NEOLITHIZATION OF THE CARPATHIAN BASIN:
NORTHERNMOST DISTRIBUTION
OF THE STARČEVO/KÖRÖS CULTURE

PAPERS PRESENTED ON THE SYMPOSIUM ORGANIZED
BY THE EU PROJECT FEPRE
(THE FORMATION OF EUROPE: PREHISTORIC POPULATION DYNAMICS
AND THE ROOTS OF SOCIO-CULTURAL DIVERSITY)

Edited by

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KRAKÓW–BUDAPEST 2010
The publication of this volume was supported by the European Research Project FEPRE, the Jagiellonian University and the Polish Academy of Arts and Sciences

Editorial coordination:
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Distributed by:
PAU, ul. Sławkowska 17, 31-016 Kraków, Poland
e-mail: wydawnictwo@pau.krakow.pl; www.pau.krakow.pl
and
Institute of Archaeological Sciences of the Eötvös Loránd University,
Budapest, Múzeum körút 4/B, Hungary

Obj: ark. wyd. 36,7; ark. druk. 22,75; nakład 400 egz.

DTP: Quad

Printed by:
Poligrafia Inspektoratu Towarzystwa Salezjańskiego
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ABSTRACT: The Körös Culture represents the beginning of the neolithization process in Southeastern Europe. The expansion of the early Neolithic through the Balkans followed river valleys and reached the Carpathian Basin at the beginning of the 6th millenium BC. For a long time, the expansion of the Körös Culture was thought to have been stopped in the middle of the Tisza valley on the Great Hungarian Plain (Alföld), explained by different historical or palaeoecological causes, while its northeasternmost appearance had reached the Upper Tisza region at Méhtelek. In the last three decades, several sites of the Körös Culture have been discovered along the Tisza river.

From the middle of the Miocene onwards, strong volcanic and post-volcanic activities took place in the northeastern part of the Carpathian Basin. Thanks to this, obsidians, opalites, limnic quartzites, geyserites and hydro-quartzites were formed in the Tokaj Mountains (north-east Hungary) and in the Vihorlat-Gutinian Ridge (Transcarpathia, Ukraine). The richness of the Upper Tisza region in lithic raw materials may have attracted early farming communities in the northeastern part of the Great Hungarian Plain within the framework of their expansion. The aim of the planned research project is to study this problem by combining field investigations with techno-economic analyses of the knapped stone industries of the sites in the region.

Introduction and acknowledgements

The northeastern part of the Carpathian Basin is a fascinating region for the research of all prehistoric periods. It provided a large diversity of landscapes, both in the geographical and ecological sense: the alluvial lowland of the Great Hungarian Plain (Alföld), small plateaus covered by loess, river valleys, low and high altitude mountainous areas. The corresponding vegetations, faunae and soil types provided various subsistence possibilities both for foraging and farming communities. Due to its geological properties, the region is rich in rocks and minerals which are valuable raw materials for prehistoric people. The range of the Carpathian mountains separates the territories inside and outside, but – at the same time – it connects them by its passes, the archaeological evidence indicate the existence of cultural and economic contacts from the Palaeolithic to the Iron Age.

Our scientific research deals mainly with the problems of Palaeolithic populations. However, our interest in the technology of knapped stones and in the geology as well as the archaeometry of siliceous rocks has
oriented our attention toward the question whether the expansion of the first farming communities in this region could be related to access to raw materials, first of all of obsidian.

The initiative in this research project was taken by Prof. Pál Raczy (cf. Domboróczi, Raczy in this volume) to whom we are grateful for his encouragement and many stimulating discussions.

**Basic considerations**

One of the most important moments in the history of humanity was undoubtedly the change of the economic basis from hunting-gathering to food-production. On the level of a subsistence group (Dennel 1983, 12) one of the consequences of this shift is the diminution of the area required for the production of food sufficient in terms of both quantity and quality. A group of hunter-gatherers needs a greater living area which they must own as their territory, like in the animal world. Moreover this territory ought to be wide enough for including sources of all the other goods necessary for survival, such as raw materials for construction and tool production. But even in the Palaeolithic we have evidence of the existence of higher levels of organisation in the distribution of raw materials for lithics and ornaments (Féblot-Augustins 1997; 2009c). These organisational levels could be related to reproductive groups (Dennel 1983, 14) and/or what we call taxonomic units (Kozłowski 2005).

