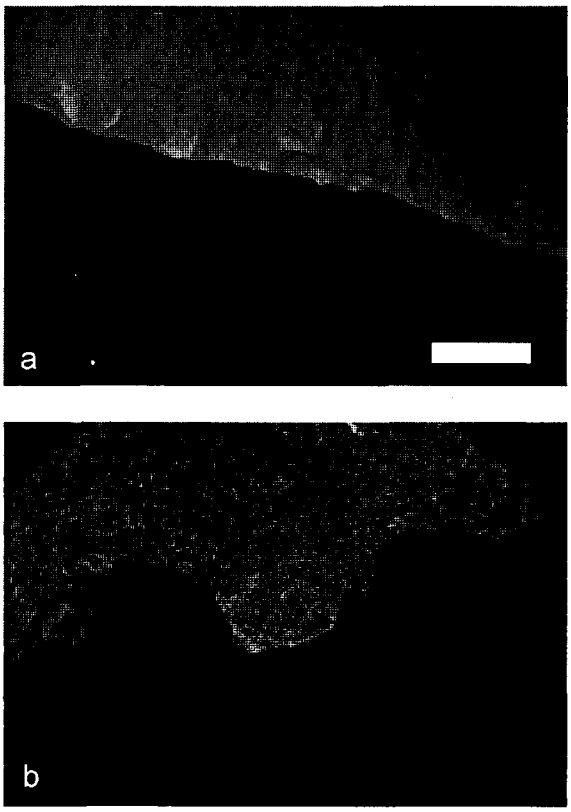

Figure 4. a. Edge scarring on backed bladelet (Magn.: 40X, scale bar: 1 mm); b. Same tool, slightly polished areas at the edge and edges of the scars (Magn.: 100X).

functional analyses of micro-/Gravettian points have been conducted (e.g. O'Farrell 1997; Soriano 1998; Borgia 2003). At the Perigordian site Rabier à Lanquais (Dordogne) many fragments of microgravettian points as well as some complete pieces were found. The proximal fragments were the most frequent, but the difference between the number of proximal, medial and distal fragments was much smaller than in Stillfried/*Steinschlägeratelier*. Impact fractures were frequently detected (Soriano 1998). M. O'Farrell (1997) analysed the Gravettian points of Corbiac (Dordogne) and stated that a part of the Gravettian points had been used as projectiles but that production of the tools was an important activity at the site, too. Gravettian and microgravettian points from different archaeological layers in Willendorf showed wear traces indicating their use as projectiles (Gurova 1998). At Temnata Cave the Gravettian points were used especially as arrow heads, but also for other activities. A few micropoints, among them a microgravettian point with retouch on both lateral edges, as well as a Gravettian point were used for piercing hide (Giourova & Schtchelinski 1994).

6 - Conclusions of the artefact use at Stillfried/Steinschlägeratelier

- Many of the microgravettian points at the site have probably been used.
- Edge damage indicates the use of microgravettian points as projectiles and borers.
- The high number of proximal fragments compared with the low number of distal fragments also indicates a probable use as projectiles.
- Larger tools have also been used.
- Still, there seems to have been little use and handling of the general assemblage to judge from to the rather fresh looking edges and ridges.
- Flintknapping was likely to have taken place at the site because of the numerous spalls and fragmented pieces.
- The modes of use of the microgravettian points and the association of used tools with tool production resemble the situation at other sites.

Thus, the interpretation of the function of the site can be modified to suggest that flintknapping took place but it was probably not the only activity at the site. Possibly tools were repaired and the microgravettian points found at the site replaced.

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MATIÈRES PREMIÈRES ET TRACÉOLOGIE : TRAJECTOIRES IMPLICITES

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L'étude des matières premières est une partie inhérente et inséparable des recherches sur les industries lithiques. On aborde inévitablement ce problème quelles que soient les intentions générales et les objectifs concrets de nos démarches spécialisées. On l'aborde en réussissant parfois à élucider certains aspects, mais on n'est presque jamais capable d'épuiser le sujet des matières premières et de mettre en évidence la variété de ses circonstances contextuelles et de ses implications cognitives. Actuellement, on n'imagine guère une recherche approfondie sur les industries lithiques limitée dans un cadre traditionnellement typologique et descriptif sans une approche technologique plus au moins adaptée, sans une tentative d'approcher l'économie et la circulation des matières premières, sans une analyse fonctionnelle des artefacts en pierre. Il s'agit de tenter, autant que possible, de restituer la chaîne opératoire – une notion sacralisée indispensable, héritée de Leroi-Gourhan.

L'économie des matières premières est liée tout d'abord à des conditions, y compris des restrictions, paleoenvironnementales et au degré d'adaptation des populations à ces conditions. Une fois les matières premières présentes sur le site, sous la forme de produits primaires ou déjà taillés, elles s'inscrivent dans le cercle 'domestique' du fonctionnement de site : débitage suivi par la fabrication des outils ou utilisation directe. La question la plus intéressante à mon avis est lequel de ces cas de figure est le plus influencé par la nature et la qualité des matières premières? Aucune réponse définie et commune ne peut être apportée, seulement une variété de cas particuliers.

Chaque site possède sa propre histoire et un réseau de relations caractéristiques. A propos des rapports entre matières premières et technologie lithique, les travaux expérimentaux sur la technologie mettent notamment en évidence que dans la taille de silex de bonne qualité par exemple, il existe des démarches sophistiquées et très difficiles à reproduire même par les tailleurs expérimentés. La même constatation est valable pour le façonnage de certaine types d'outils, comme les pointes foliacées de Volgu. En même temps, il y a des assemblages dont les stratégies technologiques et les répertoires typologiques montrent peu d'investissement malgré les qualités mécaniques des matières lithiques disponibles et les capacités potentielles de leurs explorateurs. Pour ma part, la thèse d'un choix intentionnel et préférentiel des tailleurs préhistorique vis-à-vis des matières premières reste équivoque sauf s'il s'agit d'objets d'échange ou de valeur spéciale (bien de prestige) et/ou sacrée. Même d'un point de vue théorique, l'équilibre entre la disponibilité d'une matière première quelconque, la maîtrise de ces aptitudes et la nécessité/restriction d'application de savoir-faire technologique assez élaboré semble d'être fragile et insaisissable.

La résolution de tous les problèmes mentionnés ci-dessus implique comme condition la connaissance des matières premières. Dans quelle mesure cela existe-t-il dans l'archéologie préhistorique bulgare?

La question qui repose sur la localisation des gîtes de provenance de silex et leur exploitation éventuelle est partiellement concernée et élucidée, surtout du point de vue des propriétés chimiques et minéralogiques des types de silex, y compris les remarques sur leurs aptitudes de clivage et de taille (Кънчев 1978; Кънчев, Начев, Ковнурко 1981). Il n'existe malheureusement pas de base de données référentielle universelle et disponible, qui permettrait l'identification certaine des types de silex et de leurs gisements d'origine. Pour cette raison, les possibilités des chercheurs d'opérer avec les matières premières comme une source d'information fiable et nécessaires sont assez limitées. Normalement chacun possède une collection référentielle des types de silex présents sur le site étudié, mais personne ne s'engage à réunir et uniformiser ces collections afin de créer une seule collection référentielle permanente. Ce qui existe dans la littérature spécialisée, ce sont les listes descriptives des types de silex, établie par les archéologues sur la base de critères

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macroscopiques (texture, granulométrie, couleur, clivage), ou les descriptions plus professionnelles faites par les minéralogistes. Dans ce cadre, des travaux ont été accomplis sur certains sites paléolithiques - la grotte Temnata (Pawlikowski 1992) et les sites de plain air dans les Rhodopes (Иванова, под печат). Récemment il y a eu un intérêt saisissable portés aux études sur les industries lithiques des séquences holocènes (du Néolithique jusqu'à l'âge de Bronze) provenant des sites de la Bulgarie et également de la Turquie - la Thrace turque, la région de Marmara et de Troade (Гюрова 2001a-в; Gatsov 1998, 2001; Gurova 1997, 2001, 2002a-b; Sirakov & Tsonev 1995, 2001). Quoiqu'il en soit, l'issue optimale - la reconstitution de la chaîne opératoire avec ses étapes successives dès la localisation des gisements de provenance des matières premières, à travers les modalités de leur approvisionnement (l'extraction de blocs et de nodules en silex et les voies de leur circulation), jusqu'à leur mise en place sur le site pour qu'ils soient taillés et que les produits de débitage soient façonnés, usités et rejetés - une telle issue reste toujours désirable, mais un peu fantaisiste pour les chercheurs bulgares. Je vois ici une ressemblance avec l'état des recherches lithiques en Autriche, décrit par Monica Derndarsky (Derndarsky 2001). Ce qui est sûr c'est le fait que l'issue optimale dont je viens de parler exige une démarche pluridisciplinaire et solide, assurant des données et des résultats envisagés et voulus.

A part son objectif spécifique et précis, l'identification des fonctions des instruments lithiques, la tracéologie, elle aussi s'intéresse aux matières premières. Dans quelle mesure leur nature et leurs comportements mécaniques peuvent influencer d'un côté la sélection éventuelle d'un outillage en vue d'une utilisation précise et d'un autre côté le développement et l'identification des traces d'usure. Parfois ces relations sont approchables par l'intermédiaire de la typologie : la corrélation typologie/fonction est toujours actuelle et toujours assez banale. Le fait qu'un répertoire typologique assez riche et varié peut correspondre à une application fonctionnelle assez limitée et monotone cherche à trouver une cause et une explication. Parfois les questions sont directement posées : quel est le rôle du quartzite sur un site, où se procurer des silex de bonne qualité; quel domaine fonctionnel peut être réservé pour l'obsidienne, s'il y en a, et également pour le silex qui est plus résistant; quels sont les priorités de l'homme préhistorique pour choisir tel ou tel type de matière première afin d'effectuer un travail concret? Je me heurte à de pareilles questions au cours de mes recherches sur les assemblages lithiques de Kovacevo (Néolithique ancien bulgare) qui comportent une industrie importante en quartzite, et sur les assemblages d'Ilipinar et de Mentese (Néolithique ancien anatolien), dont une partie minime des pièces lithiques est en obsidienne.

Les expérimentations dans le domaine de la tracéologie amènent à révéler d'un côté l'efficacité des outils (en fonction de la matière dans laquelle ils sont façonnés) et d'un autre côté le lien entre les propriétés des matières premières et les microtraces d'usure dues au contact avec les différents matériaux traités. Il existe déjà une base de données empirique assez riche sur l'utilisation des outils en silex, quartz, obsidienne, roches à grains grossiers (Astruc *et al.* 2001; Beyries 1985; Derndarsky, Ocklind 2001; Gassin 1996; Hurcombe 1992; Knutsson 1988; Plisson 1985; Rodriguez 1998; Sussmann 1985). J'ai participé cet été à un programme d'expérimentation sur la moisson à l'aide des outils en silex et en obsidienne, mené par Dr. L. Astruc (Paris, Nanterre). Ce programme fait partie d'un projet qui porte sur la nature des matières premières en relation avec leur réaction différenciée à l'usure. Le projet est inspiré de l'étude approfondie sur les outillages du site précéramique de Khirokitia à Chypre et tente de mettre en évidence la distinction tracéologique précise parmi les artefacts usités en silex et en obsidienne (Astruc 2002). L'importance d'un tel sujet de recherche est incontestable, étant donné la présence des outillages en obsidienne du Néolithique précéramique et céramique en Anatolie et à Chypre, des zones étroitement liées à l'exode de la Néolithisation vers l'Europe.

Un de mes intérêts se concentre particulièrement sur la néolithisation des Balkans et de l'Anatolie du Nord-Ouest à travers les trajectoires, les étapes et le mode de diffusion de la nouvelle stratégie de subsistance. Malgré le fait que le débat sur la néolithisation s'enrichisse continuellement de nouveaux scénarios, beaucoup de morceaux de cette mosaïque sont et, probablement, resteront énigmatiques. Dans mes recherches, je fais toujours très attention à l'*instumentarium* lié à l'agriculture et la récolte, parce que je le considère comme un critère comparatif assez durable et fiable.

L'analyse tracéologique des matériels présentés ci-dessous a été effectuée à l'aide des microscopes MBS 10 (x 100) et METAM P1 (x 500). Les microphotos ont été prises avec un appareil WILD MPS 51; leur grossissement est de 100x.

Dans le contexte de la néolithisation, j'ai étudié des assemblages en silex du Néolithique ancien des Tells Karanovo, Azmak, Kapitan Dimitrievo et du site de Kovacevo (Bulgarie du sud), ainsi que des sites d'Ilipinar et de Mentese, deux villages anciens d'agriculteurs en Anatolie nord-occidentale. En bref, ce qui mérite d'être noté sont les constatations suivantes :

* Dès le début du Néolithique ancien, les attributs généraux du 'bagage néolithique' (ou '*Neolithic package*') sont présents sur les sites étudiés : il s'agit tant des espèces végétales cultivées – les taxons de

Cerealia et *Leguminosae* - que des espèces animales domestiquées;

* Parmi les artefacts en silex utilisés, il y a une quantité significative d'éléments de faucille dont la partie prédominante consiste en armatures aux polis en diagonale, suggérant l'insertion oblique dans un manche courbé. Ces stigmates d'emmanchement sont caractéristiques pour la faucille bien connue de 'type Karanovo' (ce terme n'a qu'une signification typologique). A ce propos, les procédés de façonnage et les gestes d'utilisation de cette faucille sont assez proches de ceux de la faucille de Hacilar - couche VI (Fig.1). Les armatures de faucille possédant des polis parallèles aux tranchants sont très rares. Au sein des assemblages bulgares, les éléments de faucille consistent surtout en lames retouchées, suivies par les lames brutes, tandis que parmi les inventaires d'Ilipinar et de Mentese, seules des lames brutes ont été utilisées pour cette fonction (Fig. 2). Malgré la nature différente de matières premières (consistant surtout en silex), les stigmates d'usure, la trame, la texture et la microtopographie du poli (toujours brillant) et la striation parfois associée, sont indubitablement liées à la coupe des céréales.

* En ce qui concerne le répertoire typologique des outillages étudiés, on peut constater une différence bien marquée par les types prédominants suivants : grandes lames aux retouches abruptes à Karanovo et Azmak ; robustes grattoirs sur éclats à Ilipinar; lames retouchées et perçoirs de très petites dimensions à Kovacevo, etc. La culture du Néolithique ancien bulgare, nommée 'Karanovo I' se caractérise par la technologie de production de grandes lames (traditionnellement interprétées comme un héritage anatolien), façonnées par des retouches latérales abruptes. Une telle stratégie technologique s'étend sur une partie du

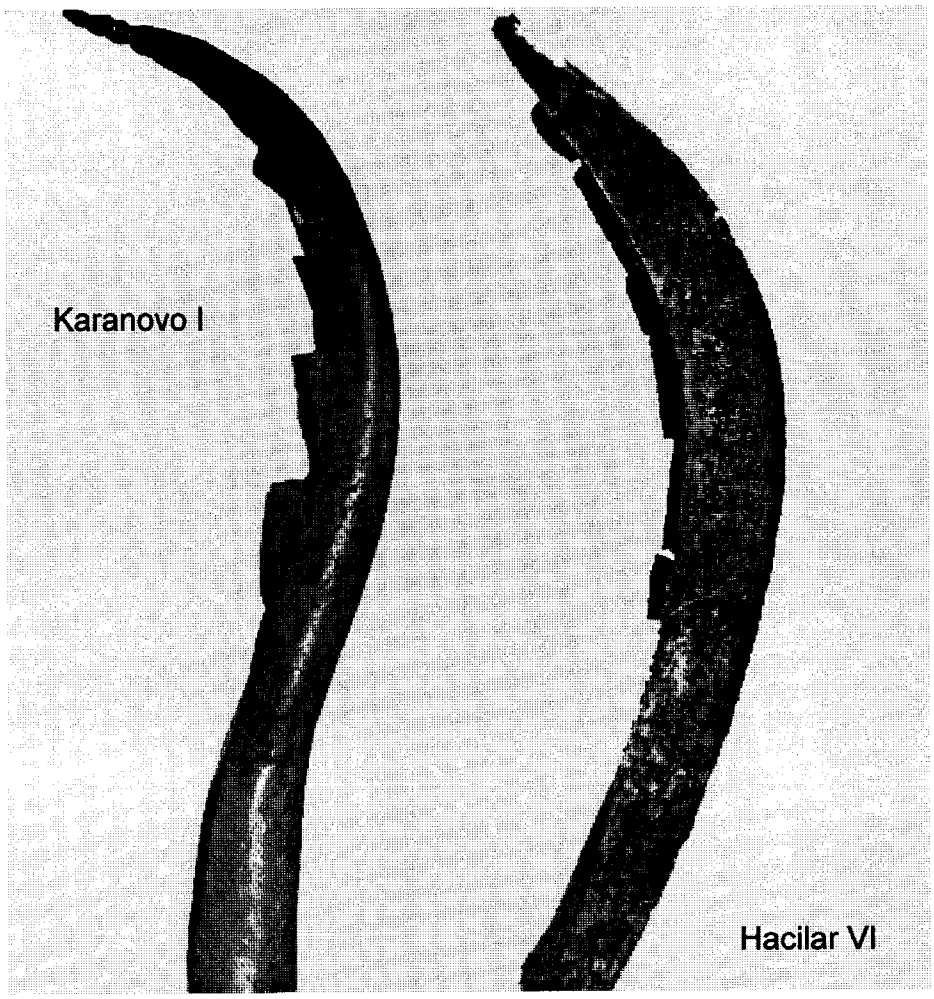

Figure 1. Faucilles préhistoriques de Karanovo I (fouilles G. Georgiev) et de Hacilar VI (fouilles A. Mellaart).

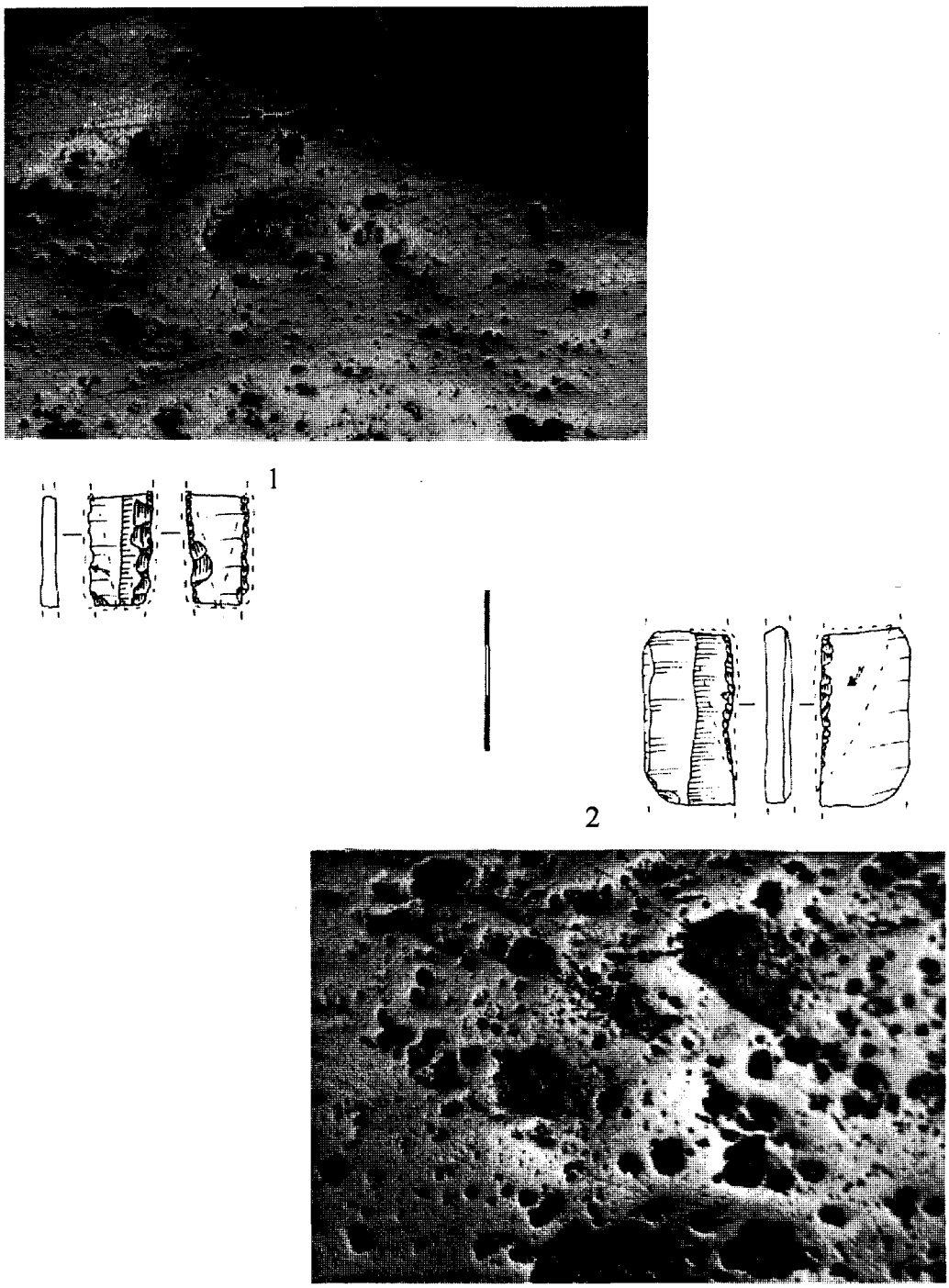

Figure 2. Eléments de faucilles: du site Kovacevo (1) et de Tell Kapitan Dimitrievo (2). Microphotographies -x100.

territoire européen occupé notamment par la culture de la Céramique Linéaire. Mais cette technologie ne peut pas être appliquée aux industries lithiques étudiées de la région de Marmara. Elle n'est quasiment pas connue au sein de l'industrie de Kovacevo, qui représente la séquence la plus ancienne de la culture Karanovo I. Il est bien évident que même sur un espace assez limité, il y a suffisamment de problèmes qui attendent leur résolution...

* Le spectre des matériaux traités et détectés

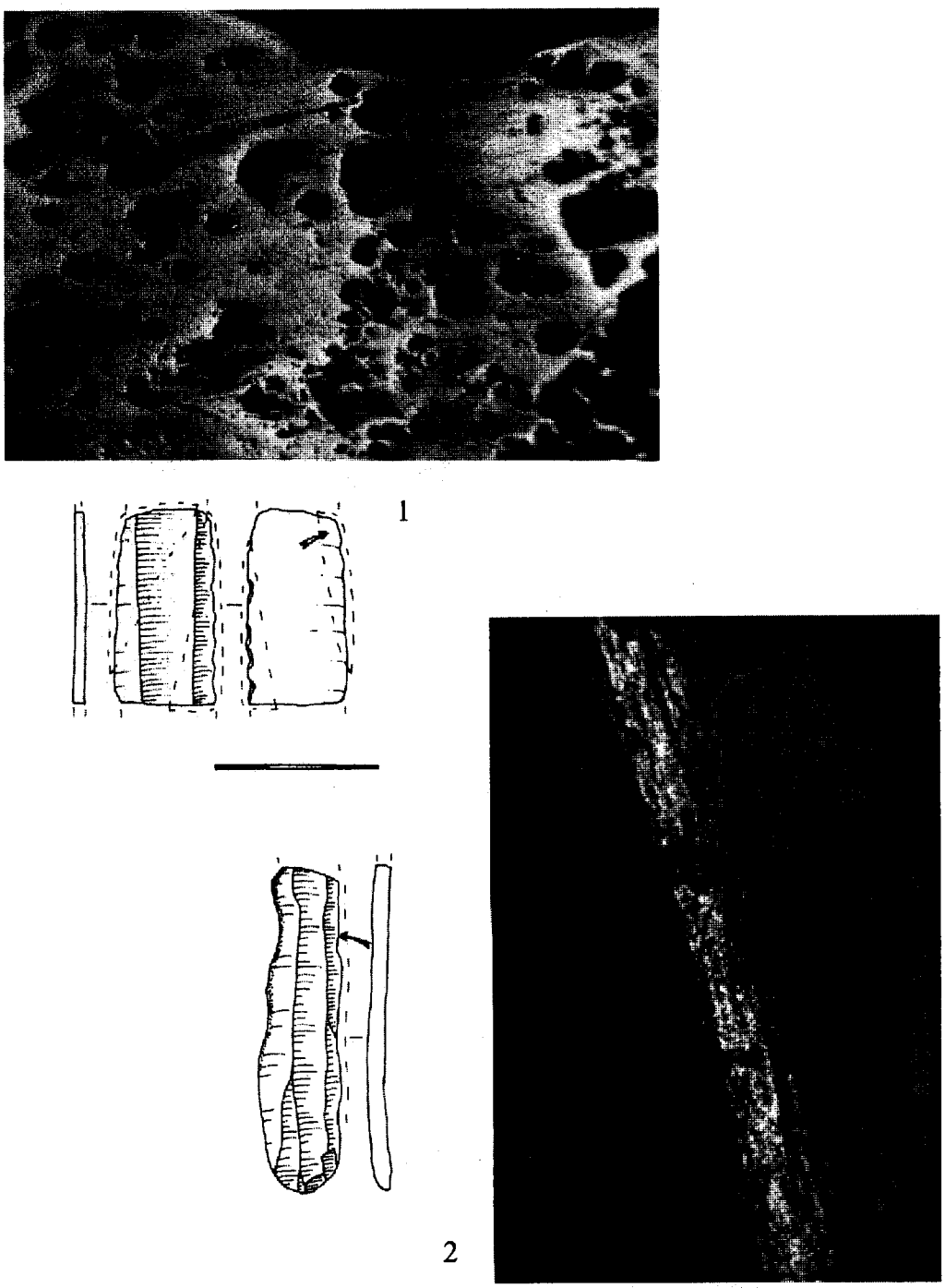

Figure 3. Specimens du site Mentese: élément de faucille (1) et outil à travailler de la matière minérale (2). Microphotographies - x 100.

est assez large. Y prédomine le travail des céréales et d'autres végétaux (y compris roseaux, bois frais, plantes non-identifiées), suivi par le traitement des produits animaux (tissu carné, peaux, os). Il y a des activités attestées de moindre importance (nommés " varia "), comme le traitement des différentes matières minérales (Fig. 3). Les exemplaires extrêmement rares de pointes de projectiles y sont aussi associés.

