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“Post” Transformation: Preliminary Research into the Organization of Technology during the Neolithic

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ABSTRACT

Using lithic data from the Neolithic tell-site of Hungary, the authors discuss social and cultural developments that characterize the Late Neolithic after the Neolithic transformation. The premise is that the inhabitants of the site of Hódmezővásárhely-Gorzsa, had a good knowledge of, and access to, the raw materials that they chose. By the time of the Tisza archaeological culture represented at the site, the landscape had been enculturated. The agro-pastoral subsistence base had been established. Connections with neighbouring territories, through exchange and/or trade, had been developed. Transformation continued, however, within the society particularly in terms of the development of social relations and the growth of socio-economic complexity.

1. Introduction

The site of Hódmezővásárhely-Gorzsa, a Tisza culture tell-site, lies at the confluence of the Tisza and Maros rivers in south-east Hungary (Figure 1). After water management activities of the 19th century, the location of the site was on a natural terrace at a height of 4–5 m, surrounded by water courses, swamps and marshes due to the fluvial system of the Tisza. At the foot of the terrace, an ancient stream, the Kero, constitutes a direct link with the Tisza, the Hód lake near Hódmezővásárhely, the Száraz stream, and the Maros River (Horváth 1991; 2005).

The most recent excavations were begun in 1978, directed by Ferenc Horváth of the Móra Ferenc Museum of Szeged. They became part of the ongoing study of tell settlements in the region, for example, at Szegvár and Tápé-Lebő. The layers of the settlement formed a sequence that was 2.60 to 3 m thick and contained remains from the late Neolithic to the period of the Sarmatians. The thickest layer was 180–200 cm and was that of the late Neolithic, representing the early, classic and late periods of the Tisza culture. In terms of absolute chronology,

calibrated dates place the sequence roughly between 4970 and 4380 BC (Horváth 2005; Gulyás *et al.* 2010).

There are at least three culture groups associated with the Late Neolithic in eastern Hungary, known as the Tisza-Herpály-Csőszhalom complex. The Early Copper Age Tiszapolgár culture is characterized by more dispersed sites but is clearly developed from the earlier complex (Bognár-Kutzián 1972). Kalicz and Raczy (1987) discuss three basic site types for the Hungarian Neolithic: tells, tell-like mounds, and small to moderate sized flat sites enclosed by ditches. Although larger sites are associated with the Late Neolithic, all three are also known in the Copper Age. At the same time, there has been a burst of recent research that focuses on the nature of changes during the Neolithic that led to the settlement patterns, economic systems, and social structures known during the Copper Age (*e.g.*, Raczy, Anders 2006; Parkinson *et al.* 2004).

The expanse of Gorzsa was approximately five hectares, but during the late Neolithic, different parts of the area were not inhabited simultaneously. Over the 12 year period 1978 to 1990, only 1.4 % of the extent of the settlement has been brought to light. According to the modifications of the settlement structure and the typology of the objects, the Neolithic occupation was divided into five different phases of occupation, succeeding each other directly through time.

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Figure 1. Geographical location of the tell site Gorzsa (from Starnini *et al.* 2007, Figure 1).

Although the stratigraphy is complicated and disturbed by numerous pits, it was possible to uncover several houses of wattle and daub (Horváth 1991).

During the first two phases of the settlement, subsistence was heavily based on food production, this being evident from frequent finds of carbonized cereal grains and impressions. The percentage of domestic animals among the faunal remains measured close to 80 % and the diet was also supplemented by fish and molluscs. Studies of ceramics have shown that the people of Gorzsa had extensive cultural and economic relationships with neighbouring sites and archaeological cultures. Studies of the stone assemblage have suggested similar results (Biró 1998; Starnini *et al.* 2007; Szakmány *et al.* 2009; 2010).

In 1999, the authors undertook a study of the chipped stone assemblage from Gorzsa. One of the authors (Voytek), after engaging in the Hungarian research for several weeks in the summer, would then travel to Prague to meet with Marek Zvelebil and work with him and his Czech colleagues on the Northern Bohemian project. This collaboration continued for

three years and although Voytek and Zvelebil did not publish the results of their research, it was a particularly positive and memorable period which created a warm and lasting friendship that included Marek Zvelebil's time as a Visiting Professor at UC Berkeley, California.