Taking into account its smaller living area, a farming community needs complementary natural resources to assure the lacking goods (food and raw material). The network of these sources outside of the habitation area constitutes its “virtual” territory, virtual in terms of it being independent of actual ownership. This virtual territory covers more exactly the conception of territory demonstrated by ethnological analyses: a territory is the culturally determined organisation of the physical space as well as the representation of the symbolic space within which the complex relations of the known world are being managed (Bracco 2001). The natural resources of the virtual territory give the security of survival for the group. In case of expansion, the constant re-construction of the virtual territory is inevitable (Fig. 1). It means that the group continues to exploit the known sources, becoming more and more distant from the living area, as long as it could discover new ones in the vicinity. Once the exploitation of the new sources is securely established, the group leaves the former ones. It is a valuable strategy in case of indirect exploitation too. However, if we can outline a sufficiently detailed resource exploitation history of a group in time and space using its archaeological remains, the gradual shift from one source to an other may offer evidence of a spreading process.

**The lithic evidence**

Among the natural resources exploited by early farming communities, the lithic raw material is the most promising for the study of the afore-mentioned problem. Stone tools played a crucial role in the everyday life. Knapped artefacts were produced in large quantities and form therefore a considerable part of the archaeological record. In comparison with those of former periods, neolithic knapped stone industries demonstrate an increase in technological and social investments (Binder, Perlès 1990). As the lithic production system has constituted one of the sub-systems of the technical system of each prehistoric group (Geneste 1991; Inizan et al. 1999, 14–15), the evidence of tool production in the archaeological record shows marked differences between cultural units (e.g. Binder 1987; Kaczanowska, Kozłowski 2008).

Siliceous rocks utilized in tool-making have various characteristics resulting from the geological conditions under which they were formed. Consequently, types of raw material can be well distinguished in the lithic assemblages. Because of the limited geographical distribution of the related geological formations, the origin of these raw materials could be identified more or less precisely. Due to the long-standing experience of European prehistoric research, outcrops of several types of characteristic rocks are known, that originate from recognizable provenances (concerning the Carpathian Basin, cf. Biró 1986; 1987; Kozłowski 1989; Kaminská 2001). A diversity of analytical techniques are applied to guarantee an increasingly scientific recognition and identification of these materials (Andrefsky 1998, 43–46; Poupeau et al. 2007).

According to the ecological requirements of agricultural economy, farming communities settled generally more-or-less far from geological outcrops of lithic raw materials. For this reason, the supply had to be organized in space and time. Diachronically, the tool-making process may be subdivided into phases and sub-phases (Geneste 1985, 178–182). These may take place even separately, in different locations or sites which
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– consequently – form a geographically organized acquisition system (Geneste 1988b). Palaeolithic evidence shows numerous correlations between the on-site distribution of stone tool production categories (retouched tools, blanks, cores, waste, unworked blocks) and the quality and availability of the different siliceous rocks: raw materials originating from long distance circulation tend to be of the best quality and are represented by fewer pieces but of a high level of elaboration. Local raw materials, on the other hand, usually occur in great quantities, showing a low ratio of retouched tools (e.g. grotte Vaufrey – Geneste 1988a; Marillac – Meignen 1988; Scladina – Loodts 1998; Van der Sloat 1998; Bonjean, Otte 2004). Manufacturing strategies of the given human group can be analysed by the technological composition of the lithic assemblage (Tixier 1978, 75–76; Inizan et al. 1999, 26–27).

Fig. 1. Model of modifications in the virtual territory of an expanding farming community: A – looking for new natural resources; B1 – integration of the new resources; B2 – shift to the exploitation of the new resources; C – abandonment of the old resources
The spread of the Körös/Starčevo Culture