Quelles que soient les différences parmi les assemblages étudiés au niveau des matières premières exploitées, des stratégies technologiques adoptées, des répertoires typologiques et des modalités d'utilisation, il y a, quand même, un *instrumentarium* en silex dont le fonctionnement est identifiable et permet une reconstitution grosso modo des activités domestiques sur les sites. Sans pouvoir offrir une image exhaustive de la vie préhistorique, les données fonctionnelles nous aide à révéler les nuances contextuelles et voilées de cette vie. Cette application 'généralisante' des données tracéologiques peut être considérée à mon avis comme la plus raisonnable et la plus importante. Cela ne signifie pas la marginalisation ou la sous-estimation des recherches particulières et heuristiques sur les méthodes techniques et interprétatives en tracéologie. L'application des démarches pluridisciplinaires (et plutôt chimiques et physiques) reposant sur les mécanismes qui influencent l'apparition, la variabilité, l'identification et finalement l'interprétation des traces d'usure est nécessaire et profitable. Elle est d'autant plus utile quand elle aboutit à des descriptions détaillées et une visualisation microphotographique des stigmates d'utilisation. Dans ce sens, je veux bien revenir sur les expérimentations à large échelle, menées par L. Astruc afin de trouver l'équivalence admissible entre les traces d'usage des pièces archéologiques de Khirokitia et les traces produites sur les spécimens expérimentaux. Actuellement, dans ses programmes expérimentaux, il y a deux sujets préférentiellement explorés:

1. Le traitement des matières minérales telles que matière argileuse, calcaire, jaspe, picrolite, hématite, etc., connues par la production du mobilier en pierre à Khirokitia;

2. L'influence de la texture des matières siliceuses sur la nature et le développement des traces d'usure. La démarche tribologique effectuée et les analyses scléromètriques et rugosimétriques mettent en évidence que la texture d'une pièce lithique définit sa microtopographie et sa sensibilité à l'abrasion, deux facteurs qui se reflètent directement sur le développement de l'usure.

Tous les résultats sont parfaitement décrits et illustrés, ce qui constitue un corpus référentiel utilisable et fiable.

Ce que je veux bien souligner pour terminer, c'est le fait que chaque tracéologue se rend compte des facteurs limitatifs dans une telle procédure de recherche : les artefacts mal conservés, l'ambiguïté évidente des traces dues soit à l'utilisation brève et spontanée (ou trop complexe), soit aux déformations post-dépositionnelles, etc. Malgré toutes ces complications, au fur et à mesure de la recherche, chacun de nous énonce finalement sa perception du fonctionnement de l'outillage examiné, tant sur la base de l'expérience personnelle que sur la base de l'application adéquate de l'expérience (parfois plus riche) menées par d'autres collègues. Il n'est pas nécessaire de mener une expérimentation continue et répétitive dont l'issue est déjà généralement connue. Au contraire, il est très important d'enrichir les données empiriques et les connaissances sur des assemblages différents de même que saisir la variabilité de leur comportement afin de pouvoir les comparer du point de vue synchronique et diachronique. Dans une telle perspective, les données fonctionnelles garderont toujours leur valeur considérable dans la reconstitution des contextes préhistoriques.

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CHARACTERISTICS OF STONE ARTEFACTS FROM THE EARLY ENEOLITHIC SETTLEMENT OF RAKITOVO, PAZARDZHIK REGION (SOUTH BULGARIA).

Kancho KANCHEV* and Chavdar NACHEV**

The Early Eneolithic settlement near Rakitovo found on the border between the eastern and western Rhodopian mountains is situated in the southern part of the Pazardzhik region, in the Northern Rhodopian anticline, which comprises archaic and proterozoic metamorphites, Pre-Cambrian gneisses, schists and marbles, Pre-Cambrian and Paleozoic ultrabasic bodies carbonate rocks, marl flysch etc. Also found are magmatic rocks from the Upper Cretaceous, Paleogenic and Neogenic sedimentary rocks, effusive rocks (rhyolites) (Batakliev 1969: 15-17, 35-25; Encyclopaedia 1986: 22-23; Bonchev 1955: 106, 123, 143, 147), which creates the impression that in this case we have in mind a high mountain settlement. This settlement arose in a region with a considerable variety of rocks, all of them potential sources of raw materials. The aim of our study is to establish which of these resources were exploited and to what extent the Eneolithic inhabitants used them. In other words this is he first attempt to study the raw material supply of a settlement. The authors' presumption is based on the existence of Neolithic tells where life continued for centuries and probably millennia. Their existence was determined by suitable sources of raw materials that were successfully developed, and which provided the Neolithic-Chalcolithic population with the possibilities for a stable subsistence. The main element in the raw material base in the Neolithic were rocks and soils. The latter were tilled manually with hoes. We began this study of rocks as they were the main source of the soil in the region and a source of the raw material for stone implements.

The cultural layers in this settlement have a total thickness of 1-1.45 m. It comprises of two building horizons that cover an area of 3,300 sq. m. The settlement was completely excavated in 1974-1975. (Radouncheva *et al.* 2002: 10-11). This is a supplementary study of the already published results but not studied from the point of view of the sources of raw materials (Radouncheva *et al.* 2002). Thirty-three samples were taken for thin sections from fragmented stone inventory from the two building horizons. These were subjected to microscope analysis conducted by E. Dimitrova, of the Institute of Geology, BAS. The thin sections came from the following implements and rock samples:

	Type of implement	Total	Number of rocks
1	Adzes	23	6
2	Axes	6	5
3	Hammers	4	2
	Total	33	

We shall examine the sources of raw materials of the respective types of implements. Adzes are examined first. They were made from the following materials:

No.	Type of rock	Implements No.	%
1	Actinolite-tremolite schists	15	65,22
2	Amphibolite	2	8,70
3	Diorite	2	8,70
4	Serpentinite-actinolite-tremolite rock	2	8,70
5	Serpentinite	1	4,34
6	Serpentinizeated Peridotite	1	4,34
	Total	23	100,00

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Axes were made from the following type of rock:

No.	Type of rock	Implements No.	%
1	Actinolite-tremolite schists	2	33,33
2	Diorite Porphyrite	1	16,67
3	Gabbro-diorite Porphyrite	1	16,67
4	Hydrothermally altered peridotite	1	16,67
5	Quartz vein	1	16,67
	Total	6	100,00

The following rocks were found with hammers:

No.	Type of rock	Implements numbers	%
1	Quartz vein	3	75,00
2	Hydrothermally altered peridotite	1	25,00
	Total	4	100,00

According to the extent of use the above rocks can be classified as follows:

Type of rock	Implements numbers	%
1.Actinolite-tremolite schist	15	45,45
2.Diorite Porphyrite	4	12,12
3.Quartz vein	4	12,12
4. Serpentinite	3	9,03
5. Amphibolite	3	9,03
6.Serpentinitizated Peridotite	1	3,03
7.Gabbro-Diorite Porphyrite	1	3,03
8.Lomonitizated Actinolite schists	1	3,03
9.Hydrothermally altered Peredotite	1	3,03
Total	33	100,00

According to E. Dimitrova microscopic analysis has shown that the artefacts studied originate from rocks found around Rakitovo - mainly in Rhodopian metamorphic complex (actinolite-tremolite schist, serpentinite, quartz veins). There are rare veins, igneous rocks, diorites and Gabbro-diorite prophyrite, which

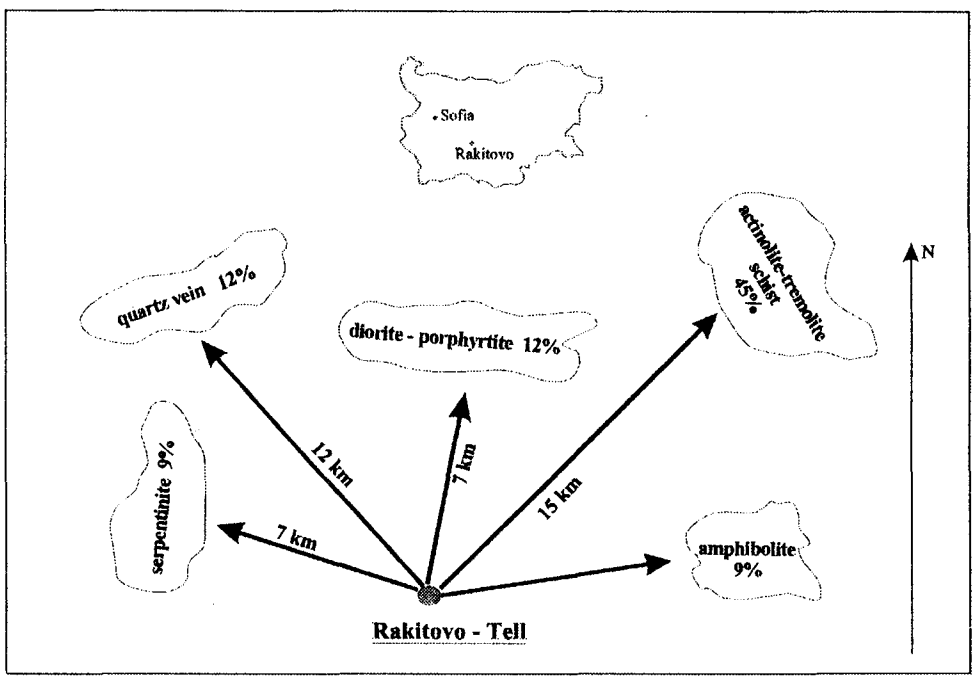

Figure 1.

are pre-Cambrian. They were all mentioned in the introduction to this study. All quarry sources of the rocks used by the inhabitants of the Eneolithic settlement at Rakitovo are to be found in its vicinity (fig. 1).

No doubt their components show a marked presence in soils around the settlement and contribute substantively to both improving their fertility and the ease of manual tillage with primitive implements. These are the main factors for determining the preferences of early farming communities for settling the area near Rakitovo for more than a century.

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THE BULGARIAN OBSIDIAN: MYTH OR REALITY? THE VIEW OF GEOLOGISTS AND ARCHAEOLOGISTS

Angel KUNOV*, Anne HAUZEUR**, Gerhard TRNKA*** and Tsoni TSONEV****

There are very few obsidian artefacts from prehistoric settlements in Bulgaria - *sensu lato* Neolithic till Bronze Age (Eneolithic). On the contrary, such artefacts are numerous in the countries surrounding (European Turkey, Romania, Greece, Hungary). We have tried explain this general absence of such artefacts in Bulgarian settlements.

It seemed interesting to compare two generally divergent approaches, the geological and the archaeological. We decided to look for the existence of obsidian in the territory of Bulgaria, and organised a study trip to the main paleovolcanic regions located in the south and south-eastern parts of the country (Fig. 1): the Dambalak (Eastern Rhodopes), as well as the Bulgarovo and Rossen paleovolcanoes (the latter actually under the Black Sea). According to geologists obsidian exists as nodules in these areas, as the paleovolcanoes produced acid conditions favourable for the production of obsidian or glassy rocks.

1 - The region between the villages Garvanovo - Tatarevo, Haskovo district

The area explored is located to the west of the village of Tatarevo (Fig. 2), on the right bank of the Banska river. It is found on the north-eastern periphery of the Borovishki volcanic area (Priabonian - Lower Oligocene) which belongs to the Eastern Rhodopian volcanic region (Harkovska *et al.* 1989). The region was formed by association of pre-caldera volcanic rocks and volcanoclastics, and post-caldera volcanic rocks and volcanoclastics (Harkovska *et al.* 1997). The particularity of both types of rocks is the high content of K2O. The pre-caldera volcanic rocks are represented by fine porphyric latites, high-K-rhyolites, and high-K-basaltic andesites. The post-caldera volcanic rocks are described as trachyrhyolites, trachyrhyodacites, high-K-rhyolites and the associated with them perlites (Yanev *et al.* 1989; Panteva 1996).

The transition between the trachyrhyolites from the core and the perlites of the perlites' periphery of the trachyrhyolitic vault in the vicinities of Tatarevo is made by the change of layers of perlites and trachyrhyolites (Yanev *et al.* 1989). The perlites' periphery occurs about 300 m wide. The perlites are black in colour merging from greenish, gray to white, as we have observed *in situ*. The latter are more hydrated. None of the previous authors mentions the presence of true obsidian nodules. The perlites analysed from Tatarevo show that during heating their loss of water is no more than 3%.

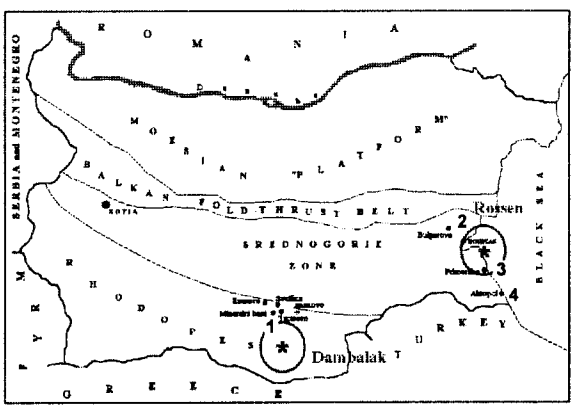

Figure 1. Localisation of the different visited places. 1. Tatarevo - Garvanovo (Haskovo district); 2. Bulgarevo; 3. Cape "Kupriya" and quarry "Primorsko"; 4. Ahtopol (Bourgas district).

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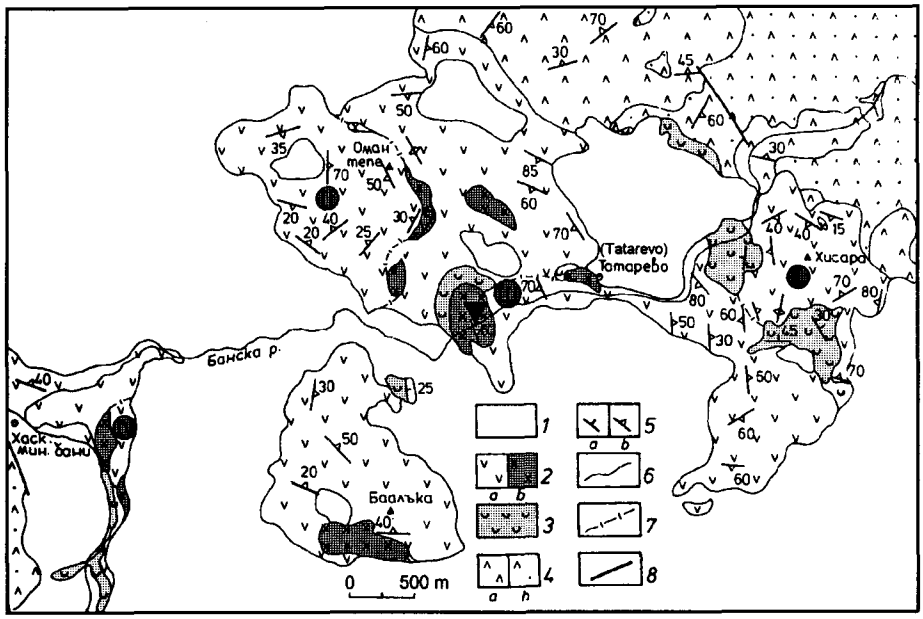

Figure 2. Paleogen acid volcanics, from the region of Tatarevo village and Haskovo mineral springs. ▼ visited place. (after Panteva 1996). 1. Quaternary; Paleogene volcanic: 2. rhyolites, trachyrhyodacites, trachydacites (a) and perlites (b); 3. volcanomictic conglomerates with an acid tuffaceous matrix; 4. latites (a) and latitic agglomerates (b); 5. stratification (a) and flow structures in the volcanics (b); 6. geological boundaries; 7.probable boundaries between the acid extrusion; 8. faults; I. Hisara dome; II. Oman body; II and IV. endogene domes, according to Yanev *et al.* (1989).

2 - Quarry "Bulgarovo", Bourgas district

This quarry is located about 12 km to the north-west of the town of Burgas (Fig. 1). It is situated in a small volcanic formation of a linear type – Bulgarovo paleovolcano (Mezosoic, Late Cretaceous; Staniszeva-Vasileva 1982). In the geological profile, there is a complex of lava flows of different thicknesses. The flows are often zonal as for example the third zone consists of pillow lava, and the last one is hyaloclastic. The rocks have high K. Borisov (1963) called them Bulgarites.

A hyaline zone 5 to 30 cm thick was observed in the periphery of the pillow lavas layer. The cement from volcanic glass from hyaloclastic zones and the hyaline periphery sometimes contains a perlite structure. Thus this lightly coloured volcanic glass - or obsidian - occurred as a very thin layer, archaeologically not suitable for use. Up till now, the presence of obsidian here has never been mentioned.

3 - Cape "Kupriya" and quarry "Primorsko"; Primorsko, Bourgas district

The area is situated in the southernmost part of the Upper Cretaceous Rossen palaeovolcano of the

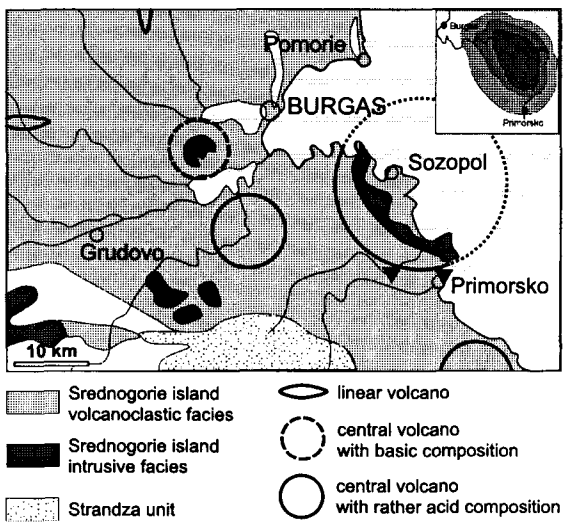

Figure 3. Detail of the geology in the Primorsko region, and localisation of quarry "Primorsko" and cape "Kuprija" (▼) (after Dabovski *et al.* 1989).
In frame, the schematic structure of the Rossen paleovolcano. From dark grey to light one: caldera, ring-like caldera intrusion, eroded soma. (after Harkovska *et al.* 1989).

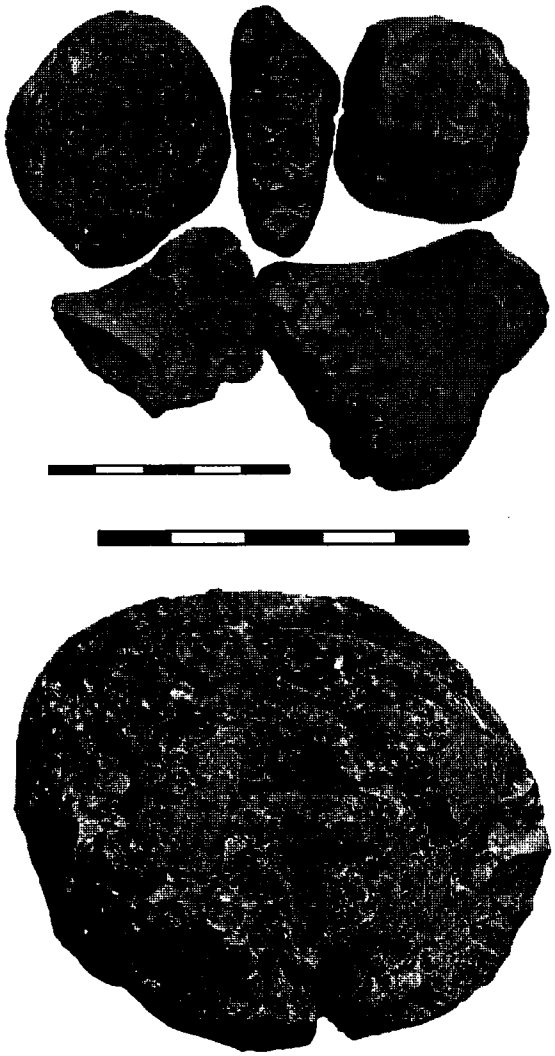

Figure 4. Obsidian nodules from the cape "Kupriya".

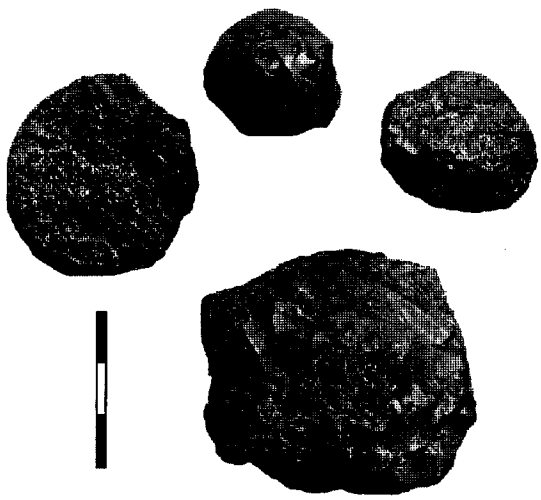

Figure 5. Obsidian nodules and blocs from the quarry "Primorsko".

Eastern Srednogorie volcano-intrusive area (Harkovska *et al.* 1989). The outer zone appears to be the probable base of the strongly eroded soma of the palaeovolcano (Fig. 3). It comprises volcanic rocks, volcanogenic- sedimentary bodies of the so-called Bourgas group (Petrova *et al.* 1980), belonging to Upper Cretaceous. The volcanic rocks comprise basalts, high-K basaltic andesites, K-trahybasalts, and K-trahyandesitobasalts (Harkovska *et al.* 1989).

3.1 - Cape "Kupriya"

Georgi Bonchev described (1900, 1908) obsidian for the first time in Bulgaria, only in one place - cape "Kupriya" - near the village with the eponymous name on the Black Sea coast. The outcrop is on the seashore within a band 2-3 m wide. The author describes the obsidian as having a black tarry colour and glassy surface and with uneven perlites' cracks. According to him, pearls as big as human fist and eggs could be found there. Microscopic analysis shows that it is a typical glass (Fig. 4).

Within the microscopic elements from the obsidian pieces from the same outcrop A. Kunov (1992 - unpublished data) observes typical volcanic glass with unpronounced bulbous perlites' cracks and rare glomeroporphyry from plagioclase. The obsidian glass is included in the greenish to brownish mass of weakly clayey volcanic glass, porphyry and glomeroporphyry from plagioclase and into the higher quantities of porphyry pyroxene, veins and clusters of carbonates. In another microscopic element the quantity of the plagioclase, pyroxene, and carbonate is greater. The rock from the opposite side microscopically has a spilite-like structure, with plagioclase microliths in the major mass, with a porphyry generation from plagioclase and pyroxene, with carbonate clusters. In some places epidote develops on the plagioclase.

3.2 - Quarry "Primorsko"

The quarry is situated few kilometres to the west of the town of Primorsko. It is in a formation of volcanic rocks, probably trachybasalts and basaltic trachyandesites according to the geological map, with reddish to greyish colour. Occasionally small spots of black obsidian glass appear. In one part of the quarry there is a lava flow of black trachybasalts or basaltic trachyandesites in which there are no macroscopic traces of porphyries or rock generation minerals. Among them different intensity black, bright nodular obsidian glass with dimensions from a few millimetres to 4-5 cm. is unevenly distributed. Most of the rocks have cracks and deposited calcite has been observed in cracks and on surfaces. In the core of some nodules,

the material is more coarse grained and mat (Fig. 5).

There is no known data about the chemical composition of the obsidian and the rocks both from the cape "Kupriya" and the quarry. Archaeologically speaking, the size and the quality of these obsidian are not suitable for flaking.

4 - The lighthouse on the seashore near the town of Ahtopol

Guided by the personal communication of I. Nachev we visited the rocks near the lighthouse of Ahtopol (volcanic rocks of the Bourgas group; Petrova *et al.* 1980). These are reddish to gray-greenish rocks (most probably with trachybasalts to trachybasaltic andesites). We found a small cliff with little and unevenly dispersed black volcanic glass. Sometimes obsidian nodules reach 2-3 cm in diameter.

5 - Other evidences for obsidian

Georgi Bonchev in his "Contribution to the petrography of the Eastern Rhodopes" (1908) mentions about presence of a black strip (band), which constitutes the occurrence of rhyolites to the north of Ajhedin and river Arda. It is composed of black perlites.