2. Methodology

The study of the lithic assemblage from Gorzsa is still underway, currently funded by the Hungarian Scientific Research Fund (OTKA), with the Principal Investigator being Ferenc Horváth who had directed the excavations. Thus far, approximately 1900 chipped stone artefacts have been analysed for raw materials, typology, metrics (including weight), and use wear, utilizing a low power binocular microscope. A preliminary report on this research was made in 2006 at the Middle/Late Neolithic conference held in Krakow, Poland, and subsequently published (Starnini *et al.* 2007).

This current contribution must also be considered preliminary, not only because the study is ongoing, but also because only a small sample of the analysed tools has been assigned stratigraphically to specific phases of the Tisza archaeological culture. A large portion of the analysed materials comes from pits that have yet to be clarified as to provenience. Therefore, we would like to emphasise that the current exercise presented here is basically a test case of the directions in which we hope to take this research. The conclusions section of this paper will underscore that fact.

Our premise is that the inhabitants of the site of Gorzsa had a sound knowledge of, and access to, the raw materials that they chose. Given the fact that the surrounding environment was comprised of mud, clay, and silt-sand, the stone used for tools had to have come from some distance away. Referring to the theme of this volume, we would venture to say that by the time of the Tisza archaeological culture, the landscape had been enculturated. The agro-pastoral subsistence base had been established. Connections with neighbouring territories, through exchange and/or trade had been developed. Transformation continued, however, within the society, particularly in terms of the development of social relations and the growth of socio-economic complexity.

Squeezing information about increasing socio-economic complexity from stones is not an easy matter. However, we formulated a hypothesis that could be tested with the lithic data, at least in preliminary terms. We focused on the choices made by the toolmakers and tool users – specifically, the choice of raw materials to produce specific types of tools that were used for specific purposes. We hypothesized that if there is a strong correlation between these three variables (raw material, tool type, and use), then the Neolithic peoples had based their choices on the functionality of the raw material. If however, there was no strong correlation, and the choices appeared to be random, the functionality or characteristics of the raw material was not the main factor. Other issues, such as ease of access including social access, had been in play. Admittedly, the hypothesis is a basic one. However, it is a beginning in the attempt to understand prehistoric human choice and behaviour.

As has been mentioned, the sample is admittedly very small, 175 pieces, because it is only composed of used tools coming from only two of the excavated squares. Roughly half can be assigned to the Classic Tisza phase of the culture, the other half to the Early Tisza (Figures 2–9). Due to the fact that the sample is as small as it is, we did not make any attempt at dividing it according to further chronological sub-phases. Interesting differences between the two suggests avenues for future research. For example, concerning raw material, obsidian is found principally in the later Classic Tisza levels, including used scrapers as well as cores and core fragments (Figure 9). In the Early Tisza, no used tools of obsidian were noted in the sample. In addition, during the Classic Tisza, it appears that there had been knowledge and use of Prut flint, also among the few pieces we included from the Late Tisza phase (Figure 8, 14). No Prut was seen from the Early Tisza artefacts of this sample. In the future, we hope, with

more data, to test whether the introduction of such exotics was indeed a later development. In this study, we focused on three different lithic raw materials: Transdanubian (both Szentgál and Úrkút Eplény variants) radiolarite, Mecsek radiolarite, and Central Banat radiolarite (also known as Central Banat chert or silex). The distances between the site and these potential sources are not particularly large; however all are located more than 60–100 km distance from the site as the crow flies. The Transdanubian is generally to the north-west, Mecsek generally south-west, and Central Banat to the south-east. Central Banat raw materials have been also uncovered at Vinča archaeological sites such as Opatovo in Vojvodina and Selevac in Serbia (Voytek 2001; 1990). Raw materials identification was carried out according to the list proposed by K. T. Biró (1998) and following the classification of Lithotheca of the National Museum in Budapest (Biró, Dobosi 1991; Biró *et al.* 2000).