The Körös/Starčevo Culture represents an important stage in the neolithization process of Southeastern Europe. Its identity lay in a novel economic basis and shared features of the material culture (Kalicz 1970; Chapman 2003). The expansion of early Neolithic followed river valleys throughout the Balkans, as archaeologically demonstrated by the distribution of the painted ware (Nikolov 1989; Van Andel, Runnels 1995; Tringham 2000; Kozłowski 2003; Tichý 2004). This expansion reached the Carpathian Basin at the beginning of the 6th millennium BC by three branches: the Starčevo Culture in the southern part of Transdanubia on the right bank of the Danube (Kalicz et al. 1998), the Körös Culture in the Tisza valley in the Great Hungarian Plain (Alföld) (Kutzián 1944–1947; Trogmayer 1968), and the Criş Culture in Transylvania (Luca, Suciu 2007). For a long time, the expansion of the Körös Culture was thought to have been stopped in the middle of the Tisza valley, explained by different historical or palaeoecological causes (Kalicz, Makkay 1977; Szathmáry 1982; Kertész, Sümegi 2001), while its northeasternmost occurrence had reached the Upper Tisza region (Kalicz 1970, Fig. 7; Kalicz, Makkay 1976). Several discoveries along the Tisza river moved the boundary of the Körös Culture toward to the north (cf. Domboróczki, Raczky in this volume): Tiszapüspöki, Nagykörű, Kőtelek, Tiszaszőlős, Ibrány, Rivne, Zastavne, Berehovo, as a result of field work by P. Raczky (1980), L. Domboróczki (2005) and M. Potushniak (2004) carried out during the last three decades (Fig. 2).

Fig. 2. Archaeological sites of the Körös/Criş Culture discovered along the Tisza river since the 1980s: 1 – Tiszapüspöki; 2 – Nagykörű; 3 – Kőtelek; 4 – Tiszaszőlős; 5 – Ibrány; 6 – Rivne; 7 – Zastavne; 8 – Berehovo
From our point of view, it is interesting that the advancement of this cultural complex starts from the distribution area of the Aegean obsidian (Kilikoglou et al. 1996) and arrives into the region of the Carpathian obsidian (Williams Thorpe et al. 1984). The Neolithic inhabitants of continental Greece preferred making their knapped stone tools from exogenous, good quality raw materials despite the difficulties of procurement (Binder, Perlès 1990, 272). The obsidian – first of all of Milos – dominates most of the lithic assemblages (Perlès 1990, Tableau 3) although it had to be imported partly by seafaring. Toward to the north, the presence of the Melian obsidian is reported up to Macedonia, Greece, from the Early Neolithic at Nea Nikomedeia (Kilikoglou et al. 1996). In the northern Balkans, the main raw material was good quality, white spotted, honey flint, outcrops of which are located in southwestern Romania or in northern Bulgaria (Gatsov 1993; Kozłowski 2003; Kaczanowska, Kozłowski 2008). This “Banat” flint was distributed in the north up to the Great Hungarian Plain and Transylvania (Mateiiciucová 2007; Biagi et al. 2007). Its northernmost appearance in the Carpathian Basin is documented at the site of Méhtelek (Sternini 1994, 69). This latter site yielded a rich lithic industry dominated by Carpathian obsidians. On Mateiiciucová’s map (2007, Fig. 31.10), the distribution areas of the two raw materials overlap in the middle of the Great Hungarian Plain where a hoard with flakes of “Banat” flint was unearthed in the context of the Körös Culture at Endrőd 39 (Kaczanowska et al. 1981). This situation seems to be similar to the afore-mentioned rebuilding of the virtual territory in the theoretical model.

Raw materials in the northeastern part of the Carpathian Basin

The formation of the Carpathian Basin was linked to that of the Alpine mountain system. According to current geological and geophysical hypothesis (Budai 2009) the basement of the basin is made up of two fragments of continental crust that developed in the Africa–Eurasia Collision Zone (Fig. 3). The northwestern part (Alcapa Megaunit) broke off of the African Plate, while the southeastern part (Tisza Megaunit) derived from the Eurasian Plate. The two megaunits contacted each other along the Mid-Hungarian Lineament, which is a tectonic belt crossing Hungary in a southwest–northeast direction. The development of the basin was triggered by the thinning lithosphere plate and the simultaneous thermal subsidence, in connection with the orogenic folding of the Carpathians which started in the Miocene. Within the framework of this geological process, strong volcanic activity took place in the Carpathian forelands from the middle of the Miocene onwards.