A number of research publications about the Rhodopes (Goranov 1960; Goranov *et al.* 1960.; Yanev 1989) describe bodies with perlites which have black colour. In the chemical analyses of different perlites from Bulgaria presented by these and other authors, none shows presence of volcanic glass with no or little content of water. The character of the different compositions of volcanic occurrences and especially the great number of perlites and the presence of volcanic glass shows, that there is a possibility of finding new (possibly larger) occurrences with obsidian.

In 1997 Y. Yanev *et al.* describe andesitic obsidian from the Oligocene volcano Dambalak in the Eastern Rhodopes. Briefly the story of this description is the following: Stefka Vassileva (History Museum, Department of Earth Sciences in the town of Kardzali) found a piece of obsidian, which is now on exhibition in the Museum. This single piece comes from the

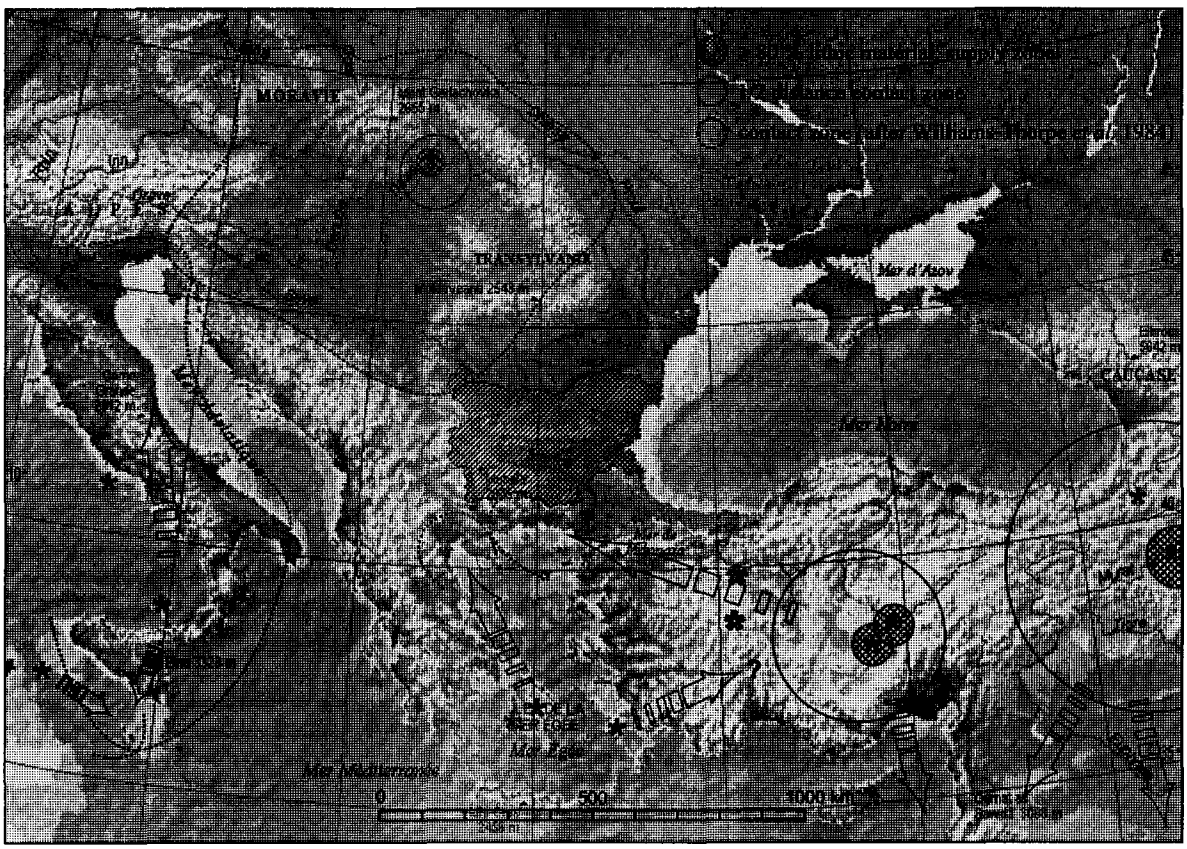

Figure 6. Geographical widespread of obsidian sources (asterisks) in South and Southeastern Europe, and Anatolia. (Data after Dpt. of Chemistry and Biochemistry, Numazu College of Technology (web site); Renfrew *et al.* 1966, 1968; Williams Thorpe *et al.* 1984; Willms 1983).

western foothills of the Dambalak volcano within the locality 'Strelbishteto' (south of the Momchilgrad - Raven road and the river Kidikdere). The authors of this article made micro-drill quantitative and infra-red spectroscopic analyses. The maximal quantity of loss (LOI) reaches 0,79%. In the article the geological profile of the region where this piece of obsidian has been found is described. The authors reach the conclusion that the origin of this obsidian is connected with the andesitic lava of the Dambalak volcano.

It is important to note that one of the authors of this article Y. Yanev, as well as other volcano scientists (R. Ivanov, P. Marchev, A. Harkovska, etc.), know the volcano Dambalak in detail. So far, neither of them nor any other Bulgarian geologists produced any data about obsidian. Theoretically speaking one isolated piece could provide important evidence of long distance exchanges, if it were found in the vicinity of another potential source of a raw material. But without any geological proof no archaeological evidence of exploitation could be inferred.

From another point of view concerning Eastern Bulgaria, we still have to consider the availability of potential outcrops during Neolithic times over a wider area since the Black Sea level was then some 10-12 m lower than today.

The geographical position of Bulgaria between the East European obsidian outcrops and the Near Eastern ones is right in the middle of their distribution range of artefacts (Fig. 6). But few obsidian artefacts are known from Bulgarian prehistoric sites; the most well known is a blade found in a Varna grave. On the other hand we find the distribution of another kind of prestigious artefact, namely blades and implements, made of high quality flints from the North-East Bulgaria.

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THE HUMANIZED MINERAL WORLD: WEB-BASED COMMON RESOURCES

Katalin T. BIRÓ*

Introduction

There is a growing uptake of natural resources by human societies. The roots and beginning of this process is studied by special branches of prehistoric archaeology, archaeometry and cultural anthropology. We are interested in what and why, as well as where from and we are always getting only a part of the possible answer.

The knowledge of the prehistoric communities of the surrounding world was essential for their survival. They accumulated this knowledge over generations. For archaeologists dealing with the same problem, it is imperative to know as much of the location, availability, quality of these past resources as possible to reconstruct past activities and history.

There are many contraversies hidden in this approach. We are confronted with a selective fossilisation of evidence, the similarity of different materials which could, or could not be allocated to source regions, the total or partial exploitation of former resources, the destruction of original raw material sources by subsequent quarrying or construction and many other things.

As a rule, we are left with a very small and imperfect selection of the products, worked, used and traded in prehistory. It is even more important therefore collectively to know and access as much information as possible. Easily accessible common resources on the Web can be a solution.

1 - Spatial, temporal, material framework

The present initiative by the organisers of the meeting focused on the investigation of humanised mineral resources from prehistoric South-Eastern Europe. This is a large enough unit connected by seemingly strong ties in prehistory. The distribution of certain material and cultural features - i.e., obsidian, spondylus and spreading of ideas - housing and farming serve, in a way, as a natural background for possible collaboration. The time period for the early exploitation of mineral and natural resources necessarily point to "lithic" periods in the first place.

The starting point for what we can actually study is necessarily the specific range of materials we can find on archaeological sites. Recently, on the occasion of a national project in Hungary[1] we tried to survey sourceable and mappable goods on prehistoric sites and ended up with a list of about 200 categories we could differentiate and, more or less, attribute to some region within Hungary and its immediate environment.

2 - Web-based resources - pro and contra

Modern information technology, especially the internet is a great challenge for all disciplines including the humanities. It has immense possibilities for expressing thoughts and ideas in a fast, instructive and accessible way. At the same time, the ephemeral character, the unsolved questions of intellectual property rights and consequently uncertain status of web-based publication prevent a lot of good content from being immediately accessible.

The scientific community has to realize that the methods of knowledge acquisition are changing dramatically and if we want to keep our role in directing opinions concerning our specific subject, we must provide good and accessible data on our own professional work

- for the general public (whom we owe responsibility, in presentation as well as forming opinions)

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[1] OTKA- T 025086, Atlas of prehistoric non-metallic raw materials in the Carpathian Basin

- for the generations of students, raised on modern IT
- for ourselves - to make our work better and more efficient.

3 - Current examples, world-wide

To the best of my knowledge, so far there is no web-page or portal systematically dedicated to humanised mineral resources. One of the (regional?) aims of our collaboration can be to create one. However, there are a number of good sites all over the world dealing with some aspects of the problem. Such is, for example flintsource.net [http://www.flintsource.net/], which is - apart from giving first-hand information on some important natural resources mainly used for the production of chipped stone tools - also provides an extensive bibliography on the subject as well as a link to related subjects. Other specific materials like obsidian [http://www.peak.org/obsidian/], amber [http://www.brost.se/eng/welcome/index.html] or salt [http://www.saltinstitute.org/38.html] also have an extensive world-wide network - which cannot all be mentioned in this article. A formerly available interesting site on spondylus [http://www.spondylus.net/] known to the author is currently under re-construction, and is an example of the transitional character of e-information; hopefully by the time of publication, it will be functioning again.

4 - Hungarian practice

Spreading information on the net was rapidly adopted in Hungary. Especially good services are provided for electronical text archives [http://mek.oszk.hu/] and collective portals [http://www.startlap.hu/], having specific pages devoted to archaeology [http://regeszet.lap.hu/] and geology [http://földtan.lap.hu/] as well. Individual institutes dealing with the subject have their own information services, such as the Hungarian Geological Survey [http://www.mafi.hu/], the Archaeological Institute of the Academy [http://www.archeo.mta.hu/] and the Archaeolgical Institute of the University [http://www.btk.elte.hu/regint/].

Museums typically have their own data service; a portal-type site[http://www.museum.hu/] covers those which do not intend to run their own info. The individual data service of museums is incorporated within the framework of Virtual Library Museum Pages [http://icom.museum/vlmp/] by the *ace* server.

5 - Data services on *ace* server

Most information regarding the humanised mineral world in Hungary is mediated by the *ace* server [http://www.ace.hu/]. This is the server of the Archaeocomp Association, a small non-profit scientific association dealing with an interdisciplinary approach to archaeology, mainly introduction of IT and sciences to the field. The data service of the Association was recently revised and reported on in the framework of Networkshop 2003, the annual meeting of networking and IT applications in the academic sphere in Hungary (Biró *et al.* 2003). The specific data services regarding petroarchaeology were presented on the VIIIth Flint Symposium, Bochum (1999; Biró in press). These services still function, and have been completed by a recent major project, the Atlas of prehistoric non-metallic raw materials in the Carpathian Basin.

The oldest of our data service is the exhibition guide of the Szentgál-Tuzköveshegy flint (radiolarite) mine [http://www.ace.hu/szentgal/], the first electronic exhibition guide in Hungary (Biró-Regenye 1995). The original version was made in DOS-based hypertext, published on CD in two editions, and later migrated to web in its current form. It is a good example how to make standard publication (on CD) available to a wider public.

The other application with a considerable tradition is our Lithotheca [http://www.ace.hu/litot/]. This is also a two-media publication, the Catalogues published in standard printed version in English (Biró-Dobosi 1991, Biró-Dobosi-Schléder 2000) while the web version contains the main data base of the collection representetive for the chipped stone tool raw materials in Hungary in two languages, English and Hungarian, supported by colour-coded true colour images which are very important for the study of lithic raw materials and cannot be generally realised in printed books because of the costs of reproducing coloured images.

We were also happy to host the project webpage of UNESCO IGCP-442 [http://www.ace.hu/igcp442/], entitled "Raw materials of the Neolithic/Aeneolithic polished stone artefacts: their migration paths in Europe". This was the first interdisciplinary project between geology and archaeology supported by UNESCO. The leaders of the project were Dusan Hovorka (geologist, Bratislava University) and Gerhard Trnka (archaeologist, Vienna University). During the operation of the project (1999-2002), a lot of good content available also in electronical form was produced. We are still working on final publications and hope to extend the web-page accordingly.

The biggest project we started on the *ace* server is the Atlas... project [http://www.ace.hu/atlas/], devoted to the study of humanised mineral resources in Hungary. This project was supported by the

Hungarian National Grant Foundation (OTKA, project nr. T-025086). The official duration of the program was 1998-2002, however we are still working on some parts especially the electronic publication of the results. Apart from the author (basically with an archaeological background, affiliated to the Hungarian National Museum), the key persons of the project included György Szakmány, a petrologist from ELTE University and the regional-mapping geologist Péter Scharek from the Hungarian Geological Institute. All of us have considerable experience in archaeometry and the scientific (basically, geological) study of archaeological finds.

The idea was to collect and locate mappeable archaeological, geological and analytical data on prehistoric material culture from Hungary. Evidently we cannot do much with very general categories without provenance information. Also there is a natural biass towards the lithic periods we know much more about.

As a starting point we listed (and revised many times) the different kinds of raw materials we can separate and locate to sources on prehistoric archaeological sites. The source location information was collected on the basis of previous provenance studies, the digital geological map of Hungary (scale 1:500 000) and, for the Carpathian Basin, the map and catalogue of the Hungarian stone quarries produced in 1904 (Schafarzik 1904). The analytical data and distribution data were partly from our own practice and observations and partly from technical literature. The structure of the Atlas follows the main functional categories (Fig. 1). Within each category, the raw materials encountered and distinguished so far on archaeological sites are listed (Fig. 2).

The individual raw materials are described, shown on images (macroscopic and microscopic) and maps of distribution in respect of the sources and the archaeological/analytical distribution data, if available (Fig. 3).

Though collection of the data proceded simultaneously, the construction of the web pages is a slow process because we had to re-structure the information several times. As of today, the sheets on chipped stone tools and polished stone tools are more or less finished while we are working on the rest.

6 - Future perspectives

The data behind the Atlas are collected on several sheets and a growing unified database. For the

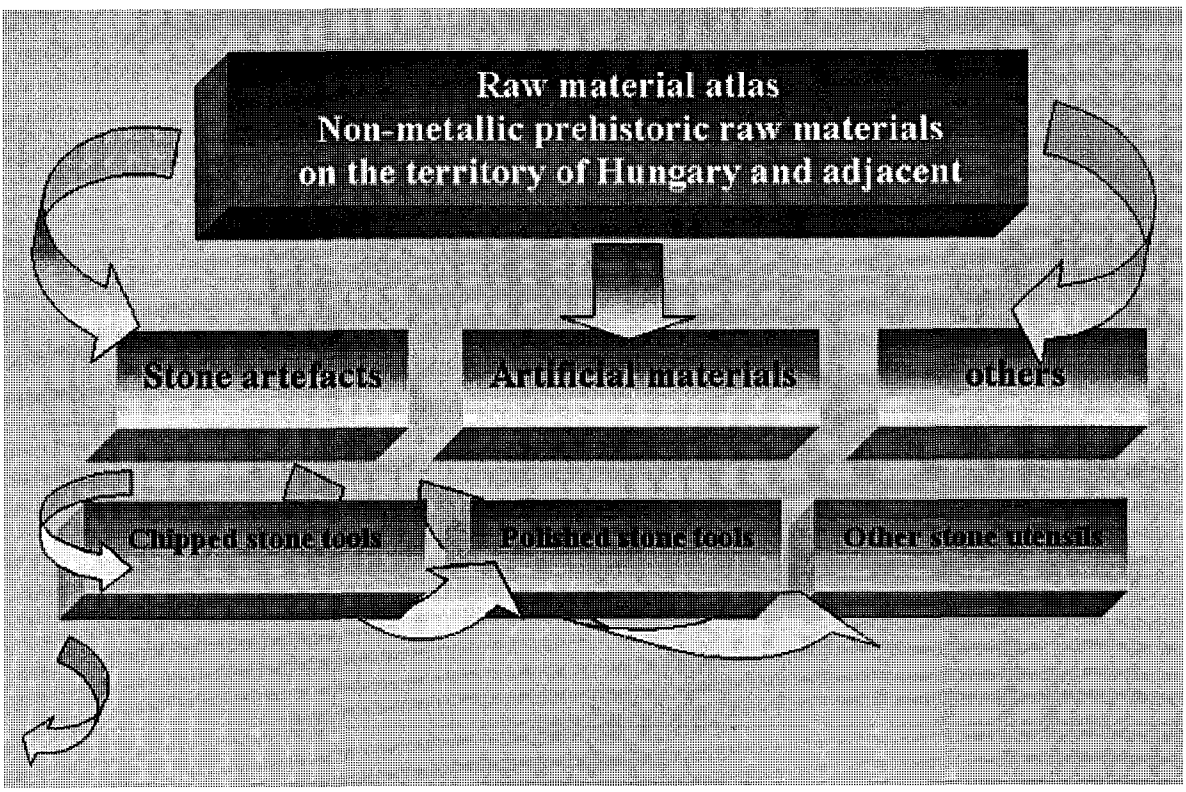

Figure 1. Structure of the Atlas (screen shot from the Atlas).

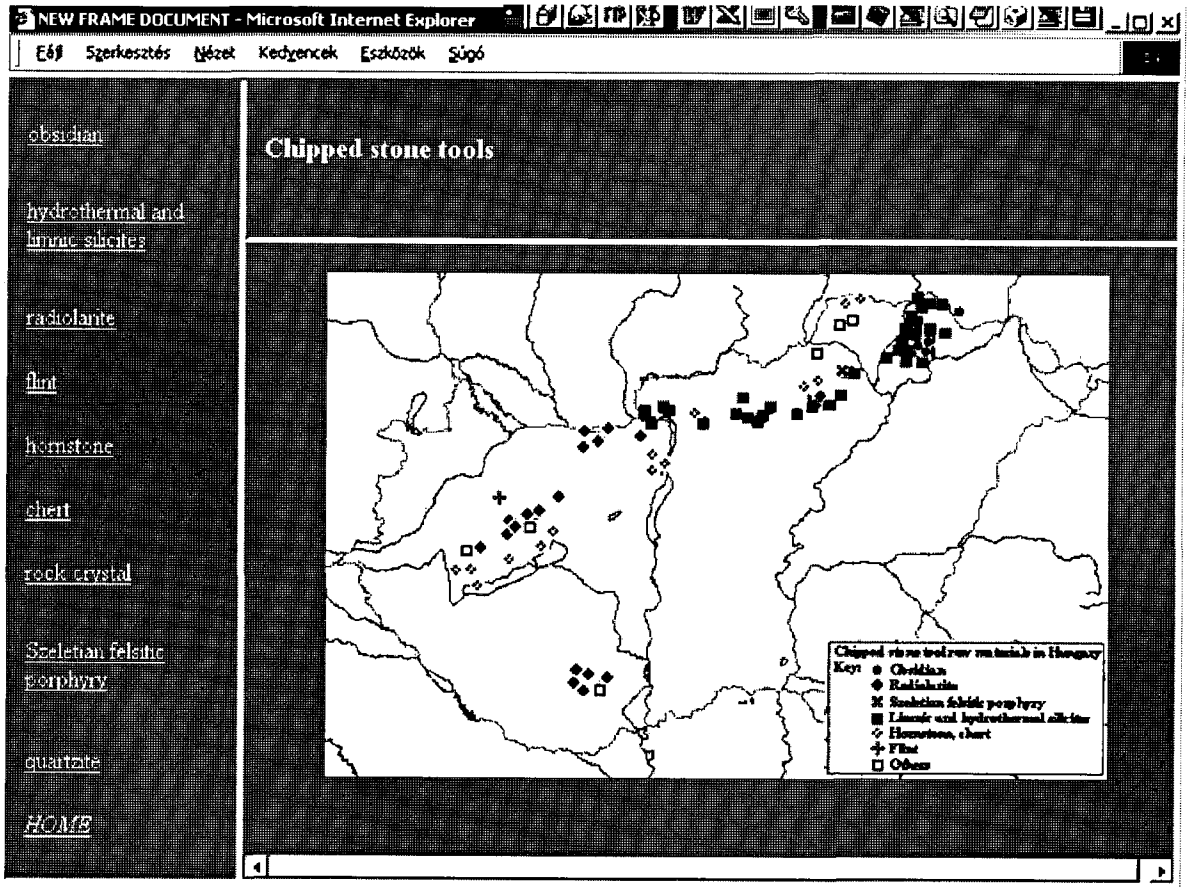

Figure 2. Categories separated within one unit: example, chipped stone tool raw material (screen shot from the Atlas).

time being, the images and the maps are static and the presentation of the evidence follows a hierarchical scheme. As time goes by and we complete all sheets in preparation we may venture a dynamical database with on-line maps, however our complexity and technical background is not enough for such service as yet.

Also, we would appreciate collaborating with other sites of similar or partly similar scope.

Collaboration with South-East European countries for the study of the humanised mineral world is just a rational step in this direction.

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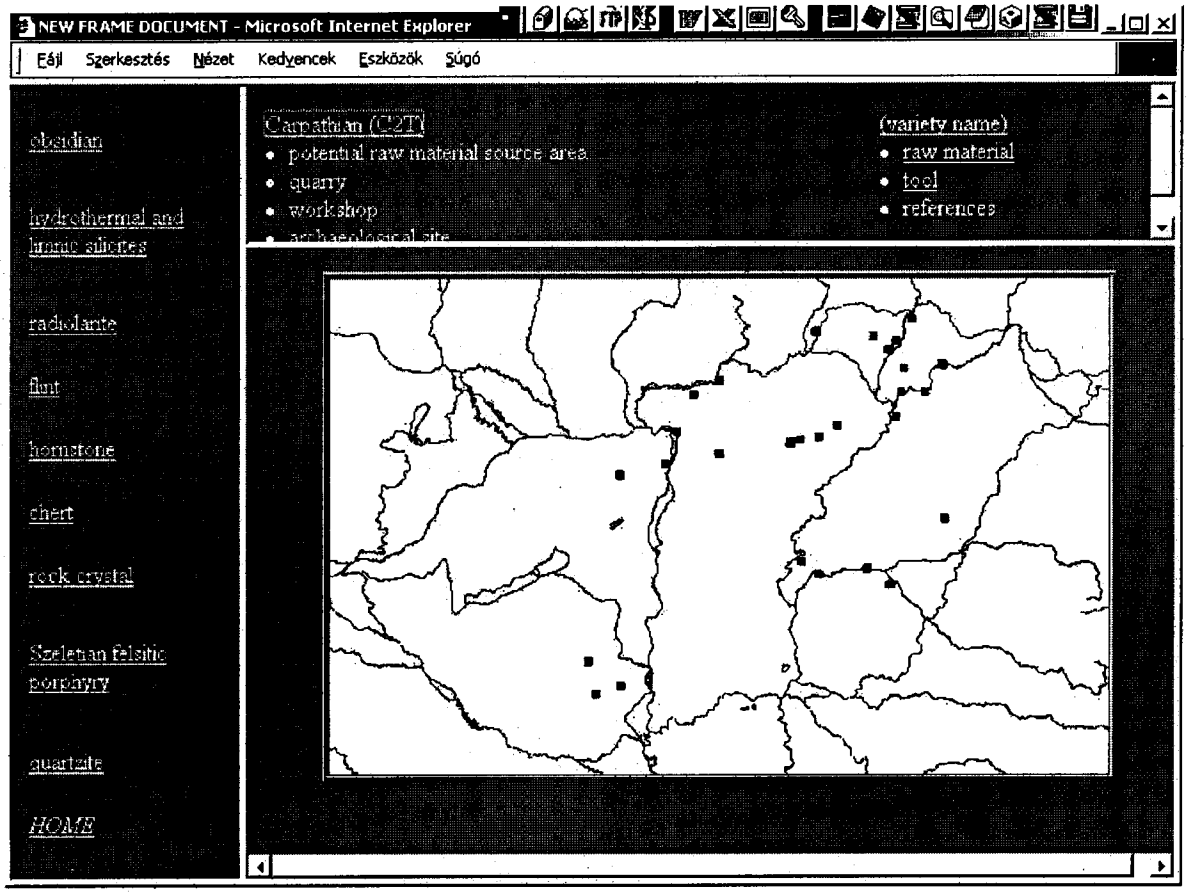

Figure 3. Distribution of individual raw material types, example, Carpathian 2T obsidian (screen shot from the Atlas).

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SETTLEMENT PATTERNS AND LANDSCAPE PERCEPTION IN NORWEGIAN HIGH MOUNTAINS IN THE STONE AGE

Espen ULEBERG*

Introduction

Norway has been seen as a last refuge for the reindeer hunters of the North European plain. The subsistence in the South Norwegian high mountains has been said to depend mainly on reindeer through the Mesolithic, Neolithic, Bronze Age and Early Iron Age, *i.e.* from around 8500 – 2000 BP (Hagen 1963, Indrelid 1975). It is however reasonable that the changes that took place in the lowlands influenced the activity in the high mountains, especially since the subsistence model for Norwegian hunter/gatherers supposes that the mountain areas are part of a seasonal cycle.

One important change on the Norwegian west coast has been a shift from a hunting economy in the Mesolithic to a pastoralist economy in the Neolithic. Hunter/gatherers would visit the high mountains in the autumn, while pastoralists would stay in the mountains during late spring, summer and early autumn. The subsistence activity decided the seasonal cycle, the experiences people had in the landscape and thereby the reading of the landscape.

In this article it will be argued that subsistence change is visible in the pattern of artefact distribution in the landscape, and that the landscape perception can be interpreted through the allocation of archaeological sites.

1 - The Lærdal Mountains sites

The area that will be presented here, The Lærdal Mountains in South Norway, (Fig.1) is situated between 1100 and 1500 m a.s.l. The landscape is dominated by lakes surrounded by mountains. There are steep mountains in the west and the distance down to the innermost part of the Sognefjord is only 50 km. From there the fjord stretches about 200 km westwards to the outer coast. In the east, there is more gentle sloping terrain for about 250 km to the Oslofjord.

The present tree line at around 900 m a.s.l. is a product of climate and human activity where especially the shieling in the 19th and early 20th century demanded a lot of firewood. In areas where shieling has stopped, the forest is growing higher than earlier, but the regrowth is slow because of the high altitude. It can be difficult to imagine that most of this area was covered by forest, but an outline of the early vegetation history in South Norway can give a better understanding of the allocation of the sites.

1.1 - Vegetational changes

A mainly non-arboreal pioneer vegetation with some birch, willow and juniper was established at 1150 m a.s.l. as early as 8900 BP in South Norway. By 8500 BP all glaciers had probably melted, and the forest development in the Preboreal and Boreal Period was rapid. A pine forest was established around 1200-1300 m a.s.l. as early as 8700-8500 BP, and probably reached its maximum in the early Atlantic Period. Finds of macrofossils show that there was a birch forest above the pine. The birch tree line reached 1400-1450 m a.s.l. and remained stable until 5000 BP. The pine forest line was also relatively stable through the Atlantic and the early Subboreal Period (Aas & Faarlund 1995). This implies that most of the sites were below the tree limit; a fact that necessitates a reconsideration of the traditional interpretation of the economy and the reading of the landscape in the Norwegian high mountains in the stone age.

Today the area is a typical reindeer habitat. There is no osteological material from the Lærdal Mountains sites, but remains from the Hardangervidda mountain plateau show the presence of reindeer in the mountains in South Norway as early as 8500 BP. However, the Hardangervidda osteological material also shows moose, possible deer and bird (Indrelid 1994:237-40). Like the Lærdal Mountain sites, the

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Hardangervidda sites are in the high mountains today, but below the prehistoric tree line. The osteological material from Hardangervidda thus supports the idea that the sites were in the forest, and that the subsistence was varied.

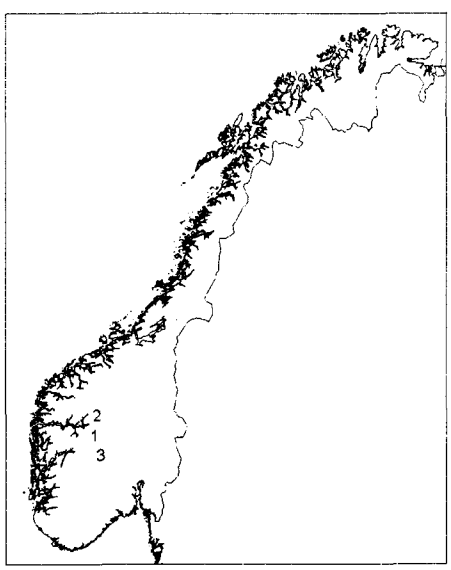
1.2 - Archaeological research

The surveys in the Lærdal Mountains was concentrated around six lakes (Fig. 1). Archaeological features and dateable artefacts were found around four of them. Only one lake, Kvevotni/Flævatn, has no sites in spite of a thorough survey. One factor that puts Kvevotni/Flævatn in a group of its own is the height above the sea. Four of the lakes are well below 1400 m a.s.l., which places them in the prehistoric pine forest. The fifth is at 1415 m a.s.l. which was closer to but still below a birch tree line at 1400-1450 m a.s.l. The series of Kvevotni/Flævatn lakes was above 1458 m a.s.l., and constantly above the tree line.

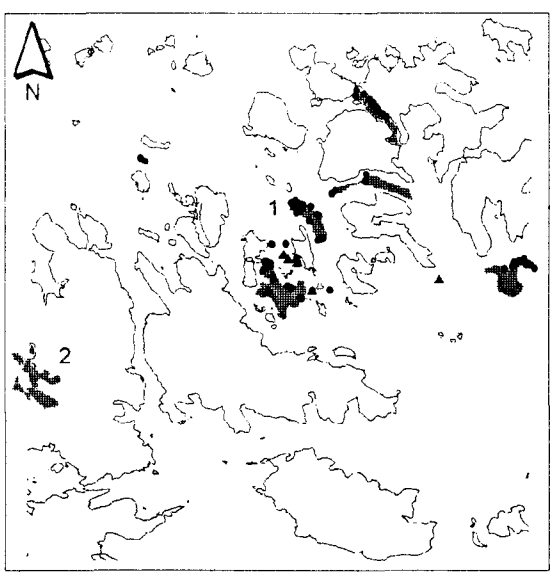
The lakes with the highest site density are Eldrevann/Tjørni (Fig. 2). They are treated as a unit, since the height difference between them was only 20 cm, and they where separated by just a few metres of a small, shallow river. Tjørni had two outlets, creating a small island called Glitreøyni. The terrain leads the trail up from the west coast to this lake, creating one of the main routes from eastern to western Norway. A reindeer trail passed here, and there has been modern shieling as well.

There were artefacts around all of Eldrevann/Tjørni except for a smaller part in the southwest. The dateable artefact concentrations were mainly in the northwest. Nine of the excavated sites had dateable material. These sites can be divided in six activity areas. One of them is dated to Late Neolithic/Bronze Age with a possible Mesolithic component. Three of them have Mesolithic, Early/Late Neolithic and Late Neolithic/Bronze Age components. The two remaining site groups, Eldrehaugen and Glitreøyni, have only Mesolithic components. Eldrehaugen is on the south shore, and Glitreøyni is the abovementioned small island in the north. The earliest C14-date from the area, 8510 ± 110 BP, is from this island. It is also worth noticing that neither of these two have any affinity to modern shieling buildings.

There is a possibility that the relationship between sites and lakes is mainly due to the surveying strategy. In Hardangervidda, sites are found at a certain



1. Lærdal Mountains
2. Nyset-Steggje
3. Hardangervidda



Lærdal Mountains
▲ Quarry
• Site
1460 m a.s.l.
Lake

1 Eldrevann/Tjørni
2 Kvævotni/Flævann

0 5 10 15 Km

Figure 1. The Lærdal Mountains with the larger lakes in the area. The highest possible tree line was 1450 m. There are no sites around the lakes Kvævotni/Flævann in the west which have always been above the tree line.

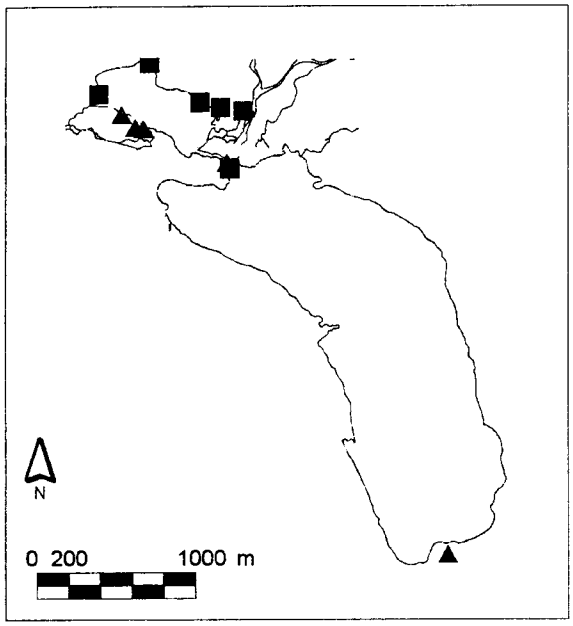


Figure 2. Lake The lake Eldrevann/Tjørni . Artefacts were found around most of the lake. Only the dateable sites are marked on the map. ▲ Mesolithic; ■ Mesolithic and later.

distance from the water both around regulated and unregulated lakes (Indrelid 1994:218-21). This suggests that the relation is spurious. Results from surveys in the Nyset–Steggje mountain area also indicates that the concentration around lakes is not so strong (Bjørgo 1988). Later work has, however, shown that the relation between lakes and sites is stronger in the Mesolithic and Early Neolithic periods and weaker in the Late Neolithic and Bronze Age (Prescott 1995).

1.3 - C14-datings and artefacts

C14-samples and dateable artefacts can give a possibility of placing the sites on the time scale. Generally there is thin topsoils covering the sites, and accordingly a chronological sequence could hardly be observed. Moreover it must be expected that frost perturbation has changed any existing sequences. There are no organic remains apart from charcoal, and artefacts were found on the surface and just under the turf. There are few diagnostic pieces among the artefacts, and most of the flakes are expedient tools, simply flakes used as cutting edges.

C14-samples and dateable artefacts show that some places has been chosen several times through the 6000 years of occupation from around 8500 BP till 2000 BP. At the same time the C14-samples also indicates longer periods without any activity at all, especially between 5800 and 3500 BP; an interval of ca 2300 years. In Norway this covers the Mesolithic/Neolithic transition, which is at around 5000 BP. On the other hand, dateable artefacts indicate activity in this period. For instance, slate points dated to Early or Middle Neolithic and bifacially retouched quartzite points dated to the Late Neolithic and Early Bronze Age, imply a certain activity in the period not covered by C14-samples.

The plant species was not determined in the C14-samples done in the 1960's. That rises an important methodological problem; especially in this area where it even today is possible to gather firewood that is several thousand years old. The occupation hiatus shown by the C14-results is however corroborated by results from other high mountain regions where the species in the C14-samples have been determined to willow and birch (Bang-Andersen 1986). The results from these other sites together with the fact that the sites were below the tree line suggest that they were not using fossil firewood. The conclusion must be that the area is used extensively and not continuously. The hiatus and the fact that the dateable artefacts are slate and quartzite points, *i.e.* tools for hunting, may suggest that this is a period when the only activity is sporadic hunting.

2 - Landscape perception and Stone Age economy

The areas around the lakes seem to have a lot of identical locations, yet there is a concentration of activity in certain areas. The reason why one location was preferred over another could be mere chance, since there are probably a great number of adequate places to choose among. On the other hand, the fact that exactly the same place is chosen several times suggests that there was other reasons for the choice.
A certain location was evidently a good place to settle for people with a certain reading of the landscape. People with different subsistence economy, will see and look for different elements in the landscape. The landscape belongs to those who belong to it, with their experiences within the landscape. It is therefore hardly possible for us to understand why one specific location should be preferable to another, because we do not share the same experiences and the same way of looking at the landscape (Meløe 1989). The experiences made are dependent on the subsistence pattern. Hence, the subsistence pattern can be visible in the allocation pattern, and a shift in allocation pattern should reveal a shift from one type of economy to another. A hunter is looking for good places for the hunt, and needs an understanding of the animal's movement in the landscape and will position himself according to this. As

well as the hunter, the pastoralist needs an understanding of the animal's movement in the landscape, but the pastoralist is also looking for favourable grazing grounds and places where it is possible to control and guard the animals.

2.1 - Subsistence in the high mountains

Hunting and shieling have been the two subsistence patterns in the high mountains. The Stone Age sites are traditionally seen in relation to the reindeer hunt. This idea must however be reconsidered, since the sites were not in the barren high mountains, but in the forest. The fact that they were situated in the forest contradicts the exclusive dependence on reindeer hunting, and indicates that the area has been more of an extension of the lower-lying forest regions than a totally different environment.

In western Norway the transition to the Neolithic is dated to 5200 BP with the introduction of slate points (Bakka 1976, Nærøy 1992). Domesticated animals are introduced in the Early Neolithic, and the economy becomes based on pastoralism. In the Late Neolithic, western Norway is probably connected to a European economic system, where southwest Norway seems to be in contact with Jutland in Denmark (Prescott 1995b). Pastoralism is an expansive economy. The goal is to enlarge the herd, and hence to expand the grazing grounds. This could lead to an expansion into the high mountains with its rich summer pastures.

There are no finds to support Neolithic pastoralism in the Lærdal material. However, results from Nyset-Steggje, a mountain area to the north, support the idea of transhumance in the Late Neolithic and Bronze Age (Prescott 1995b). Also in Hardangervidda, in the south, the results from pollen analysis indicate grazing in the Neolithic period (Moe *et al.* 1978). Both Nyset-Steggje and the Lærdal Mountains were probably used by people living most of the year on the west coast. It is therefore reasonable to understand the finds in the Lærdal Mountains in relation to Nyset-Steggje and the west coast.

One would then expect a hunting economy in the Mesolithic period and a pastoralist economy from the Late Neolithic period onwards. Since this shift is not visible in the artefact material, one must look for a possible change in the allocation pattern. Such a change might be visible on two levels. As a large scale change, visible in the Lærdal Mountains as such, or as a change in the settlement pattern around a lake.

2.2 - Strange Attractors

Landscape perception is connected to bodily experience in continuous space. The events that took place in the Lærdal Mountains can only to a limited degree be separated on the time scale. The model describing the prehistoric situation should therefore be able to incorporate finds from all periods. It is events taking place in continuous space and time. The concept of Strange Attractors can make us think of these sites in a way that transgresses the idea of time limited point allocations (Uleberg 2003). Thinking in this way makes it possible to see the traditional sites as areas with activity concentrations, where other kinds of activity leave fewer traces around the sites and along the paths leading to and from them. Separate activity concentrations that can be placed in time can give indications of changes in landscape perception and subsistence.

2.3 - Landscape perception

The dateable artefacts range from the Mesolithic to the Late Neolithic/Bronze Age, and the C14-results from 8500 – 2000 BP. The results indicate that a lake with archaeological material has sites from all periods. When the area is studied as a whole, it is hardly possible to distinguish a shift in the perception of the landscape through time. The only observable pattern is that the relation to the tree limit has been important in all periods.

Another pattern becomes visible when looking at only one lake, Eldrevann. In this case, the material indicates that the first people in the area settled around most of the lake, all sites have a Mesolithic component. The island in the northwest and one activity area in the south were used extensively only in the Mesolithic period. People in later periods have not seen these areas as well suited for habitation. Instead, they have chosen other areas some of which correlates with modern shieling. This indicates that there has been a shift in landscape perception, which again indicates a shift in subsistence activity.

Conclusion

Landscape perception is related to scale. In this material, it is not possible to see any changes on the large scale. When the area is seen as a whole, there seems to be two major conditions for site allocations valid through for the whole period; that a site should be close to a lake and below the tree line. A change becomes visible then the study is concentrated to a smaller part of the landscape, the sites around one lake. Some activity areas were only used in the Mesolithic, other activity areas were also used in later periods and even today. It seems possible to use the allocation patterns as an indication of a change in landscape perception. It can therefore be argued that the change from Mesolithic hunting to Late Neolithic pastoralism is visible in the material from the Lærdal Mountains.

Aknowledgements

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THE MESOLITHIC-NEOLITHIC TRANSITION IN THE TRIESTE KARST (NORTH-EASTERN ITALY): POSSIBLE CLUES FROM THE ANALYSIS OF LOCAL *VERSUS* EXOTIC LITHIC INDUSTRIES

Emanuela MONTAGNARI KOKELJ* and Chiara PIANO**

Introduction

If we consider the traditional polarization between theories of allochthonous or autochthonous processes of Neolithization, as well as the theories that combine the two approaches, such as the Availability Model of M. Zvelebil (1994), we acknowledge easily that the possibility of distinguishing local from exotic objects and phenomena can play an important role in the study of the Mesolithic-Neolithic transition.

Nevertheless such a distinction is often difficult, due not only to the different stages of development of the analytical methods currently used, but also because of possible misunderstandings derived from the lack of clear conceptual definitions. Consequently, before discussing the situation in the area under examination we want to say that in our attempt to contextualize exotics we have chosen to adopt the theoretical definitions given by A. Schofield and D. Olausson.

The identification of what could represent the result of the interplay of physiographical and cultural elements in a given area is in fact of primary importance: this implies to investigate "1st. the spatial and/or temporal context in which an artefact was lost or discarded. 2nd. the circumstances relevant to that loss/discard event ... : ... the specific behavioural context ... the social, economic and political conditions ... - the link, in other words, between material culture and culture generally", but also to evaluate the "3rd. academic and philosophical context in which items are studied" (Schofield 1995: 4).

Within such a frame, foreign objects – i.e. "which originate at some (unknown) distance from the site under study" – can be revealed by the "1) identification of raw materials which are spatially removed from the site under investigation, 2) stylistic elements or techniques which differ from others of the same class of objects on a given site" and can be recognized when "3) two objects [are] found in different contexts at two sites, 4) [there is] a lack of local precedent for a given type, or 5) a limited spatial distribution" (Olausson 1988: 15). Moreover, "the possible mechanisms by which foreign objects are introduced into a given archaeological context can be: 1) the movement of objects alone (trade and gift exchange), 2) objects moving with individuals (traders, craftspeople, bride exchange, etc.), 3) objects moving with groups of people (colonization, war and foraging), and 4) the movement of ideas, not objects" (Olausson 1988: 18).

1 - The Trieste Karst: available data

These concepts must be checked against the available data. The situation of the Trieste Karst region cannot be presented in detail here[1], so we will list only the evidence that we consider most relevant to the subject.

In particular:

-caves and few rock shelters represent the only sites from the Lower Palaeolithic to the Middle Bronze Age;

-over 150 caves (including rock shelters) with archaeological remains have been discovered since the late 19th century: they have been investigated by both amateurs and professionals, with a consequent high variability in the quality of the information

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[1] The physiographical situation, some notes on the history of research and an outline of the prehistoric cultural evolution of the Trieste Karst are contained in Montagnari Kokelj 2001, 2003, in press (with extensive references to previous literature).

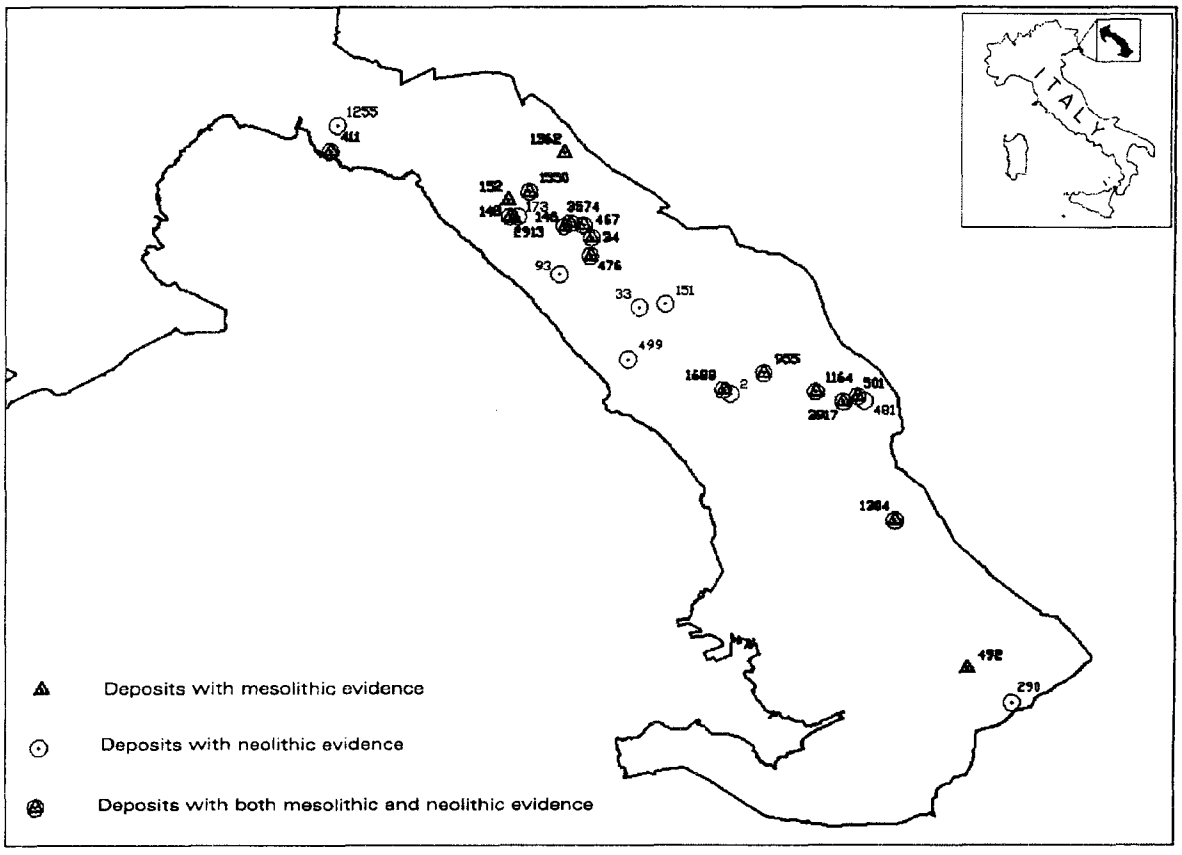

Figure 1. Distribution map of mesolithic and neolithic sites of the Trieste Karst (elaborated by A. Rossi and C. Piano, Department of Geological, Environmental and Marine Sciences, University of Trieste, Italy).

recovered[2];

-in the last 20 years only one deposit with both Mesolithic and Neolithic – grotta dell'Edera – has been systematically excavated, but only few notes have been issued so far;

-the Mesolithic is present in 18 sites and the Neolithic in at least 23 sites, with a high percentage of overlapping (see below and fig.1)[3];

-as to lithics: till now the mesolithic industries have been studied essentially on typological grounds, while the neolithic ones have often been merely illustrated;

-complete re-examination and publication of neolithic and post-neolithic materials from old collections started in the early 1990s and are still in progress;

-interdisciplinary studies – in particular petrographical analyses, sedimentological and soil micromorphological analyses – have been carried out over the same period.

The latest research developments have added new elements to the analysis of the Neolithization process made ca. 10 years ago by one of us (Montagnari Kokelj 1993; see also Boschian & Montagnari Kokelj 1984), without changing its basic conclusions. Probably the most negative of these conclusions was, and still is, the discrepancy between the high quantity of deposits which might document the Mesolithic-Neolithic transition, on the one hand, and the often low quality of the relative data, on the other.

As to the Mesolithic, this discrepancy is at least in part dependent on the fact that only 8 out of the 18 potential deposits have actually been excavated, sometimes with long, successive campaigns: Azzurra

[2] The implementation of a GIS-supported database of all these caves is in preparation (Montagnari Kokelj *et alii* 2003).

[3] The sites on the map are the following: Mesolithic: Benussi 1362 (regional cadastral number), Trincea 492, Riparo Zaccaria 2913, Ladroni 152; Mesolithic and Neolithic: Azzurra 34, Tartaruga 1688, Edera 3574, Lonza 1164, Caterina 146, Zingari 955, VG 4245 - 1304, Pettirosso/Vlaška Jama 148, Gialla 467, Riparo di Monrupino 3917, Ciclami 501, Ansa 1550, Teresiana 411, Moser/Muschio/Jama na Dolech 476; Neolithic: Gallerie 290, Orso di Gabrovizza 33, Cotariova 151, Gigante 2, Mitreo 1255, Tre querce 481, Pocala 173, Tripoli 93, Bersaglio militare 499.

(1961-63, 1982) – the cave where the Mesolithic was first identified and that remains one of the most important sites –, Benussi, Tartaruga (1962-64, 1965-67), Edera (1975, 1990-2002), Lonza, Caterina, Zingari, VG 4245. In the other cases, mesolithic layers have been exposed but not investigated in 2 caves, Pettirosso/Vlaška Jama and Gialla, and in 2 rock shelters, Monrupino (but the allegedly mesolithic materials could be neolithic instead) and Zaccaria; mesolithic artefacts have been recovered at Ciclami, Trincea and Ansa (though the microliths from Ansa could date to the Copper Age); the presence of mesolithic artefacts is sustainable only on the basis of information found in literature in the case of Teresiana, Moser and Ladroni (with doubts for Moser and Ladroni).

Furthermore, the stage immediately preceding the Neolithic would be present in 10 out of the 18 possible mesolithic sites if we include non-investigated sites such as Monrupino (but see above), Trincea and Teresiana, as well as Zingari and VG 4245 where single trapezes were found in the neolithic layers; but if we exclude them, the number of deposits with Late Mesolithic decreases to 5, i.e. Azzurra, Benussi, Tartaruga, Edera, Lonza (in the last instance with some doubts).

As no Neolithic is attested at Trincea and Benussi, when we consider the sites with both late mesolithic and neolithic evidence their number oscillate from 8 to 4 according to the exclusion criteria adopted.

2 - Old and new interpretations

It is clear that the limited or absent investigation, stratigraphic unreliability, the difficulty of comparing analyses carried out by using different typological lists[4] bear negatively upon both objective data and interpretations of the Mesolithic-Neolithic transition. In spite of this, some observations made in the past can be reconsidered now in the light of the new evidence.

As to the Late Mesolithic, trapezes are certainly not the only artefacts of the Castelnovian phase, but are the most diagnostic especially when the sample is biased by the lack of systematic water sieving. The 1961-63 excavations at Grotta Azzurra already revealed a low incidence of trapezes in comparison with the total number of mesolithic tools, and with that of microliths in particular; this observation, consistent with the results of later investigations in other deposits, has been confirmed by the 1982 campaign in the same cave (Cremonesi *et alii* 1984; Ciccone 1992).