As a consequence, a series of Tertiary volcanic formations lay at the northern border of the Great Hungarian Plain from the Danube Bend (Visegrád Mountains) through the Northern Hungarian Range (North Hungary) and the Vihorlat-Gutinian Ridge (Transcarpathia, Ukraine) to the Oaș Mountains (North Rumania). These formations were predominantly built up of andesite and rhyolite. In the eastern part of this mountain arc, the related volcanic rock bodies contain different eruptive rocks with amorphous crystallin structure, such as obsidian and vitreous dacite (previously ascribed to andesite), which are ideal raw materials for knapped stone tools (Biró 2004; Rácz 2008). The volcanic eruptions were accompanied by intensive post-volcanic activity thanks to which a large variety of silicified rocks, such as limnic quartzite, hydroquartzite, geyserite, opalite, silicified sandstone, silicified tuff, were formed across the entire territory of the aforementioned mountain arc. These siliceous rocks of post-volcanic origins were also used as raw materials by Prehistoric stone tool-makers (Dobosi 1978; Biró 1988; 1998; Rácz 2009).

Because of its specific petrographic and geological characteristics, as well as its importance in some archaeological assemblages, the obsidian has been studied since the early years of prehistoric research (Szabó 1877; Rómer 1878). Due to its well identifiable and limited geographical origins and wide distribution in archaeological sites, this raw material provided an opportunity for studying the problem of Prehistoric change and trade (e.g. Gábori 1950). As a result of the analyses and characterisation studies in the 1970s, two types and two varieties of the second type were distinguished for the Carpathian obsidian, and several hypothetical obsidian sources were dismissed (Nandris 1975; Warren et al. 1977; Biró 1981; Williams Thorpe et al. 1984; Biró 2004; Rats 2009). Recently, a third type of the Carpathian obsidian was determined from Transcarpathian archaeological samples (Rosania et al. 2008). The outcrops were identified by field survey in the rhyolite tuff lying between the villages of Rokosovo and Malýj Rakovets near Khust (Velikiy Scholles Ridge) (Rácz 2008). This Carpathian 3 type obsidian has a dark grey cortex quite similar to that of the Carpathian 1 type, but it is of black colour and non-transparent. In thin section (Fig. 4), the matrix shows a striped pattern, and the fluid structure due to the lava flow is well observable. The matrix contains microcrystallin grains spectacularly
Fig. 3. Tectonic setting of the Carpathian Basin in the collision zone of the Eurasian and African plates (after Horváth 2002, reproduced as Figure 1 of Budai 2009): 1 – Eurasian plate; 2 – African plate; 3 – remnants of the oceanic crust; 4 – Alpine mountain range; 5 – Alpine foreland basins; 6 – boundary between the Eurasian plate and the African plate.
embracing the phenocryst minerals (plagioclases, amphibole, biotite, monoclinic pyroxene) which form often aggregates. This obsidian was first described by V.F. Petrougne as one of the raw materials of the local Middle Palaeolithic industries (Petrun 1972; Petrougne 1986). It was confirmed by recent archaeological investigations (Ryzhov 2003).

Quartzite rocks of post-volcanic origins are related to two geological units in the Tokaj Mountains: the Baskó Andesitic Formation of lower Sarmatian age and the Rátka Quartzite Stage of the Erdőbénye Formation of upper Sarmatian–lower Pannonian age (Gyarmati, Szepesi 2007, 29–33). The first covers the central part of the mountains. This acidic volcanic rock has a higher silica content than typical andesite. This volcanic rock often contains hydroquartzite and jasper veins of different thickness up to some meters. The second geological unit is composed by limnic quartzites, geyserites and hydroquartzites, which have silica content up to 95–98%. They form bigger bodies in the rocks of the mountains. They are varied both in colour and quality, in some cases slightly transparent. They have often inhomogeneities or impurities in the texture, such as vegetal remains, bubbles, cracks, etc. The identification of the source is not so easy. Attempts of differentiating the outcrops did no yield a sufficient number of specific characteristics (Szekszárdi 2005). The presence of opalites has been demonstrated by recent field surveys in the Berehovo Hill region (Rácz 2008).