The use of modern standards in field research and subsequent study of the materials has allowed to determine the incidence not only of trapezes, but of the whole late mesolithic components, and to focus on the relations among the different elements of the *chaîne opératoire*. Although not all data are published, also a broad comparison is significant: the mesolithic sequence in general includes 380 cores, 50 rejuvenation core flakes, 182 microburins, 13.498 unretouched blades and flakes, 41.601 débitage products and 2132 tools (including 55 microliths), while only 905 blades-flakes and 818 tools (with 92 microliths, 14 of which are trapezes) come from the levels dated to the Late Mesolithic (Ciccone 1992). The close structural analysis of the 1982 materials has thus confirmed a reduced human presence in the Karst during this period, limited to an early stage of the Castelnovian, revealing at the same time that there are no evident changes in the techno-typological composition of the lithic industries between the Early and Late Mesolithic.

A further decrease in site use, indicated among other things by a reduction in the number of lithic artefacts, but a drastic change in terms of typology, technology and raw materials characterize the post-Mesolithic sequence of Grotta Azzurra as well as of other caves. Few data are sufficient to understand the dimensions of the phenomenon: 2356 mesolithic tools were recovered in the 1961-63 investigations at Grotta Azzurra *vs.* 7 flint pieces (1 tool) and 274 pottery sherds from the neolithic level, 2132 *vs.* 0 and 30 respectively in the 1982 investigations; 613 mesolithic tools *vs.* 21 neolithic pieces (2 tools) and 87 sherds come from the 1975 excavations at Edera[5].

In these cases the results of recent sedimentological and soil micro-morphological analyses offer a well-founded explanation: they indicate in fact that the post-Mesolithic layers of these deposits[6] are coprogenic, i.e. that these caves were used repeatedly, though probably discontinuously, as stables (Boschian & Montagnari Kokelj 2000).

Direct evidence of *fumier* layers – made up of thoroughly disaggregated and burned herbivore droppings, that can take the form of layered heaps of ashes and charcoal with high quantities of spherulites and phytoliths or of sub-horizontal, broadly spaced and rather wide homogeneous brownish deposits with interbedded black and white lenses and layers (Fig.2) – have been found also at Caterina and Lonza, while

[4] The typologies more commonly used are those elaborated by the School of Pisa and by G. Laplace, but others have been occasionally used too (the articles included in the volume *Il Mesolitico sul Carso triestino* 1984 exemplify the situation).

[5] These figures are taken from the literature and from recent, still unpublished re-examinations of the post-Mesolithic materials of the old collections.

[6] The preliminary information on the 1990-2002 excavations at Edera confirm the previous data.

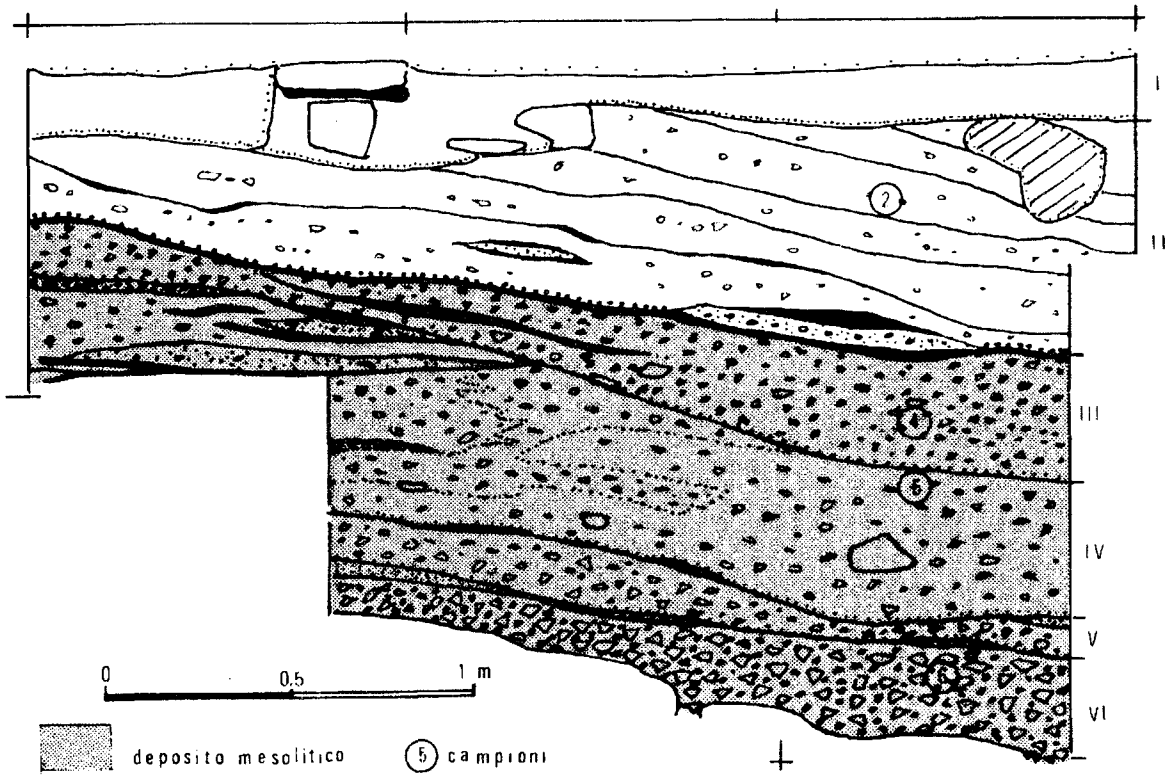

Figure 2. *Fumier* layers of Grotta Azzura (from Boschian & Montagnari Kokelj 2000).

the re-interpretation of old data suggests a similar use in the case of Zingari, VG 4245, Cotariova and Orso[7].

Stabling is likely to have started already in the Early Neolithic[8], even if the beginning of this activity is often difficult to ascertain beyond doubt, owing to the scarcity of material remains – which is a typical correlate of this specialized practice – but also because the boundary between mesolithic and neolithic deposits is often a paraconformity, that is a sedimentary *hiatus*. This means that if transitional layers had ever been present, now they are no longer preserved.

The implications of this situation are still to be evaluated completely, and the results of the 1990-2002 investigations at Grotta dell'Edera can be important. Here the *fumier* layers and the available C14 dates, though perhaps not fully reliable due to the high standard deviation[9], suggest that the reworking of older strata was a primary process in the formation of layer 2a, where the first stage of the Neolithic is documented by materials of the Vlaška cultural aspect.

As a matter of fact, the Adriatic early neolithic Impressed Ware culture would not be present in the Karst: the few Impressed Ware pottery fragments allegedly found at Pettirosso/Vlaška Jama, Orso, Gallerie, Ciclami and Azzurra have not been traced in the recent re-examinations of these caves, with the only exception of a single sherd found at the base of the neolithic layer in the 1961-63 excavations at Grotta Azzurra (Cannarella & Cremonesi 1967: 298, fig.5/1). In our opinion, this fragment, like those of two coarse vessels found together with late mesolithic flint artefacts in layer 3a of Edera and identified as of non-local production through preliminary archaeometrical analyses (Spataro 1997-1998: 72), might simply indicate the first contacts between local mesolithic communities and foreign neolithic groups, as postulated by M. Zvelebil in the Availability Model elaborated for the study of the processes of Neolithization and tentatively applied also to the eastern Adriatic regions and the Balkans (Zvelebil 1994: in particular 116-120).

[7] The re-interpretation of the data from Grotta dell'Orso was not included in Boschian & Montagnari Kokelj 2000, and is based on the description of the deposit given in literature (Marchesetti 1890: 162).
[8] This chronology is almost certain at Azzurra, Edera, Zingari, VG 4245 and highly probable at Orso.
[9] Layer 2a: 6305 ± 285 BP, 6445 ± 210 BP, 6590 ± 100 BP; layer 3a: 6700 ± 130 BP (Spataro 1997-1998: 66).

3 - Further considerations

The characterization analysis of the raw material of the lithic artefacts associated with pottery in layer 3a of Edera, as well as of other vessels from the neolithic level at Azzurra could confirm, or disclaim, this hypothesis. Similar analyses of materials from other deposits where the Mesolithic-Neolithic transition is likely to be documented might demonstrate that the situation of Edera and Azzurra exemplifies a more generalized local phenomenon.

However, we believe that the interpretation of the results will not be straightforward, because it always depends on the theoretical models used by individual scholars[10], and because models created to study different phenomena can/must overlap, as in archaeological contexts there is very often a "problem ... of equifinality: that a number of different processes can lead to the same resulting pattern" (Scarre 1993: 2).

As to lithic industries, for instance, the presence of exotic materials can be the result of direct procurement by local groups as well as of direct or mediated exchange, where the functional value and the symbolic value of objects are usually inextricably connected. Mobility, which is typical of both hunter-gatherers and pastoralists, can enhance one mechanism or the other, or their interplay.

In such cases only a strict contextual analysis combined with the study of all data on lithic typology, technology and raw material might hint at the processes involved, but a complete coverage of these aspects is not frequent. Moreover, two other facts concerning the identification of raw materials should not be underestimated: characterization analyses do not have the same degree of reliability, due to the intrinsic characteristics of the materials and/or to the developmental stage of the techniques themselves; as the geological formations of possible origin could be located far from the area under examination, the possibilities of recognition are dependent on the dimensions of the geo-archaeological mapping of the sources.

The outline of the general situation of the Karst and of the situation relative to lithic industries at the Mesolithic-Neolithic transition presented so far can be integrated by few observations on the points touched just now. If we consider the most common lithic classes – flint, obsidian and greenstone – we can say that the characterization studies of obsidian are probably the most advanced. Few artefacts were recovered in neolithic contexts of the Karst[11]: they were analysed ca. 20 years ago by means of Instrumental Neutron Activation Analysis and the results indicate that most of them come from the Lipari islands, in southern Italy, while one single item comes from the Carpathian basin, more precisely from the source area of Szöllöske and Malá Toroňa in Slovakia (Williams Thorpe *et alii* 1984). The fact that no cores or other elements of the *chaîne opératoire* were found together with the obsidian artefacts would indicate that these objects were manufactured elsewhere and entered the Karst as finished products.

Greenstone – the archaeological name of metaophiolites of high pressure, commonly used in the production of polished tools – has petrographical characteristics that, combined with sophisticated techniques of analysis, allow a reliable identification of the source. Ca. 50 polished stone artefacts of different typology – mainly axes/adzes and shaft-hole axes, but also other tools and ornaments – and different chronology were found in Karst caves, and many of them are still preserved (Montagnari Kokelj 2000). In the second half of the 1990s a small lot of shaft axes, of post-Neolithic age, was examined by means of Stereomicroscopy, X Rays Diffractometry and S.E.M. (Scanning Electronic Microscopy): the results exclude their origin from north-western Italian sources, and point to a probably eastern provenance from geological deposits still unidentified (D'Amico *et alii* 1996). A strong orientation of the Karst towards regions to the east and south-east throughout the late prehistory emerged already at the middle of the 20th century, mainly through studies of ceramic materials: new analyses of the neolithic greenstone artefacts could further confirm this tendency. The different state of preservation of greenstones, ranging from complete, apparently non-utilized artefacts to fragments of worn-out tools, as well as the apparent lack of production waste, are two other elements that deserve close attention in order to hypothesize the mechanisms of introduction into the local contexts.

The reliability of characterization studies of flint is highly debated at theoretical level. In any case, analyses of materials from Karst deposits have been carried out so far only at macroscopic level and only in few instances, essentially Edera – 1975 excavations (Boschian & Pitti 1984) and Azzurra (Cannarella & Cremonesi 1967; Ciccone 1992) for the Mesolithic and Zingari (Gilli & Montagnari Kokelj 1994-1995) for the Neolithic. Moreover, the implementation of a GIS-supported database of the regional primary and secondary chert formations is in progress (Montagnari

[10] See Bruckner & Montagnari Kokelj 1998 for some comments with special reference to the circum-Adriatic regions and the Balkans.

[11] The attribution to the Neolithic, though almost certain, is not always supported by stratigraphic data.

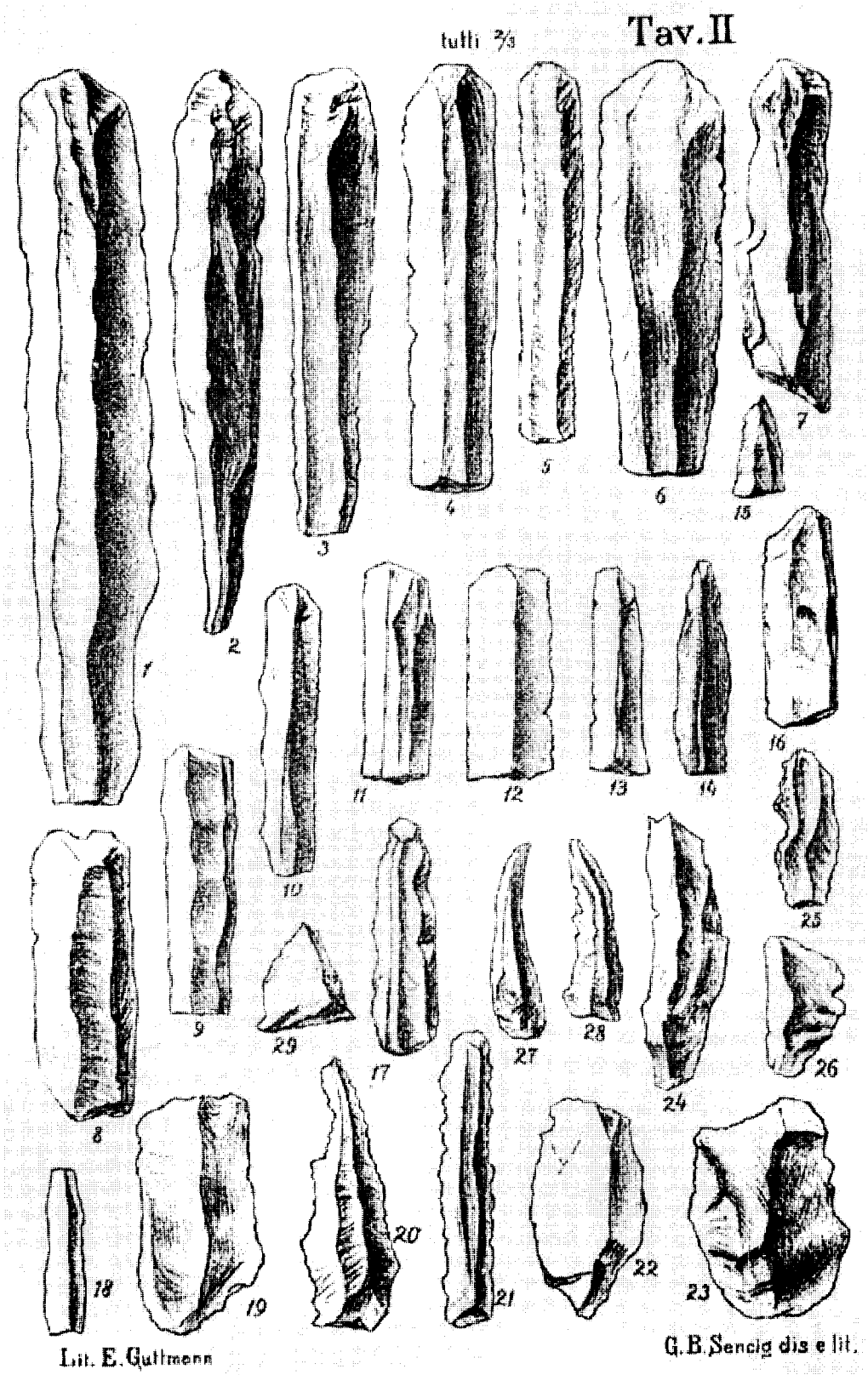

Figure 3. *Long blades* and other materials from Grotta dell'Orso (from Marschesetti 1890).

Kokelj *et alii* 2003a), but similar instruments of analysis are not yet available for the surrounding areas. Nevertheless, by combining the available data we can maintain that there was a prevailing use of local chert during the Mesolithic, with a limited presence of non-local lithotypes of good quality that seem to be more common in its recent phase; these lithotypes become predominant in the Neolithic and remain so in later periods (see also Boschian in press). As to the Neolithic, these data are consistent with the changes in typology and technology, as well as in use of the sites, indicated above.

At present, though we can be quite confident of the exotic origin of most neolithic and post-neolithic flint artefacts, we can only guess about their origin. A preliminary macroscopic analysis would indicate a generic similarity with lithotypes present in the Lessini Mountains of northern Italy, on the one hand, but also along the eastern Adriatic coast, on the other[12]. This resemblance is not really surprising, because similar and coeval sedimentary environments and diagenetic processes can produce lithofacies that are not easily distinguishable at macroscopic level when the samples are no longer *in situ* and specific markers of various nature – palaeontological, palinological, mineralogical, etc. – are missing. A close analysis first of the microfacies, and then of the palinological aspects, the mineralogical ones, etc. is necessary to try to characterize the artefacts with more precision.

The techno-typological characteristics of the industries do not seem to be discriminative either. As a structural analysis of the industry is often impossible, due to the very low number of artefacts and/or to problems of stratigraphic position (see above), the study cannot but focus on single artefacts, essentially on the most typical ones, if present. But even these can be ambiguous: *long blades*[13] with triangular or trapezoidal section, sometimes retouched, are a case in point, also because they would appear in different periods in different cultural contexts. In the Karst a few artefacts that can be defined as *long blades* with relative confidence have been found at Orso[14] (Fig. 3) (Marchesetti 1890), Azzurra (Marchesetti 1895; Bregant 1957), Lonza (Lonza 1973-74), Ansa (Marzolini 1975-77) and Monrupino (Cannarella *et alii* 1973-1974): in the first two cases their association with pottery of the Early-Middle Neolithic Vlaška cultural aspect is possible but is not supported by stratigraphic data, while in the other cases it is almost certain. In relatively close areas and in the same timespan *long blades* are present in the Dalmatian Danilo culture (Korošec 1959: tav. 55 ff.)[15], but also in the northern Italian Fiorano culture (see for instance Barfield 1972: 192). The strong cultural connections of the Karst with the Danilo culture, testified mostly by pottery and known at least since the 1960s, are balanced by single elements pointing to Fiorano[16]: which of these areas is then responsible for the presence of long blades here? is the Karst acting as a mediator of long-distance contacts? if we consider the pastoral vocation of the Karst and the fact that *grottes-bergeries* would be specialized flock-parking sites on plateaux visited seasonally by shepherds moving from complementary open air settlements in lowlands or valleys, we can easily admit that these questions are destined to remain open, unless we collect new data from local sites as well as from far-off areas.

Conclusions

To sum up, we can say that, in spite of the limitations inherent in old data, a re-examination of the most significant lithic contexts aimed at studying subjects essentially neglected till now, such as the relationship between raw materials and different components of the *chaîne opératoire*, could give interesting results.

In more general terms, a re-analysis of the process of Neolithization from the viewpoint of the lithic industries would represent "an alternative approach", as said by J. Kozłowski some 15 years ago. The possible continuity of techno-typological traditions from the early phase of the Mesolithic to the recent one, but the apparent break at the Mesolithic-Neolithic transition might indicate that the Karst is oriented towards the Balkan-Danubian zone rather than to south-western Europe, according to the interpretation given by Kozłowski (1989). Nevertheless, this break often corresponds to a sedimentary *hiatus*, and consequently we do not know whether single sites, or

12 We want to thank L.H. Barfield for the information on the Adriatic area.

13 The definition itself of *long* blades is somehow ambiguous, as it depends on the metrical parameters used (see for instance Bagolini 1968: in particular 195-199).

14 A comparability of the artefacts from Grotta dell'Orso with the long blades/super-blades of the Bulgarian Copper Age – first hypothesized by T. Tsonev on the occasion of his visit to the Museo Civico di Storia ed Arte of Trieste (Italy), preparatory to the ESF Exploratory Workshop *The humanized mineral world: towards a social and symbolic evaluation of prehistoric technologies in South Eastern Europe* (Sofia, Bulgaria, September 3-6, 2003) – cannot be excluded *a priori* due to a basic comparability of geological processes that, as just said, can generate confusing macroscopic similarities of materials.

15 L.H. Barfield is among the first scholars who have underlined this similarity (Barfield 1972: 203).

16 These elements are limited to few rhomboids from Grotta Lonza (Lonza 1973-74: fig. 5/12,17,19-20,22; 1 unpublished piece) and single pottery sherds from Ciclami, Gallerie, Pettirosso/Vlaška Jama and Moser/Muschio/Jama na Dolech (Barfield 1972: 203), but the latter are only loosely comparable.

the whole area, were really involved in the Neolithization or not. On the other hand, on the basis of the most recent studies we can assume a rather generalized involvement in transhumant pastoralism, and this opens up new avenues of research that we have already started exploring (Montagnari Kokelj in press).

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DISCONNECTION IN ECONOMIC AND CULTURAL NETWORK DURING LINEARBANDKERAMIK CULTURE: THE EXAMPLE OF MIDDLE MOSEL

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Archaeological research and the relevant publications are often focused on one specialised aspect of the material culture, analysed in very closed details but missing the general view of the of a group or a culture. The result is that one can get an image of a cultural entity which appears as an obvious, coherent system, with its network of affinities or influences over crossing the group itself. Nevertheless, it leads also to a reduced scheme of interpretations that strongly depends on one aspect of the material culture. That is why in this paper, taking the Middle Mosel as a case study, I would like to focus on several, even not all, but main aspects of a culture in order to elaborate a more complex image of the network of intra- and extra-regional relations built on either chance occasional contacts or traditions.

1 - Context

The Mosel, is one of the main afluents of the Rhine that runs on its left river bank. It occupied a very important geographical area within the vast territory peopled by the communities of the Occidental Linearbandkeramik Culture (LBK). The Mosel is settled in its middle part, belonging to what it is called the North-West LBK, a stylistic variety within the-group of the Occidental LBK (Fig. 1). Within the frame of this group the Mosel region is located in its southern part, at the border of other regional LBK groups, that from the Neckar valley, the South-West LBK distributed from the centre of the Paris Basin to the southern part of French Lorraine and Alsace, and at least the LBK of Haute-Alsace. In this paper the direct confluence of the Mosel with the Rhine will be excluded from this discussion, taking into consideration only the middle section of the river.

So far about hundred sites are registered. Their representativity is high because the amount of work through which they are registered ranges from field surveys to extensive excavations. None of them is fully excavated. The distribution of the settlements tends to express clusters seeming not only linked with archaeological state of knowledge. The region is characterised by a lack of siliceous rocks of a quality good enough to produce a blade debitage in the tradition of the true LBK. The necessary procurement of flints from the outcrops surrounding the country would suggest established relations with those regions. A question arises whether this economic network is connected with some other aspects of the material culture, such as the tools production, the architecture or the ceramic decoration style.

2 – Lithic industry

The procurement in siliceous materials for the Mosel valley shows four types of management clustered in four geographical groups of settlements (Fig. 2). One group is centred on the depression of Wittlich (Germany), and constitutes the major source to the procurement network of the Belgian-Dutch region. At the same time they maintained connections with occidental sources of the East fringe of the Paris Basin. Another one is the Luxembourg cluster essentially oriented towards the import of flint supports or tools made on Belgian-Dutch flint. At least some rare sites seems to focus mainly either on the occidental sources or on the local hornstones.

Even if we have no direct comparisons in between the settlements from Luxembourg and North of Lorraine, we can point out that no differences exist between long/short time settlements or in sites installed in valleys or plateau's. The origin of the raw material of the set of tools gives a homogeneous image whatever is the oro-hydrographical position of the settlements, even their chronological one.

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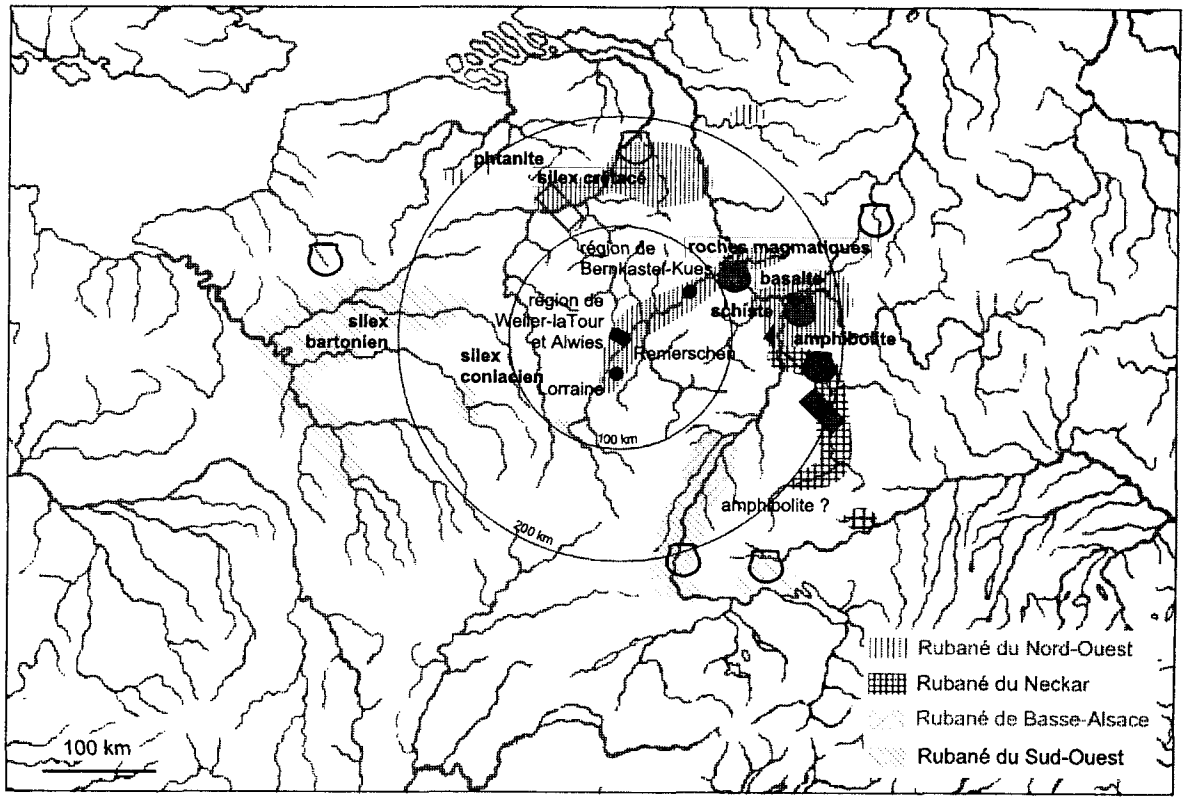

Figure 1. Localisation of the Middle Mosel valley in the cultural context of the Occidental Linearbandkeramik Culture (raw materials, arrowheads, architecture, ceramic). A dark pictogrammes or framed words indicates the strongest relations.

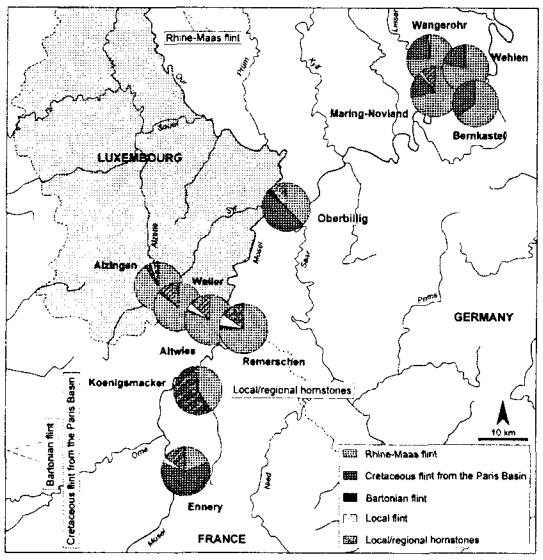

Figure 2. Detail of the raw material procurement for some settlements of the Middle Mosel (data after Hauzeur 2003; Petitdidier et al. 2003; Schmidgen-Hager 1993).

The two settlements characterised by the majority of flint coming from the Paris Basin (Ennery, Lorraine ; Oberbillig, Germany) share a common chronological position in the most recent phase of the Mosel LBK. They could attest a turning over the Belgian-Dutch procurement coming from the North of the North-West LBK into a new network in process of establishing an extra-territorial western route. So far no explanations have been given to that phenomenon.

If the Middle Mosel has involved throughout raw material procurement a major axe of relation in the direction to the North, but still remaining inside the stylistic province of the North-West LBK, it is interesting to observe that this main direction does not find the same correspondence in the flint tools, pottery, and architectural traditions.

According to the present state of knowledge and studies, the lithic inventories from Luxembourg do not express evident differences. As for the raw material procurement it seems that no clear distinctions can be made from the point of view of the topographical position (valley/plateau) as for the chronological one (long/short occupation). On the contrary, the analogy

noticed between the settlements of the Middle Mosel and those of the Neckar valley appears to be linked by an identical quality – rather mediocre - of the local raw materials (hornstones). These two regions are indeed characterised by the absence of good quality flints and/or nodules of important size which is in contrast with the northern regions of the North-West LBK, where the settlements are established on or nearby the outcrops.

The main feature of the Mosel assemblages is the generalised presence of arrowheads and *pièces esquillées* in quantity. This high frequency can be explained by the combination of imported tools and reuse cycles. The *pièces esquillées* are obviously the final step of the transformation/reutilization cycle of the used tools, such as the sickle blades and the scrapers. The latter "disappear" from the lithic assemblages through this process of reuse. The arrowheads undergo markedly less the recycling process and in case of reuse continue to have the same function. Their quantity in the assemblages remains the same compared to the domestic tools.

Notwithstanding the economic necessities which could have influenced the morphology of the arrowheads of the Mosel region, these artefacts show throughout their characteristic features a great resemblance with the southern countries such as the Neckar: predominance of symmetric arrowheads and left lateralisation of the shaping retouch (Fig. 3).

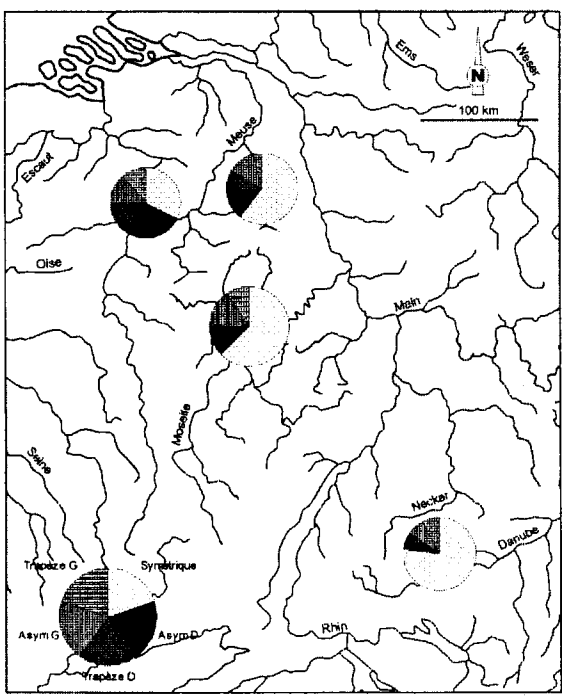

Figure 3. General distribution of arrowheads, symetrical or lateralised (detailed data in Hauzeur 2003).

Concerning the adzes, the raw materials used for the manufacturing are coming from local or regional outcrops. The basalt rocks are dominant and are easy to collect when the Mosel cross the Eifel and Hunsrück, nearby the clustered sites of the depression of Wittlich. Other volcanic or metamorphic rocks originated from the Middle Rhine region. This rather local procurement contrasts with the long-distance imported tools made on northern flints from the Meuse basin.

3 – Domestic units

The few rather well preserved plans of houses which have been excavated on the territory of Luxembourg evoke an architectural tradition turned towards the south-eastern regions such as the Neckar. It concerns mostly the houses with bipartite internal division. The nearly systematic presence of a rear foundation trench is in contrast with its rare occurrence in the northern regions of the North-West LBK (Fig. 4). The same phenomenon can also be observed with the shape of the plans. The Mosel territory counts a majority of rectangular or pseudo-rectangular plans, which is very similar in proportions to those from the Neckar valley, even from Bavaria. On the contrary the northern regions of the North-West LBK show more diversity and can be distinguished from the southern ones by the presence of trapezoïdal shapes such as in the Paris Basin.

Despite the fact that the Mosel valley belongs to the North-West LBK, these architectural features are not linked with flint procurements, and express by somewhere the weight of the tradition exceeding the regional border of groups defined by ceramic style.

One of the Luxembourg settlements occupies an unusual topographic position for LBK sites, when these settled normally on the lower fluviatile terraces or on plateau's. It is installed at the edge of a rock shelter head created by tectonic movements. This constitutes the very end of the main plateau, with an open large view spreading down to the Mosel valley provided there are no dense bushes. Moreover the village is directly installed on the sandstone substrate, just covered by a thin layer of sediment. We thought about extraction and distribution of this raw material to other settlements in the surrounding (used as mill- or grinding stones), but no evidence was found during excavations. Even in the lithic assemblage, there is a lack of this material and the corresponding implements. This site could be a special point out of the occupied territory as a limit of a cluster of other villages which are settled in the background plateau and/or could have offered a mark point in the landscape.

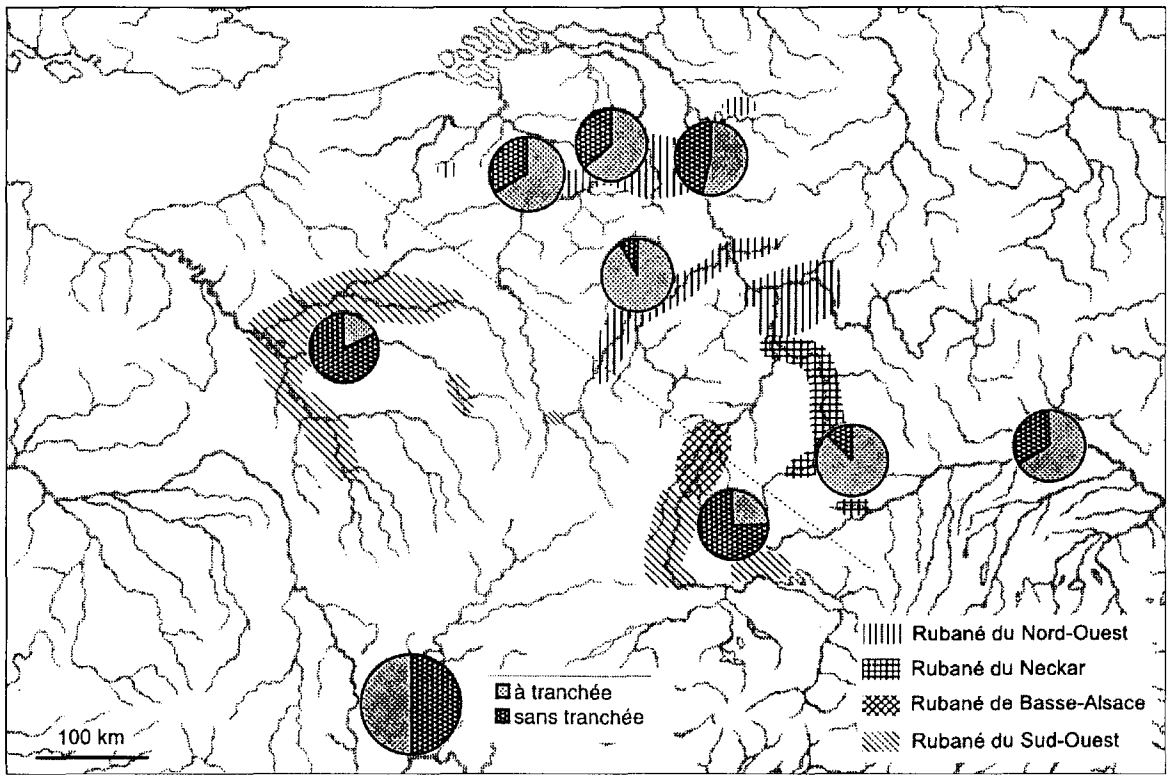

Figure 4. Presence or absence of a rear foundation trench in the houseplans, and its relative frequency amongs the main Occidental LBK groups.

4 – Ceramic

The pottery corpus of Luxembourg settlements indicates a clear stylistic connection with the Middle Rhine, from the confluence of the Rhine-Mosel-Lahn till that with the Main. This "genetic" link manifests itself by a strong similarity with the "Plaidt style" in the decor components such as their organisation (Fig. 5: 1-3,9-10).

In such a frame, ornamental elements of a peculiar style or original decorative organisation gives more information about the relations between the Mosel and easterner countries, such as, for example, the "stylistic province of Leihgestern" (Fig. 5:11,15). The foreign stylistic patterns or decorative organisations reveal contacts between some North-West LBK groups and other contemporaneous groups or cultures. Though few, these elements testify the affinities of the Mosel with the Neckar LBK (Fig. 5:5), with the Hinkelstein Culture (Fig. 5:14,18), and in another direction with the Paris Basin during Late LBK; amongs others the Blicquy – Villeneuve-Saint-Germain Culture (Fig. 5: 17).

Most of these links that are visible throughout the ceramic styles have no direct connections with economic purposes in relation to flint tools procurement. For that, the massive presence of flint from the Meuse basin in the lithic assemblages of Middle Mosel compared to the rarity of pottery in Rhine-Meuse style (Fig. 5:7-8) makes a strong contrast. It is as if the Mosel populations would have no direct contacts with the northerners or stay impervious to external influences. The noticed contacts with the Neckar valley report more from a tradition or roots. Obviously it is not the poor quality of the hornstones, like those in the Mosel basin, which has induced relations with that region.

More evident contacts combining both the ceramic style and siliceous rocks procurement pattern appear with the Paris Basin. Some LBK settlements of Lorraine kept up the same direction of both economic links (Coniacian flint), and decoration of the pottery (garland motives) at the final stage of the LBK development.

5 – Conclusion

The apparent disconnection between the north-

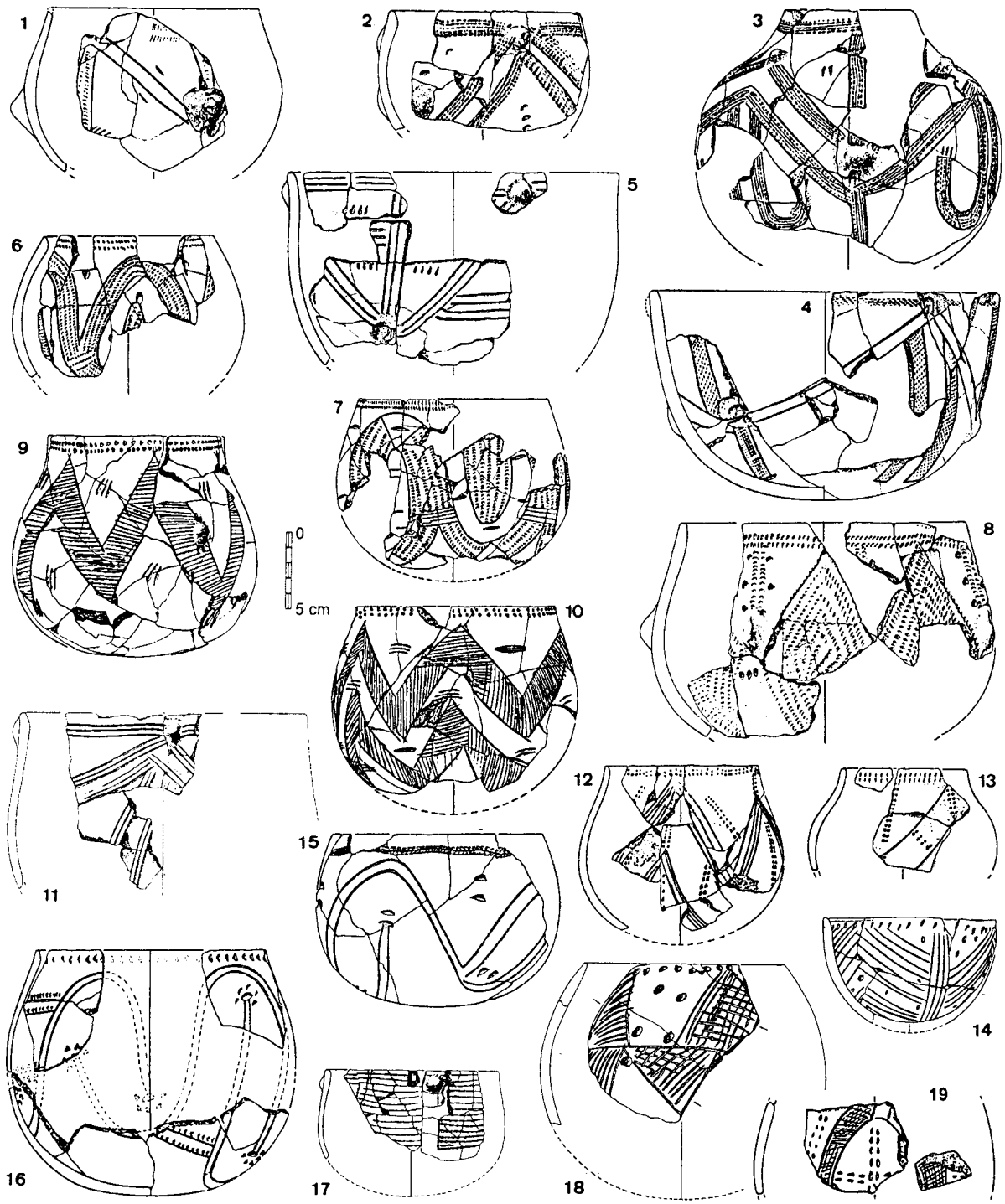

Figure 5. Potteries from the Luxembourg settlements, illustrating different affinities, local (Middle Rhine), regional (Leihgestern, Neckar, Alsace) or from other cultures (Hinkelstein, Blicquy - Villeneuve-Saint-Germain).

ern region of the North-West LBK and the southern one (Mosel) could find an explanation. The origin of the raw material points out the exchange direction, but the lack of pottery of Rhine-Meuse style could indicate a distribution of the manufactured products by the Northerners, who travel to the Mosel and not the con-

trary. In such a case, the Mosel groups would have nearly never seen Rhine-Meuse pottery, except those brought by the North-Western people. This could be an alternative hypothesis to explain partially the contrast between the style links for tools, ceramic, architecture, and the economic ones for flint.

Whatever the explanation we can propose, this case study tells us about the great variety and richness of the network imposed by the necessity of raw material procurement. More interesting is to realise that connected or disconnected with the other identity aspects of a community the mineral world as well as the material culture in general reflects the complexity of human societies.

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LONG-BLADE DISTRIBUTION AND APPEARANCE OF EARLY NEOLITHIC TULIP-LIKE POTTERY IN EASTERN BALKANS

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'Exotic' artefacts deliberately deposited in habitual and non-habitual archaeological contexts raise a number of questions about the constitution of the tell-settlement social model in the Balkans.

Anthony Giddens points out the importance of the 'positioning' of the body and the context relative to one another (1984: xxiv-xxv) and focuses attention on the 'regionalization' of encounters. Locales are not just places but settings of interaction. Time-space 'fixity' means social fixity; the substantially 'given' character of the physical milieus of day-to-day life interlaces with routine and is deeply influential in the contours of institutional reproduction (*ibidem*). The major question is how large social systems span large sectors of time-space.

On such a theoretical background we may ask the question how the new social system of tell settlement (the Karanovo I culture; Nikolov 2002) appeared and spread over a large area in the Middle Thracian plain and maintained its uniqueness for a long period of time. I shall focus on the presence of 'exotic' artefacts, materials, and on 'unique' features like pottery decoration. These characteristics delineate the field of social interactions: gender tensions and gender relations which are underlined by the remarkable absence of artefacts vested into symbolic violence: arrowheads, projectiles, microlithic points, etc.

In the archaeological record the vision of the existing tensions between the sexes appears in house and pottery decorations, in the way the settlements are organized, in the presence/absence of exotic materials, 'special' artefacts, grave goods, etc. It functions as a system of categories of perception, as ways of thinking, and in the habitual actions (Bourdieu 1988). The milestone of this complex social system is the gradual development of the idea of home (Tsonev in press). The different social roles, and especially the control imposed on domestic violence, lead towards constitution of legitimate social institution, such as 'home' that unifies and smoothes the sexual and social differences and neutralizes them as sources of social disturbance. The newly emerged public domain in the PPN in Anatolia gradually gives way to the much more flexible institution - the home. On the one hand, such an institution can effectively control the violence based on sexuality (J. C. Chapman, lecture delivered in New Bulgarian University, April 2003), and, on the other, can control the violence based on public disputes. The late tell-settlement model of early pottery Neolithic in Anatolia and the Balkans reveals exactly this: the domination of separate home (households) on tells. All the houses on them seem to be uniform, built on exactly the same foundations, and with remarkable absence of public buildings, arrowheads, projectile points, microlithic points, etc. Instead, we have rich house decoration (Catalhoyuk, central Turkey), richer pottery decoration (the Karanovo, tell, Thracian plain), and mass long-distance imports of obsidian artefacts (in Anatolia, in central Balkans, Serbia), and high-quality flints from northeastern Bulgaria in the Balkans. In the early Neolithic contexts in the Balkans, the 'exotic' high-quality flints take the form of long blades (8-12 cm long) that travel long distances to Turkish Thrace, south Bulgaria, northern Greece, Macedonia, Serbia, and probably to the Trieste Karst (Grotta dell Orso, the exhibition in the Trieste Archaeological Museum).

I would like to consider briefly the complex role of the idea of home within the basic contradiction of the early development of tell-sites of PPN in eastern and central Anatolia. At this initial stage of development of tell-sites, it is the public domain that symbolizes the unity of the different kin or lineage groups. The accent is put outside the private domain. It was not the settlements themselves as a homogeneous whole, but the public, value-laden structures that turned out to be the focal point of the wider community network.

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They had to manipulate and put under control the newly emerged large inter-group conflicts, violent actions, and to maintain the community's integrity on a base of a common tradition. Thus the public domain incorporates 'power', 'prestige', and 'wealth' that better convey the strong messages needed to regulate the intensive negotiations among different social actors and group identities. The complex reality of tell settlements caused the appearance of a variety of prestige objects: projectile points, flint daggers, long pressure made blades, microliths and geometrics, the wide spread of obsidian and high-quality flints, stone balls and artistic images and sculptures. The paradox of the social model of tell-settlement is that at this early stage of its development the male symbols become visible in the public domain, but they do not go beyond a temporary, single act of 'collective', homomorphic expression – collective feasts. The potential of the arena of social power to both unify and divide pushes the public domain up on the surface, while at the same time makes it superficial and its acts cannot effectively control the inter-community violence. A much more flexible social institution is needed that can redefine gender relations and can incorporate and put under control the violence of the public disputes. And this institution turns out to be the home (household). The new role of the private domain both constitutes and contests the public one. A 'home' viewed through the social practices and their perception by the emerging complex societies encapsulates in it the experience of the living and the realm of ancestors. A 'home', on the other hand, is viewed as a major social arena, which goes beyond conventionalities of existing differentials of wealth and access to resources that rank people in the outside public domain. The outside of home space remains mainly the area where conceptual inequalities often taken as 'natural' – age and gender – almost always have political dimensions (Strathern 1988). This mutual influence between the public and the private domains causes substantial and radical changes in settlement patterns, architecture, material culture and aesthetics of these early communities. Unlike the neo-Marxist approach that views the gradual, socially preconditioned change with little room left for individual actor the present approach seeks to justify the individual's symbolic constitution which generates emotional commitment to social order.

The fact that the cultural selection of semantically significant features almost always takes natural forms helps transfer social relations into homologue relations and inter-connections. This transforms the social into natural necessities through the otherwise arbitrary, symbolic inversion of the cause and effect processes objectively visible in the natural and human worlds. For example, the early Neolithic tulip-like bowls represent a skilful artistic deviation from the more natural forms of deep round bowls made of stone/marble that are well-known from the earlier pre-pottery Neolithic in eastern and central Anatolia. Unlike stone clay is plastic and better conveys human messages and symbolic meanings (Wengrow 1998). Such a logic of symbolic dedication to human and natural cycles of repeated human experience constitutes natural division between sexes in terms of common mythology and abstract presentations of common metaphors. Among the early Neolithic in the eastern Balkans, it is only the pottery decoration (especially the white painted pottery) which stands in remarkable contrast to the other archaeological features and artefacts that show significant uniformity replicated over large regions. The artificial monumentality of the Thracian tells is opposed by the diversity of the white painted pottery decoration. This semi-objectivity of the systems of representations implied by the pottery forms and decoration reinforces the female ideology of claims over control of private domain (the house/household).

Unlike pottery styles, however, the appearance and spread of long blades and imported high-quality flint varieties remains a highly contested social arena by male and female ideologies in the early Neolithic. The 'effectiveness' of communication between various social actors would depend on the experience induced by mystification of materials, techniques, places, people, and the vividness of imagery of selected natural symbols. This creates a characteristic way of knowing which gives visual representations of ancestrally granted, mystified practices of extraction of special materials (high-quality flints), production of particular artefacts and long distance exchange.

As guidelines for the analysis of the social role of long blades, we can use the following traits: fragility of long blades, the interesting texture and colour of the flint varieties they are made of, the direct distribution from workshops, their uneven spatial distribution. The direct distribution from workshops and the interesting texture and colour implies a lifestyle of their owners that is different from that of the rest of the community. Those who possessed such objects justified their social status by their connection to the remote workshops and the control they probably exerted on the exchange mechanisms. The redistribution of high-status objects (the uneven spatial distribution) created a dependence on certain social authorities and contributed to the formation of social identities. The fragility of the long blades suggests that they were used also for ritual purposes. The context in which long blades and other lithic artefacts occur is the domestic one. This means that they can be used equally well both by men and by women. In the early Neolithic lithic artefacts tend to occur outside, not inside houses. This also means that domestic activities

were taken as publicly displayed and valued work. The lack of chipped-stone workshops inside settlements (the only exception is the lithic workshop in a house in the Slatina IV early Neolithic site, Sofia) also means that communal actions of acquisitions of exotic materials and artefacts made out of them were undertaken by the community as a whole. Lithic artefacts and materials do not separate clearly the public and private domains. If we take as a criterion for distinguishing male from female activities the labour division suggested by the differential protein intake of the Iron Gate Mesolithic people (Bonsall *et al.* 1997), we can see that the early Neolithic horizons I and II of the Karanovo tell blades were used approximately in relation 40% to 60% in favour of women (Gurova 1998). While the blurred boundary between the domestic and public arenas does not permit to define clearly the every-day, laborous activities done mostly by women and the long distance communication and exchange probably dominated by men, it is notable the absence of investment in symbolic violence (Bourdieu 1990) expressed by arrowheads, small ritual axes, etc. People fail to identify themselves with particular knowledge, skills, attitudes, etc. that would permit them to conceptualize gender inequality.