A research project

The richness of lithic raw materials in the Upper Tisza region may have been one of the main reasons of why early farming communities appeared in the northeastern part of the Great Hungarian Plain during the
course of their expansion (cf. Domboróczki, Raczky in this volume) (Fig. 5). The same problem was investigated in southeastern France where the Early Mediterranean Neolithic (Cardial Pottery Culture) expanded northwards along the Rhône valley (Féblot-Augustins 2006). During the later part of the 6th millennium, the Gardon cave in the Bugey region was alternatively settled by the colonizing Neolithic population (layers 58 and 56) and the enduring Mesolithic groups (layers 57 and 54). The first well-characterized neolithic occupation in layer 58 was radiocarbon dated to 5300 to 4900 BC. Techno-economic analyses of the lithic industry were accompanied by a geological field survey in the Bugey region for assessing the regional affordances in siliceous raw materials (Féblot-Augustins 2009a; 2009b). This combined analysis pointed out that Neolithic peoples, when exploring the region, exploited the raw material sources found on the way.

The research project planned for the Upper Tisza region would profit from this methodological experience. First of all, the importance of a systematic inventorizing of potential raw material sources in a given region is worth stressing here. In most cases, provenience studies are content with the identification of the origins of raw materials in an archaeological assemblage by comparing them to rock samples of outcrops already known or discovered by chance. Thus there is a risk of miscalculating the provenancing distance, as a rock type may have several outcrops within a geological formation of a wide geographic extension. According to geomorphological processes, sources of raw material may be classified into three types (Turq 2000, 106–107):
1) primary source (source autochtone): in the original context of the formation;
2) secondary source (source sub-autochtone): extracted by erosion and accumulated in the vicinity of the original primary source;
3) tertiary source (source allochtone): the eroded and/or accumulated raw material had been transported by water courses and deposited with fluvial sediments.

For the interpretation of the lithic assemblage at the archaeological site, distinguishing between these types of origin is very important. The type of source influences not only the distance of transportation but also the quality of the procured blocks. Effects of weathering may deteriorate a material of good quality in the secondary context, while an originally medium quality material could become better in the tertiary context because of its more homogenous parts had been selected during water transport.

A double approach has to be applied in mapping the potential lithic raw materials of the Upper Tisza region. The first is a critical review of the data published in the geological literature accompanied by verification in the field (Rácz 2008; Rats 2009). The second step is a systematic field survey using geological maps for establishing the comprehensive inventory of siliceous rocks, including their varieties, geographic occurrences, types of outcrops, original geological context, as well as the morphological and metric characteristics of blocks (Turq 2000, 33–44; Féblot-Augustins 2009a). This study needs to be completed by a petrographic characterisation, using thin sections and other analytical methods (Rácz 2008; Féblot-Augustins 2009a). Thanks to previous archaeometric and provenience studies (Biró, Dobosi 1991; Biró et al. 2000; Szekszárdi 2005; Rácz 2008), a handful of data exist concerning the region under study.

For the evaluation of the sources, testing the materials by knapping experiments is likewise important, focusing on those techniques, reduction systems and end-products which were recognized in the archaeological record. We can estimate the quality as a raw material of each inventorized rock by combining availability data and experimental data.

In order to study the possible correlations between the expansion of the Körös Culture and the outcrops, the planned research project is also aimed at including the settlement patterns of the culture by field investigations. One may expect finding workshop sites near outcrops, such as that of Kašov belonging to the Late Middle Neolithic (Bánesz 1991; Šiška 1991). The field surveys should also concern sites from which only some features of the Körös Culture were recovered, such as Ibrány, Tiszabezdéd, or the Transcarpathian sites excavated by M. Potushniak (2004). Archaeological excavations will be carried out to clarify the functional questions of the site, on the one hand, and to collect samples in reliable archaeological context for radiocarbon dating on the other. Because of the discovery of the Carpathian 3 type obsidian, it is very important to review all lithic assemblages of the known archaeological sites in order to verify the provenances of the obsidians (e.g. Méhetelek). The detailed techno-economic analysis of lithic assemblages is of help in reconstructing the technological behaviour of the community, including procurement strategies related to each type of raw material, organisation of the lithic production system, group mobility and preferences in tool production. If we would have the chance to discover Mesolithic sites in the study region, these analyses could contribute to understanding the longtime debated eventual interactions between the local hunter-gatherer groups and newly arrived farming communities.

REFERENCES


Die Nutzung von Steinrohmaterialien im Paläolithikum der Slowakei