The temporary suspension of the spread of long blades and the gradual change of pottery styles in the final Neolithic puts an end to the domination of ancestrally based common metaphors of communication. While the spread of long blades served as an act of ancestralization of a communal perception of long-distance exchange routes, the maintenance of a wide variety of pottery decoration emphasizes the importance of the private domain that dominates the overall communal life on tell-settlements. The human replication of natural forms such as the deep bowls/ tulip-like vessels and their rich ornamentation reinforces female ideologies set against the involving of long blades in the annual cycles of communal ritualization of long-distance exchange networks. The domination of home rooted ritual practices effectively counterbalances the investment in symbolic violence, accumulation of personal power and knowledge on tell-sites. The archaeological record in the Balkans shows male domination symbols spread in other contexts such as early Neolithic cave-sites with presence of male symbols such as Middle Palaeolithic leaf-point, small polished axe, a long blade brought in from long distances. All these 'exotic' artefacts are found together in an early Neolithic context in Grotta dell Orso, Trieste karst region. Rich rock art paintings deep down in a cave are found in the Magura cave, northwestern Bulgaria. But these facts raise important questions about liminality of Karst areas, cave-sites as sacred places, etc. that go beyond the topic of my presentation.

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SOCIAL AND SYMBOLIC MEANING AND VALUE IN STONE TOOLS

Lawrence BARFIELD*

All lithic artifacts like other material culture were inevitably embedded in the social and symbolic world (Edmonds 1996). This aspect of lithic studies ranges from the symbolism of the raw material and its manufacture, through object symbolism, gender associations to value. A symbolic role as grave goods, ritual deposition and in trade and exchange can also be included. Only a few categories of lithic tools, however, - axes, daggers, arrowheads and macro blades - were used as prestige items.

Prehistorians use models based ethnographic analogy and theory to recreate past symbolic meaning but rarely can the archaeological data by itself provide us with a story. In this article I will address this interface between theory and archaeological evidence and look at ways in which we can more directly recognise symbolic meaning and value in lithics.

The two main bodies of evidence that we have for the social/symbolic interpretation are the objects themselves - their raw material, craftsmanship and appearance - , and the archaeological context from which they come.

1 - Value

There is an extensive literature on the concepts of value in the prehistoric past much of it associated with the debates about exchange and social ranking which we cannot cover here (Renfrew 1986). Suffice it to say that it is generally agreed the value of objects and materials in the past was ascribed and not intrinsic.

While this must be largely true it perhaps not surprisingly that some attractive rock types, which also have the utilitarian properties required by stone tools, have been valued in different cultures widely separated in time and space, appealing to a basic common human aesthetic sense. For example, two of the most highly prized materials in Neolithic Europe, jade, used for axe-heads and rings, and obsidian for fine blades, were similarly used and valued in several quite distinct societies and different parts of the world. Both combines the attributes of aesthetic attraction and high technical performance. Of course their *'universal'* appeal was restricted to periods during which stone tools were used; only jade retained a 'value' in Asia for other uses than axe-heads whereas its exploitation was totally abandoned in Europe, in the course of the Neolithic, for reasons not fully understood but perhaps partly in response to the introduction of metal. Indeed the European sources of jade were so totally unknown that archaeologists of the 19th century thought that the prehistoric jade axe-heads came from China.

We can principally judge the past value of lithic materials in prehistoric Europe by the distances over which they were traded and the quality of their craftsmanship. Jade axes had the longest exchange network reaching a distance northwards of almost 2000 km from their northern Italian source.

A feature of the distribution of obsidian in Europe is not so much the distances covered but the ubiquity and standardisation of the production from all known usable geological sources and its ability to traverse traditional 'cultural' boundaries. These are features that suggest a common acceptance of this material across southern Europe that was not just coincidental.

2 - Symbolic meaning

In most historical and ethnographic societies raw materials had a symbolic meaning backed by myth. Thus rock used for axe-heads may be viewed as the bones of ancestors (Whittle 1995) or the axe-heads themselves interpreted in terms of kinship, personal identity and an ancestral past (Pétrequin *et al.* 1998). In north America flint in some areas was related to concepts of north, ice and cold and the underworld and even consider to be a deity (Brown 1995 quoting

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Hall). We also find that the more prestigious the material the more elaborate the symbolism. In New Zealand, Maori jade (*nephrite*) axe-heads, which are remarkably similar in form and finish to European ones, were used in gift exchange and were often of exceptional value, a value which was enhanced by myths and fame acquired through use. Not only were they imbued with benign prestige but the were also used for formal executions and gained power when rubbed on the bodies of the dead (Clark 1965).

A similar mythical and symbolic background has been suggested for stone materials in prehistoric Europe (Whittle 1995) but how can we go beyond distribution patterns and outward appearance described above to discern some of these symbolic meanings in our archaeological record? The colour of Grand-Pressigny flint and the banding of Polish Krzemionki flint along with many other varieties would certainly suggest been the starting point for such stories, but where do we find direct evidence?

If we take the case of Krzemionki flint axe-heads we can see how there is a cycle of growth and decline, from the TRB to Corded Ware, in their production and distribution. The greatest distance of their distribution during the period of the Globular Amphora Culture coincides with what appears to be the period of their finest quality and their greatest symbolic 'value' (Whittle 1995).

At the Middle Neolithic site of Hurst Fen in eastern England a clear colour preference was recognised in that a red coloured flint was deliberately preferred for the manufacture of arrowheads and leaf points when compared with the rest of the flint assemblage (Clark & Higgs 1960). This is a local flint like the rest of the assemblage and we can perhaps make a simplistic interpretation in that it was though to represent the colour of blood, even though more complex mythological tradition may undoubtedly must lie behind this choice.

In Britain a spotted dolerite from south Wales was used for axe-heads (CBA axe group XIII) (Piggott 1954: 300-301). This rock is the same *bluestone* that was employed in the construction of one of the phases of Stonehenge, blocks of which were transported over a distance of some 200 km to the site of Stonehenge. Does this imply a powerful symbolism in the quality of the rock or are the two uses coincidental? If not was the *bluestone* initially significant because it was a rock used for axe-heads or was it because it was identified with megalithic construction?

The axe is indeed one of the most important symbolic object during the Neolithic, partly, perhpas, because it was portable and thus useful as a *primitive valuable* in gift exchange. It had male associations in burials and may also have been symbolic of woodland clearance in preparation for agriculture and thus a mastery over nature (Whittle 1995) or indeed fertility and regeneration (Ebbesen 1993), while contextual and formal evidence points to a link between it and the cult of burial and the ancestors.

One way of identifying symbolic or valuable axe-heads is by their size. That they are usually larger than others as we can see from both the archaeological and ethnographic record. In New Guinea it was the larger axe-heads that were valued for prestige value and display and size was the only feature to distinguish them from working axes (Strathern 1969, Hughes 1977) and there is indeed a continuum of size from the smaller working axes to the larger symbolic ones (Olaussen 1983). That size mattered is also clear also from European archaeological contexts where a similar continuum of size appears to have existed. While some axe-heads appear to be too large to have been used, being up to 0.40 m. long and up to 4 kg in weight in Sweden (Olaussen 1983), we find also that axe-heads from Scandinavian hoards were larger than those single finds (Tilley 1996 quoting Karsten) suggesting that prestige examples were selected from the normal production run of axe-head production as is found in ethnographic examples.

Then there is thesymbolism linking axe-heads with burial and ancestors cults.

We have already pointed to evidence of a link between axe-head material and megalithic structure at Stonehenge In Brittany not only are axe-heads found in long mounds and carved on megaliths, but there is an argument that menhirs themselves assume axe-like form - linked to male and phallic symbolism (Patton 1993). Long, triangular and trapezoidal burial mounds in Scandinavia have similarly been compared with the axe-head form and according to one author axe-heads might even sometimes have symbolised a person, with burial of an axe-head equated with the burial of an individual (Tilley 1996: 320). Since the size of axe-heads is significant in symbolic terms perhaps menhirs are a logical projection of this principle.

If such theorising may seem speculative we can note that the axe/monument link is matched, completely independently, in the interpretation of the dagger symbolism in Italy and Switzerland.. The dagger appears to replace axe as a male symbol in Europe between the third and the second millennia BC. In Italy we find that Lunigiana menhirs (in this case a statue menhir) clearly represented as a dagger (Bagolini 1981) besides having both male and phallic associations. Even further, as with the menhir/cairn to axe-head symbolism, it has been suggested that the triangular shape of stone platforms surrounding stone cists at Aosta and Sion, represent, in monumental form, the shape of a dagger (Bocksberger 1976).

Another approach to assessing past value is to

assess the quality of craftsmanship of an object although this is a somewhat subjective process as it may have involved such different motivation as commercial value, prestige value, or competitive skills between craftsmen.

Jade axes with their remarkably high mirror-like finish rendering them aesthetically beautiful are among finest artifacts produced in Neolithic Europe while obsidian and macro flint blades and bifacial daggers are examples of the high point of the flint workers craft in Europe.

Comparative studies however provide further evidence. A metrical study of arrowheads from different parts of Europe usually shows us that examples from burials are of a higher quality than those recovered from settlements and examples of this phenomenon can be cited from Italy, central and northern Europe and Britain. This may be because settlement finds mainly represent artifacts at the end of their life cycle - very much reduced in size or damaged. On the other hand, however, better quality arrowheads may have been specifically selected, or manufactured, for burial.

Some exceptionally fine arrowheads and daggers, such as the arrowhead 'sets' from the Early Bronze Age tombs in Brittany and Chalcolithic megalithic tombs in Andalucia in Spain, flint daggers from Remedello di Sotto, in northern Italy, are of such a quality that they do appear to have been deliberately made for burial (Mottes 2002). Probable further evidence for this practice was found in the Riparo Val Tenesi at Manerba, a collective burial site on Lake Garda, Italy where the intensive retouching of arrowheads seems may have been connected with the preparation of grave goods or offerings; arrowheads being the most frequent flint item of the site (Barfield 1984).

Even though high quality products are characteristic in most cemeteries, however, besides high quality arrowheads and daggers in fact a range of quality is also present. This is the case at Remedello di Sotto, Italy where besides the classic long 'Remedello' type arrowheads there are very inferior arrowheads in the graves. In Schleswig Holstein only 51% of the daggers are interred in a pristine condition - the rest have various degrees of reworking (Kuhn 1979: 41), while in the gallery graves of the Wartburg culture, in Northern Germany, the arrowheads range in quality from very fine to '*kaum ansprechbar*' (Raetzel-Fabian 2000: 102).

3 - Non functional as symbolic

One criterion for judging the symbolic character of an artifact is that it could not have served the function that it seems to represent. The fragility or unsuitability of some materials and products also points to a non-functional use. A biface of *phyllite* in Iberia (Forenbaher 1999: 88) and axe-heads of chalk in Britain have been cited as tools which because of the nature of their raw material must be symbolic tools. The fragility of Iberian barbed arrowheads such as examples from tombs in Andalucian Spain (Gonzales Rodrigues & Ramos Muñoz 1988) likewise could only imply a prestige or symbolic use as grave goods. In the same way an extremely thin non-functional bone dagger in a grave at Spilamberto clearly symbolises a flint or metal dagger (Bagolini 1981).

One categories of stone tool for which a symbolic function is often suggested are the stone battle-axes / axe-hammers and mace-heads which were often made of exotic rocks, although as with the unperforated axes could also be of inferior quality. A range of function, from practical to symbolic, comparable with the size range in unperforated axes, may match the variation in quality of material and craftsmanship. They appear, surprisingly, most commonly at a time when metal is replacing stone as the main axe materal so to what extend were they indeed functional? Broken and damaged axes appear in settlements and evidence has been produced which point to maceheads having inflicted wounds on skulls in Tuscany (Fornaciari 1979). On the other hand if we look at the impracticably long and thin decorated wooden haft of the battle-axe from Lake Zug (Hochuli 2000) we can see that we are dealing with a clearly symbolic weapon with a haft that can be compared with the representations of ceremonial halberds in the Mont Bego rock art (Barfield 1969).

4 - Contextual evidence for symbolism

Many artifacts whose appearance seems to reveal little of little symbolic significance in isolation, do reveal such values the context of burial ritual placements and hoards. While a prestige burial may be identifiable by the presence of high quality lithic artifacts, it is the burial context itself that provides evidence for other aspects of the *social persona* such as age and gender which may correlate with more mundane artifacts. By and large male attributes are remarkably consistent across Europe. In particular we find these are axes (in Neolithic) which are replaced by daggers (from the end of the fourth millennium) and arrowheads (implying a complete archery set).

While weapons are an understandable male correlate the regular occurrence of strike-a-lights (fabricators) is less understandable. They occur with male burials in Germany, Scandinavia, Italy and Britain in the 4th and 3rd millennia. We traditionally associate fire with the hearth and home and thus perhaps with women. However since settlement fires are usually kept burning and new fire can be borrowed when

extinguished, it may be that males, who were more likely to travel, needed more often to create fire - as clearly shown by the Tisenjoch Iceman.

We cannot here go into the problems of the meaning of grave goods - whether they were included with the dead deliberately to symbolise, wealth, gender and age groups or were they just personal possessions associated with the individuals when they were living - and buried because of sad associations or being on the body (Ucko 1969). Suffice it to say that more attention needs be paid to this aspect of interpretation, and the artifacts that are excluded from burial, such as sickles and scrapers etc., if we are to fully understand the relationship between artifacts and society.

We conclude that lithic artifacts can contribute to an understanding symbolism and value in the past, however interpretations remain subjective unless we have a convergence of several strands of ethnographic, theoretical, contextual and formal evidence.

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THE THINGS WE DID NOT FIND

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In the spring 2001 the site of Čatež - Sredno polje was excavated in Slovenia. The present article presents some further possibilities for research based on the questions formulated on the basis of the archaeological record discovered at the site.

When we would like to focus our attention on the smallest finds on archaeological sites, we have to ask ourselves questions about our own general conceptions of archaeology. One of the most important questions is '*What is archaeology about*?'. According to my personal opinion one of the best definitions has been provided by Clive Gamble in his general and for the broadest audience written introduction to the science of archaeology (Gamble 2001:15):

> "[Archaeology is] ... *basically about three things: objects, landscapes and what we make of them. It is quite simply the study of the past through material remains*".

This is his classical statement in which facts become meaningful when they are contained in a story and every story is an appeal to our archaeological imagination. Stories do not form out of nothing, they are logical consequences of our questions about the past. So archaeology is about the questions we formulate about the past and not about the past itself.

As we acknowledge the importance of questions formulated we are getting increasingly aware about the differences of the intellectual milieu in which research is conducted. Different research traditions are just different traditions of asking questions about the past. With this in mind, the readers should understand that this article is a product of Slovenian archaeology and tries to propose solutions to the problems emerging in current archaeological research in Slovenia.

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If we look back upon whichever period in the Slovenian archaeology, we can realise that, despite the small size of the country, synchronous archaeological overviews are still divided on the bases of individual, but strictly culturally defined characteristics of the discovered material culture. Despite the tradition of the prehistoric archaeology with its conceptual apparatus deeply rooted in the observation of the chronological and spatial dynamics of the cultural phenomena, the regional archaeological studies kept their impetus along with the introduction of the "New archaeology", which was partially transferred in to the Slovenian intellectual milieu at the beginning of the 1980-es. This is exactly the period when the systematic surveys became the key method for collecting archaeological data in the landscape. On the one hand this made us aware of the distribution of the archaeological finds in the landscape and of the processes responsible for it. On the other hand the better understanding of the archaeological space produced a shift of attention away from the dynamics of the existing archaeological record at a single site.

The systems which in the spirit of the new archaeology conceptualised the culture as an adaptive system, were added on to the key features of settlement archaeology and the research derived from it. This was based on the reconstruction of prehistoric subsistence systems and settlement patterns and became promoted as the easiest way to understand and reconstruct prehistoric cultural systems. It was all based on the premise that the observation on synchronous variations of site features and the diachronous variations of site numbers, locations, and structures of sites would "disclose" prehistoric populations and their cultural dynamics.

These trends were running in a specific epistemological context - in an archaeology that comprised synthetic articles presenting itself as a conceptual follower of the ghost of positivism. It understood itself as a "ladder of knowledge" about the past, but in an executive, analytical scientific environment the sceptical notion about the nature of recognition and final knowledge was, and is, still prevailing. At least on a declar-

ative level this meant that several aspects of the past were easier to grasp and consecutively easier to understand - and those were economy, subsistence and settlement patterns.

Slovenian archaeology systematically avoided the first two, but the settlement patterns were used as a system, which M. Conkey named "as if". She showed that archaeologist's tend to interpret the distributions of sites on the maps "as if" they were prehistoric regional systems (Conkey 1987: 66). The truth is that this approach considers site locations that are empirical generalisations about a region and are derived from the knowledge of discovered sites. It is true, that we have to start somewhere with the basics for the documentation of diachronic changes, but it seems that such a methodology produces a creation of models, which instead of cultural changes observe cultural replacements. And despite its sceptical tradition, for which one might assume that it would produce at least a slight doubt in to the nomothetic potential of the points on a map, the Slovenian archaeology never gave an interpretation of an archaeological site which would be based on a spatial synchrony and temporal diachronic variability in the archaeological record. Such a statement is astonishing in combination with the acknowledgement that modern stratigraphic excavations were introduced into the archaeological practice a long time ago and one could assume that especially this kind of excavation and documentation would offer the basis for the evolutionary based conception of the evolution of material culture and changes of activity patterns on a microlocational scale.

Because of the lack of evidence about the variability of archaeological records in the Neolithic sites on a regional level and because of the fact that on the site of Čatež - Sredno polje only a single phase of Neolithic settlement was discovered, we are again forced to return to two traditional approaches which were put into force a long time ago in Slovenian archaeology. Firstly, we are forced to set the site in a referential position and secondly, we are forced to observe and compare with it other sites in the region in that specific period. By doing this we have to be aware of the fact that the site, which was raised to the referential position is not only the largest and consequently the richest site, but also the structuration of its archaeological record enables us to observe synchronous variability in the strategies of stone tool productions and use at the site.

We can solve the problem of the variability of the stone tools discovered in the archaeological record with the documentation of the reduction sequences in individual stratigraphic units and with the comparison of the results between several units. In the past the basic unit for the traditionally typological research was the assemblage of all the stone tools discovered at the site, but in the case of Čatež - Sredno polje a sufficient number of big features was discovered, which can be interpreted as elements of the settlement in which several different activities were taking place.

And since we assume that the location of the settlement is basically determined with the adaptive systems of the subsistence (the provision with raw materials is included into the motion in the space itself), we think that every predictive model of the location of settlements or broadly speaking, every predictive model of regional settlement systems, has to include and to consider predicament models of the subsistence of particular societies. With the analysis of synchronous processes of raw material procurement and the stone tool production at the site Čatež - Sredno polje, and the comparison of these processes with the ones determined at the contemporary sites in the region, we can define the broadest range of economic strategies of stone tool production. And on the bases of all these strategies we can formulate a predictive model of the subsistence activities that are based on that a model of settlement patterns.

If we follow the notion that the productive systems are considered as being dynamic supergroups, which include several series of narrowly determined sequences involved in the production and the maintenance of the stone tools, we can present them as the binding links, which place the social rhythms of the production into the space and over the recognition and reconstruction of individual decisions and deeds at the individual process of production and of the use of stone tools include the individual into the production. In other words, the act of detaching flakes from cores is a specific act in the past, which because of its irreversibility and because of the material remnant has clear 'recognisability' and a high potential for reconstruction that offers the easiest recognition of an act or a deed of an individual in the past. In the "life" of the stone tool there is only a single point where the mental projection of the producer in the past, and the mental template of the researcher in the present correspond and overlap - the decision to produce the flake is linked with the recognition of the flake itself.

When speaking about stone tools, we were forced to confess that the mental templates were nothing more than our analytical tools for the recognition of the stone tools, where we on the bases of the previous knowledge divided intentionally worked stone tools from the natural and further divided them into smaller groups. Further applying the knowledge we have about the mechanics of stone flaking we can reconstruct what happened before with the core and later with the flake. Taking into consideration the reconstruction of the formal transformation we can reconstruct the reduction sequences, but at this moment we cannot have positive knowledge any more that we can reconstruct the acts and decisions of a single person. We can be only sure that we are talking

about a complex of decisions which were influenced by the intentions and the abilities of the temporal manufacturer on the one hand and by the physical characteristics of the raw material on the other. In this case the classical evolutionary pressures are just the dynamic relations between these two factors and because of the greater number of finds in the assemblage we cannot speak about an individual but about the complex of decisions of individuals that are members of the society.

The best example for the reconstruction of such decisions is research on the process of the intentional forming of half-products, their finalising, the process of the use of tools, their maintenance and their final discard. In the moment when we are talking about the complex of decisions of a larger number of individuals, we are into the reconstruction of productive systems, and this means, that instead on the level of the individual decisions, we find ourselves on the level which was described by classical Darwinism as group selection, although we could call it productive systems.

This would mean a radical turn from the classical position which considered archaeological finds, in our case stone tools as historical remnants, which enabled archaeologists to establish chronologies and typologies. If we observe the stone tools as technical remnants we can get further into the reconstruction of human activities that produced them (Sigaut 1993: 383). And since we can conclude that settlements are also material manifestations of social formations in the society, we can, with the observations of the depositions of flaking by-products, observe the patterns of deposition or even of social handling of raw materials in the society.

We have chosen flaking by-products as the observed category of lithics because of the major characteristic of the lithic assemblage at the site - more than 95% of all the lithics are local. In this case local means that the inhabitants gathered pebbles in a river at a distance of approximately 100 meters from the settlement. Unworked pebbles were brought into the site, tested, and if suitable, transformed into cores and further chipped. The site with its approximately 13 000 flakes and 2000 cores represents the only known site in Slovenia which might be described as a quarry site.

Unfortunately the local raw materials are all physically much the same and it is difficult to trace spatially the preparation and transformation of a single core between several archaeological units (interpreted by the excavators as remains of buildings). On the other hand this tracing is possible in the rare cases of exotic raw materials - in our case this means that they are of different appearance and were introduced at the site at a different stage of core reduction. Since after the observation of breakage patterns of fragmented blades and end-scrapers on blades, we were able to conclude that a large proportion of retouched tools was used, fragmented and discarded outside the settlement, we concluded that we should focus our attention on the remains for which we suppose that they were exposed to the smallest degree of intentional final structured deposition. We looked at the structure of rubbish, since we believed that the smallest parts of the flaking process were not structured intentionally. The tracing of small chips and flakes unsuitable for further use of exotic raw material from a single core showed a distribution between several large pits. Since we do not believe that the remains of a single chipping activity were intentionally deposited into several pits on a large area, we have to assume that this core circulated inside the settlement.

This conclusion raises several questions:

- Were the pits discovered at the site remains of houses. If so;
- Were the individual houses domiciles of independent economic units inside the community. If not;
- Are we looking at the remains of a highly egalitarian society where even the exotic raw materials circulated freely between several individuals in the society.

With these questions we go back to the beginning. What is archaeology about? As it was mentioned above archaeology is about our questions about the past, and the answers to the questions posed. Of course we do not discover questions or answers at the excavations, and it is illusionary that new excavations will simply disclose answers about the past. We have to ask ourselves what are we looking for, and later, we can formulate our questions on the bases of observed structures of the remains from the past. Sometimes, when we would like to formulate questions about the social structures of the society, we can also observe remains for which we can assume that they meant the same for the prehistoric people as they mean for us - we can observe rubbish.

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THE QUALITY AND VALUE IN NEOLITHIC EUROPE: AN ALTERNATIVE VIEW ON OBSIDIAN ARTIFACTS

Boban TRIPKOVIĆ*

Abstract

In current studies, obsidian is considered both as a highly valuable commodity, of exotic origin, and in other cases as a raw material with practical use only. The answer to the problem is not an easy one, since the basic qualities of obsidian are also found in many other raw materials, often easily accessible from prehistoric settlements. In this assessment of the subject of distribution and the chronology of obsidian finds I have tried to view obsidian exclusively on the basis of its chronological and cultural context. Such methodological premise leads to a conclusion that the role, importance and value of obsidian in the life of prehistoric communities can be best understood during the period of neolithization of the European continent and later on, when obsidian becomes an integral part of the complex changes in the perception and the use of the environment.

1 - Obsidian studies as an archaeological discipline

In spite of an interdisciplinary approach and the establishment of the obsidian studies as a separate scientific discipline, the study of obsidian is still directed towards two general subjects: one is the technology of the artifact production with a special interest in the knapping techniques and statistical analysis, the other studies the exchange mechanisms, where sample characterization and the detection of the source of raw material were conducted in order to reveal the patterns of its distribution. It is then quite understandable why H. O. Pollman in his *Obsidian – Bibliographie* containing almost 2800 items, used a title *Artefakt und Provenienz* (1999). However, even after the prospection of the sources of the raw material, the method of its exploitation and trade mechanisms, a key question remains unanswered; what was the role of obsidian in prehistory and how can we determine its value. In current studies, obsidian is considered both as a highly valuable commodity, of exotic origin, and in other cases as a raw material with practical use only (Gopher, Barkai & Marder 1998; Balkan-Atli *et al.* 1999; Ammerman & Polglase 1993; Özdogan 1994; Renfrew & Bahn 1991). The answer to the aforementioned question is not an easy one, since the basic qualities of obsidian are also met by many other raw materials, often easily available in the environment of the prehistoric settlements. Additionally, it must not be forgotten that obsidian was mainly used in the production of chipped tools and that its utilitarian role is confirmed by contextual data and by the use-ware analyses. Having in mind these general observations, it is then necessary to determine why obsidian appears in large quantities at certain sites, unrelated to the long distance from the source and the restrictive conditions of acquisition. Could it be that obsidian might have a different role, besides an utilitarian one?

The answers to these questions, however, cannot be reached by comparison with other kinds of exotic goods which were also subject to intercultural exchange. Unlike most of these objects/raw materials obsidian is differentiated by its clear utilitarian role and by its deposition within a cultural context. A good example can be seen in the case of artifacts made of *Spondylus* shell, whose appearance peaks in Europe almost at the same time of the widest obsidian use (Seferiades 1995; Müller 1997; Todorova 2000), and suggests that that distribution is a result of similar or the same exchange mechanisms that brought in obsidian. However, *Spondylus* shells were primarily used to produce specific types of items (necklaces, bracelets, amulets) which are decorative and by their use are linked to individuals. It is to no surprise then, that the *Spondylus* shell objects are mostly contextualized as a grave goods i.e. as the property of the buried individual (Müller 1997). On the other hand, in certain parts of Europe, a contextual analysis of obsidian has shown

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that its sole usage is as a flint alternative, being discarded or lost after a certain period of use, without a significant deposition in cultural context (Tripković 2001).

From a general point of view, technical, functional and aesthetic qualities of obsidian imply that its role might not have been strictly functional, and that the long period of use, from Middle Paleolithic times until the end of prehistory, could have occasionally produced a different usage for it. At the Neolithic site of Çatal Hüyük in Anatolia obsidian has been used for mirror production, besides its usual role in chipped industry (Mellaart 1965: fig. 54), whilst in the Aegean Bronze age it was used in the production of seals and vessels (Betancourt 1997; Warren 1969: 135-136). Varied use and a long chronological sequence require a comprehension of obsidian through time and cultural context that provide the role and value to the artifact.

2 - Fragmentation of time

The first appearance of obsidian on the European continent is seen in the Middle Paleolithic cultures of the Central European area, becoming very common by the Upper Paleolithic (Williams-Thorpe, Warren & Nandris 1984). However, this is not a general rule on the continent, since in some areas (Central and Western Mediteranean) utilization does not appear until the beginning of Neolithic (Tykot 1996), whilst in other areas it is isolated to certain sites before the Neolithic times (Franchthi cave in the Peloponese – Pantelidou-Gofas 1996: 13). In any case, the long time-span of use, covering several tens of thousands of years, demands a break down of the period of the obsidian use into smaller chronological sequences, in order to realize how the obsidian was exploited, delivered to the site and processed, and what were the relations of the prehistoric communities towards it. Such a rough division into the basic cultural-historical sequences such as Paleolithic, Mesolithic, Neolithic, Copper age, etc. could be practical for an analysis, since its use is mainly established by specific technical, technological and social criteria.

In this way, an opportunity for the association of obsidian with the specific cultural and historical tradition arises. However, the impossibility of a clear separation of the mentioned cultural and historical periods is a fundamental problem, since our view of the Neolithic as a time of sedentism, food production and complex social organizations, is just a simplified association of basic values with certain cultural and historical principles. Even in the time of the developed Neolithic these cannot be applied to all areas. It must be then taken into account that when we speak of neolithization, we speak of a world in transition, which prolongs existing and accepts new values. Therefore, the examination of the process of neolithization on the European continent can lead to a better understanding of the development of obsidian use and the manner in which its value was formed (Tripković in press). Key questions are:

- What is the value of obsidian? Trade and exchange are economic categories and the involvement of goods in an exchange presumes an existence of a certain value;
- How does it differ from the rest of the chipped stone industry and what knowledge was necessary for the knapping of obsidian?
- What were the motives for the purchase of obsidian? Acquirement was not necessary since the environment of the most prehistoric settlements already contains primary or secondary sources of an alternative raw material.

3 - Obsidian as a part of the Neolithic sequence

Over the millennia, raw material was involved in an exchange network in the regions of Near East and Anatolia. In these regions, it is present since the Paleolithic times, but it only appears in large amount at the time of the first Neolithic sequences, usually in a significant percentage on most of the sites (Moore 1982). Therefore, concerning the role of exchange as a means of transmission of information, knowledge, experience, raw material and technology in the process of neolithization (Runnels & Van Andel 1988; Yakar 1996), one cannot forget the significance and the role of obsidian. It was Andrew Sherratt who suggested that on Çatal Hüyük domesticated cattle was exchanged for high altitude area resources, one of which is obsidian (1982: 254). The value of cattle does not present a dilemma in this example, moreover since has been clearly confirmed by several ethno-archaeological studies (Russell 1998; Russell 1993). The interesting concept in this relationship between the highland and lowland resources is the value of obsidian; how did this come about and what are the motives for its acquirement in such large quantities?

A similar situation occurs on the European continent. Simultaneously with the spread of Neolithic across Europe, the territorial expansion of obsidian finds appears with the exploitation of outcrops not previously used (Tripković 2001). It is very important to pay attention to the spatial extent of the oldest Neolithic cultures and their position with regard to the obsidian outcrops (fig. 1). Greece, as a separate cultural unit, utilizes obsidian outcrops located on the island of Melos (Perlès 2001: 201); the Starčevo-Körös-Criş cultural complex employs obsidian sources in Hungary and Slovakia (Tripković 2001), while the Cardium-Impresso cultural complex acquires obsidian from

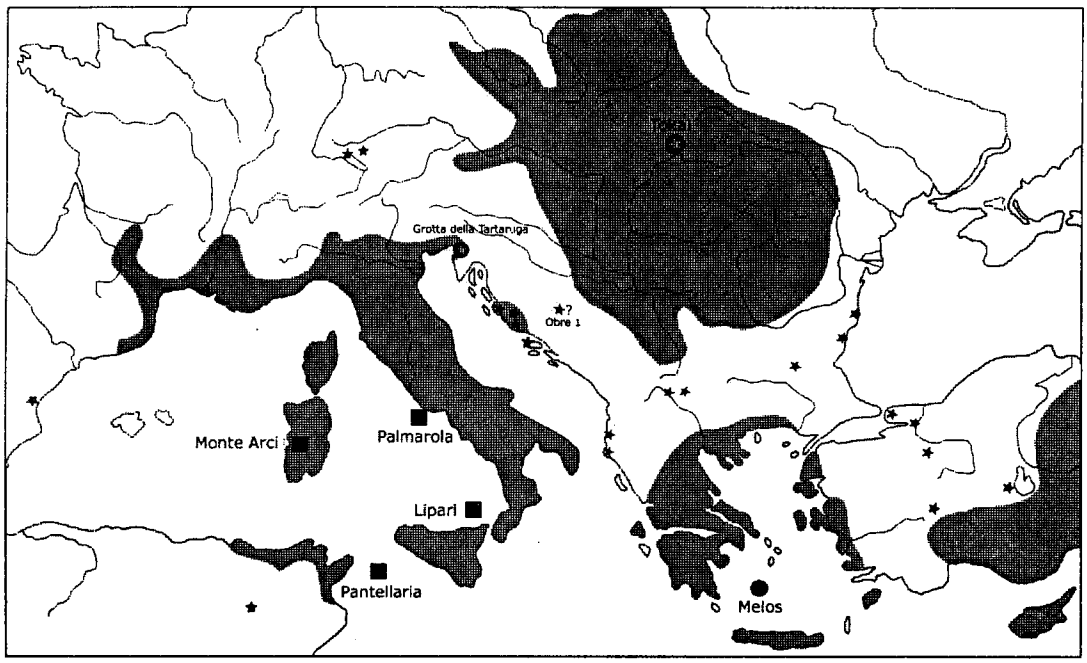

Figure 1. Distribution of obsidian across Europe in the Neolithic and Copper Age (modified after Willms 1983); ★ - not characterized obsidian.

the island outcrops of the central Mediterranean (Tykot 1996). It is remarkable that the cultural complex encompassing the obsidian outcrop in one area restricts the territory within which the distribution of obsidian occurs; obsidian originating from the outcrops of one cultural complex is not distributed to another. Exemptions from this rule are extremely rare and are usually found in the border areas, where cultural complexes generally overlap, as is in the case of Middle Neolithic sequence of Obre 1 site in central Bosnia, with reported obsidian finds originating from Sardinia (Greif 1995: 85). In the widest sense, this could indicate that cultural boundaries, pottery styles and technological experiences register the operational level of certain trade mechanisms.

It is important to mention that, like in the Near East, obsidian in Europe plays an important role in the transmission of Neolithic knowledge and experiences. This can be best illustrated on the example of the Carpathian basin, where Mesolithic communities of the Jaszag area, with a certain percentage of obsidian in chipped tools assemblages appear between Neolithic Starčevo-Körös culture and the obsidian sources (Kertesz 1996; Makkay 1996). It is clear that Neolithic communities within this cultural complex did not have a direct access to obsidian outcrops, which perhaps explains why obsidian is uncommon in South Pannonia, at the time of the earliest Neolithic cultures of the region. On the other hand, it is to be expected that these contacts between north and south have somehow begun the transformation of conservative Mesolithic communities and have prepared them for the application of the Neolithic technologies, which were to follow several hundred years later (Tripković 2001; Tripković in press).

4 - The domestication of the volcano and other obsidian stories

One question remains unanswered in this short review of the distribution of obsidian finds; why did the Neolithic communities rely on obsidian, despite all difficulties associated with its acquirement. In one of the shrines on Çatal Hüyük a potential answer is given on the northern wall of the shrine in horizon VII, where an urban settlement is depicted, with houses with approximately identical dimensions and plans. The landscape of the settlement is dominated by the eruption of a volcano, with smoke, flames and fireballs rolling down the slope (Mellaart 1965: fig. 51, 52). In this dynamic projection of a landscape, dominated by a settlement and a volcano, one man-made and one natural feature, archaeologists tend to recognise Neolithic Çatal Hüjük and the Hasan Dag volcano, located on the east part of the Konya Plain (Mellaart 1965: 83-84). The transition of the volcano from the outer, wild and unpredictable world, into the inner,

domesticated area, makes it domesticated in the same sense as the clay, transformed into figurines, altars or vessels became a domesticated form. In the same manner, the representation of the volcano eruption on the northern wall of the shrine could have represented a way of a affirmation of the *domus* principle. It is then clear, that the volcano was not domesticated in the sense of behavioral control, but in the sense of the control of its resources, resulting in abundant quantities of obsidian on Çatal Hüyük, and giving to it a symbolic meaning in the process of domestication, in a similar way as female and bovine figurines or bucrania represent values of the period.

With all this in mind, obsidian can be observed as a domesticated form, taken from nature, as an integral part of the Neolithic world, together with food production technology, items made from fired clay and new patterns of social organization. It is feasible to assume that the place of obsidian in the Neolithic narratives should also be the reason for its expansion, along with other Neolithic values. However, like most of the finds in the Near East and Anatolia, obsidian tools on European continent show distinctive traces of everyday use. Besides infrequent, isolated examples, religious and symbolic aspects of obsidian are not visible. One of such distinctive examples originates from the island of Cres, located in the eastern Adriatic, Croatia (Greif 1995: 87). W still unpublished medallion made of obsidian and dated to Neolithic period was found on the island. The medallion is interesting because of the representation of a hunt, giving him a deeper meaning. Several times in the past, I have pointed out that this representation could not be understood without its publication, but there are certainly two aspects present on it: obsidian as a part of the Neolithic world, is a clear metaphor of the period, and the representation of the hunt as a part of an older tradition (Tripković 2001; Tripković in press). The precise chronology of the find is still uncertain, but what makes it interesting is the fact that the island contains both Mesolithic and Neolithic sites (Batović 1979: 481, 488), thus making the representation of the hunt on the medallion a possible way in which the syncretism of old and new traditions could have been locally portrayed.

Conclusion

In this assessment of the distribution and the chronology of obsidian finds I have tried to view obsidian exclusively on the basis of its chronological and cultural context. Such a methodological premise leads to the conclusion that the role, importance and value of obsidian in the life of prehistoric communities can be best understood during the period of neolithization of the European continent and further on, when obsidian becomes an integral part of the complex changes in perception and the use of the environment. It is noticeable that, during Neolithic, obsidian is not contextualized into specific, individual contexts (graves), which could reveal its role on an individual level – a level of relation between an individual and an artifact. With this in mind, it is certain that, if buried with an individual, obsidian did not suggest a recognizable text. I have argued that the role and the value of obsidian on the European continent were formed through a process in which exchange of knowledge and experience and the introduction of new technologies were of governing importance. As a chipped stone tool, obsidian has had a utilitarian purpose, but it also served as a metaphor of time and value brought by neolithization. It is then highly probable that the Mesolithic and Neolithic communities accepted or rejected the use of obsidian, depending on the preference of their ideological basis towards adjustment to the coming, or the preservation of the existing time. It must be said that such processes can, certainly, be viewed on a local level, only.

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LANDSCAPES: BETWEEN LAND-USE AND INVISIBLE STARTING HYPOTHESIS

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We suggest that the early manipulation and use of landscapes and the appreciation of these practices were part of the economic and political development involved in inter-group relations in prehistory. It is stressed that people showed an increased interest in political activities: long- and short-distance communication and exchange, feasts, alliance building, sharing rituals, establishment of sacred places as markers on the terrain, etc. We suppose that some people had increased access to valuables and resources, and different groups could operate, on a regular basis, within large social networks through communication and exchange. People would be interested in producing more, which implies an increased demand for accumulation of wealth and power. The possible means for achieving such goals would be competitive public display, alliance building and construction and maintenance of group identity through common metaphors and exchange of gifts.

Such a uni-linear developmental social model would organize the archaeological record in a predictable material world, increasingly complex in terms of organization and technologies. The archaeological record, however, shows extreme diversity and variation in terms of technologies, materials, values, and perceptions of human practices. Local diversity and discontinuous variation challenge any claim for universality. A conventional perspective makes people the only active agents that change, cultivate and use landscapes. Yet, a detailed examination of human-local environment interactions suggests that the active agents are twofold: people and the landscapes they live in. The landscapes, as an ever-changing environment within which people move and build their material, social and spiritual worlds, constantly change, readjust, and influence people's decisions, attitudes and the appreciation of human activities.

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1 - Working hypothesis

Emphasis on the social perspective towards local environment would better reveal the new human-landscape relations. Family and social interactions stress the importance of kin/group identity as participating in land-use and its changes. As people change their surroundings the ever-changing landscapes also influence human perceptions, actions and images. Thus the life experience of a given person is imagined as a steep hill that has to be climbed up. Enduring pains and overcoming difficulties of such a journey is not unconnected with pleasing the invisible forces. It is meant to remind the living of their obligations towards other people and to invite them to improve their moral actions, in order to avoid human and natural disasters inflicted by the invisible forces that punish the misdeeds of humans. Families and lineages mark their sacred places (most of them situated high on the local terrain) where they meet on a regular (annual) basis to improve the relations between themselves and their relations with other families, groups, etc. by worshiping the invisible forces. Every individual standing on such a high ground sacred place can see and imagine all the cycles of work, growth, and death that constitute his/her entire life. Landscape turn out to be the basic principle that organizes the vision of the world. It never appears in an clear and coherent way. It is rather a social universe that structures itself through individual, collective and public expressions. This is also a world intimately confined between personal experiences and collective mythologies. People change their environment but they are also capable of changing the constitutive categories that stay beyond their everyday rational logic. The world becomes known and accepted as it is imagined through imaginative plays fed by the senses, based on the language of the body-environment interactions and always appears ready with adaptive responses. Landscapes and the sacred places dispersed within it initiate and end cycles of universal understandings of the world that are never a simple reduction of rational models.

They present themselves as an integral totality available at any situation. For example, this complex world is reflected in the name 'Gornishte' the name of a village in the Pre-Balkan Mountains, Vratsa district, in northern Bulgaria. The name appears in the Ottoman registers from 16th century and the village probably existed before the Ottoman invasion. There are traces of Neolithic, Eneolithic and Medieval settlements (excavations by Bogdan Nikolov, Vratsa Archaeological Museum). The word 'Gornishte' does not simply mean 'upper', 'high from the ground', etc. This is in fact a compound notion that means a broken (hilly) terrain with a spring. The name itself turns out to be a communicative medium that immediately conveys the patterns of land-use and the kind of environment of the settlements. It is the 'visiting card' of the villagers. Thus 'toponyms' codify the patterns of land-use in different localities. The physical boundaries within the terrain were constantly being marked and imagined. This acts as a major organizing principle of the magic boundaries set between the domesticated and the wild worlds (Hodder 1990). For example, people start and end cycles of domestic production: crop yields, woodwork, textile weaving, etc. and they deliberately place particular instruments and objects at certain places inside and outside their houses, yards, etc with the belief that they protect themselves and their work from evil forces. Landscapes become highly organized by nesting one into another as smaller spaces with a structured deposition of artefacts and objects. This spatial structuration is not governed by arbitrary human decisions taken in response to simple occasions, but rather belong to long-term, consistent behaviour accompanied by subjective experience of people Being-in-the-world. Thus human and physical boundaries within the landscape remain not fixed but fluctuate constantly from physical to human worlds and vice versa. They form a dynamic setting, within which human actions take place (Chapman 1997). Topology, not typology of artefacts, becomes more important for understanding the past human behaviour. Economic and practical reasons are not enough for the analysis of technical cycles when situated as a distribution of knowledge, skills, beliefs, etc. within the wider field of humanized landscapes. We need another set of analytical tools that can help the understanding their complex position between human and natural worlds.

2 - Analytical background

It is possible to make a distinction between three aspects of human - landscape interaction.

-Landscapes as natural monuments - stable points of reference of human experience.
-Landscapes as dynamic settings of human interactions
-Changing landscapes and changing human relations

The notion of landscape as a natural monument is rich in assertions and ideas about the uniqueness of a given natural area that has the potential to link social relations with prominent geographical features. In the eastern Balkans landscapes are dynamic in view of the frequent landslides, tectonic movements, etc. Within a human life span a person can experience a substantial change in the physical environment: disappearance of a hill, movement of a hill or a field, appearance or disappearance of a spring, river, lake, etc. The stable landscape features can be measured in social terms and become conceptualized into social interaction. Such stable points of reference can be perceived even nowadays as somewhat mystified places that enhance human experience in everyday life.

The notion of landscapes as dynamic settings of human interactions brings various technological cycles nested together within different natural and artificial surroundings. They are perceived as intersections of homologous group relations and identifications. For example, the rich early Neolithic pottery decoration integrates the various technological and biological cycles set against the curved landscape of the body of the vessel. The vividness of the images underlines the homologous expressions of the mostly private domain constituted by complex gender and group identities.

The third notion expresses the continuous change of landscapes through various physical and climatic processes. So do human relations through negotiation or conflicts. In the early Neolithic long blades may have been symbols of the 'repair' of valuable composite tools and through their 'exotic' appearance and easy mode of fragmentation they may have expressed partial, enchained ties with close and distant communities. The travel itself of long blades over long distances initiates and ends cycles of debt and enchainment between remote communities. Thus the technological and perceptual cycles of human experience make the natural and artificial landscapes sources of inspiration for ancestrally based common metaphors of communication.

On this theoretical background it is possible to compare the general patterns of land-use and the invisible human relations situated within the landscape.

3 - Land-use

The archaeological record does not provide enough evidence for land-use practices during the Neolithic. What we know for sure is that people with their fieldwork influenced the natural environment and

changed the spectrum of paleo-vegetation. Further, we may guess that people used the most fertile alluvial lands near the tell and open-air sites. This inevitably means tensions over the use of lands raised between different houses (households), kin and lineage groups. Crop yields must have been collected, stored for a long (year-round) period of time, and in part exchanged with close and distant communities for other goods and services. The overall amount of hunting must have decreased considerably. The importance of male dominated activities must have shifted into other areas as alliance building, supply with valuable objects and materials. Fertility must have been an important notion for maintenance of female ideology, but men transgressed into it by its dramatization. Fertility must have been helped by distant and 'exotic' materials and artefacts extracted through mystified work. Special artefacts (long blades) had to be made by high-craft techniques. All these 'exotic' materials and artefacts had to be exchanged, brought into the settlements, and had to take an active role in extraction of maximum crop yields. The naturalization of 'exotic' into local production cycles was done through "monumentalization" of artificial and natural landscapes. The "high-ground", the "hidden" fertility into the earth that had to be worked by special artefacts (sickle inserts) made of 'exotic' imported materials could have helped extraction of the maximum crop yield. Male ideology and gender tensions entered the private domain - the decoration with phallus and vulva motifs on painted pottery from the Cavdar tell, Bulgaria (НИКОЛОВ 2002: 37) made clear the dynamic relations between sexes. And it is the gender tensions that influence to a larger extent the patterns of change of the material record of prehistoric communities.

4 - The invisible

The landscape forms imagined by people incorporate within the local community's knowledge the information about distant lands, communities, and their land-use. It is a ritualization of the way of getting known the remote 'other' by the symbolic match and mismatch of landscape forms and patterns of land-use. This makes human-local environment interactions more dynamic and moves their boundaries to the limits of the knowledge and experience shared among the community. Prominent landscape forms, such as high hills, rivers, springs, plains etc. through the sacred places scatted on them, and through the narratives and special names given to them create vivid images that easily cross the boundaries of local knowledge, embodied skills and experience. This self-sustained, vivid imagery of local people enhances their ability to learn more from the knowledge and experience coming from neighbouring and distant communities. Landscapes turn from solid, unchangeable forms into something dynamic and liminal that acts as an open door that channels both ways the flow of human knowledge, skills, and beliefs. The liminality of land forms is better visible in some cave sites (Grotta dell Orso, Trieste karst area, Italy) (Montagnari Kokelj 2003) and cave paintings (the Magura cave, northwestern Bulgaria) where male ideology seems to dominate in the archaeological contexts. The contact with the world of dead is a convenient ground for ancestralization of claims for male domination. It is not by chance that in some caves (Grotta dell Orso), there is a strong presence of 'special' artefacts, such as a leaf-point, an axe and long blades that are made out of long-distance, 'exotic' raw materials. The communication with the realm of dead gives mystified knowledge and empowers claims for male domination, which otherwise cannot be sustained in the social context of a given tell-site. In the latter contexts balances of power are reached through strict denial of any visible expression of signs of symbolic 'power', 'prestige'and personal 'wealth' (Tsonev in press).

5 - Conclusions

If social relations were articulated through gift-giving, long distance exchange networks create a potential for maintenance of the social web. In this complex network, there should exist points that keep up (initiate and end) the symbolic cycles of gift-giving. Tells and multi-layered sites can do exactly this. They need to make widely known, valuable and attractive their crop production and that of the surrounding communities. The perception of an active long-distance communication network requires a corresponding symbolic constitution of harmonized metaphors that enable people to imagine and act upon a common ground of negotiation and exchange. High-quality flints and long blades in their relation to artificial and natural landscape features seem to take on exactly that symbolic role. At the level of everyday activities they serve common economic practices such as the repair of sickles, threshing boards, and other composite tools; on the symbolic level, they facilitate the perception of these practices and help to maintain the circulation of gifts, services, and the social reproduction of entire communities. Thus the match and mismatch of landscape metaphors can differentiate the supply with "special" materials and artefacts made out of them. Landscapes where a single tell dominates attract longer blades and greater quantity of imported high-quality flints (the example of tells in Thrace). In the case of merging landscapes (north-central Bulgaria), flints show a limited variety of local and meso-local flints, while extra-local high-quality ones occur rarely.

So far, archaeological evidence provides good

examples of naturalization of 'special' and 'exotic' into local notion of fertility in the contexts of tell and open-air Neolithic sites. One of the ways of male transgression into the notion of fertility that is naturally connected with women is through a dramatization of landscape forms. The match and mismatch of landscapes and patterns of land-use create vivid images that enhance the ways of getting to know neighbouring and distant communities. 'Special' artefacts (long blades) made of long-distance 'exotic' materials symbolically help the extraction (as sickle inserts, and other tools) of maximum crop yields and make it widely known and attractive for exchange with close and distant communities. The symbolic investment in "maximum" benefit sustains permanent claims for male domination in areas where women traditionally had well-defined social positions. Emphasizing the control imposed on long-distance communication and exchange networks that supply communities with 'special' artefacts made of 'exotic' materials supposes the male transgression into traditional female domains. This is also achieved through seeking contexts that lie beyond the social model of tell-dwelling where, as a rule, existed strong denial of presence of signs of 'power', 'prestige' and personal 'wealth', such as arrowheads, microlithic points, stone balls, stone scepters, etc. Some cave dwellings as stable points of reference in the landscape and imagined as marking borderlines between the realm of living and that of dead seem to take on exactly that role. They became settled by male symbols: arrowheads, leaf-points, axes, and paintings that mystify and justify claims for male domination.

Thus landscapes take a very important position between land-use and the invisible in the constitution of late prehistoric societies. As the dynamic and vivid imagery of getting to know the remote 'other' and as a means of facilitating teaching and learning human knowledge, experience, and embodied skills they enter one of the most natural divisions of human society - the gender relations and gender tensions. All these make material culture dynamic and diversify the contexts in which gender relations express themselves.

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