3. Results

3.1 Tool Types

The most common tool type within the sample (80 pieces), and most likely, within the assemblage as a whole, is the end scraper, mostly the short type (Laplace 1964). This type constituted over 50 % of the sample presented here (Figures 2–3, 5–6). Thus, we chose to focus on two of the less represented types, namely, blades (47 pieces) and borers/becks (6) (Figures 3, 6–8). Within our sample, blades made of the Central Banat chert (15 pieces) exhibit a limited range of tasks: 25% cut silica-based vegetation; 25% sickles; 25% cut soft; 5% scrape hard; 20% cut wood. In contrast, blades made of Mecsek radiolarite (30 pieces) had been used in a broader range of activities: 45% cut soft; 18% cut wood; 18% cut silica-based vegetation; 10% sickles; 5% cut medium; 5% scrape hard. The actual number of borers/becks was only six. Two were made from Mezőzombor limnoquartzite and four were of Mecsek radiolarite.

Examining the used sickles, regardless of tool type *per se*, we found that the Mecsek radiolarite was slightly less used for this task – namely, 41% of the sickles were made of Mecsek, while 53% were made of Central Banat chert. The balance (6%) were made of limnoquartzite.

3.2 Tool Function/Use

Although end scrapers are the most common tool type in the sample, the most frequent activity was cutting vegetation that contained silica. Such plants include various wild grasses as well as reeds, straw, *etc.* This category includes the sickles as well as tools that show silica gloss but not to the same extent as the sickles. They had been used to cut vegetation but not as harvest implements for grains. Of the sample, 20% had been used in this manner. This activity was followed very closely by scraping hard or resistant materials such as bone or antler (17%). Wood-working/cutting/scraping had also been the function of 17% of the sampled tools, while cutting soft or least resistant materials amounted to 10%. The

Figure 2. Gorzsa, squares III, V, VI. Early and Classic Tisza Culture chipped stone tools. Used long (G1) and short (G3) end scrapers: CG=cut grass; CM=cut medium; C-SH=cut-scrape hard; CW=cut wood; H=hafting traces; si=sickle gloss; SH=scrape hard; SHW=scrape hard wood; SM=scrape medium; SW=scrape wood (drawings by E. Starnini).

Figure 3. Gorzsa squares III, V, VI. Early and Classic Tisza Culture chipped stone tools. Used end scrapers (1–6), truncations (7–10), borers (11–13), blades (14–28), flakes (29–30): BH=bore hard; BHW=bore hard wood; CG=cut grass; CM=cut medium; CS=cut soft; CSW=cut soft wood; CW=cut wood; GH=groove hard; H=hafting traces; si=sickle gloss; SH=scrape hard; SM=scrape medium; SW=scrape wood; WM=work medium (drawings by E. Starnini).

Figure 4. Gorzsa squares III, V, VI. Early and Classic Tisza Culture cores and core fragments. Transdanubian radiolarites (1–2, 6, 8), Mecsek radiolarites (3), central Banat chert (4), Tevel flint (5), obsidian (7) (drawings by E. Starnini).

Figure 5. Gorzsa squares III, V, VI. Classic and Late Tisza Culture chipped stone tools. Used long (G1) and short (G3) end scrapers: CM=cut medium; CS=cut soft; CW=cut wood; H=hafting traces; SH=scrape hard; SM=scrape medium; SW=scrape wood; WH=work hard; WW=work wood (drawings by E. Starnini).

Figure 6. Gorzsa squares III, V, VI. Classic and Late Tisza Culture chipped stone tools. Used end scrapers (1–10), truncations (11–21), borers (22–23, 27), isosceles trapezes (24–26): BH=bore hard; CG=cut grass; CHW=cut hard wood; CM=cut medium; CSW=cut soft wood; CW=cut wood; H=hafting traces; SH=scrape hard; SM=scrape medium; SW=scrape wood; WW=work wood (drawings by E. Starnini).

Figure 7. Gorzsa squares III, V, VI. Classic and Late Tisza Culture chipped stone tools. Used blades: CG=cut grass; CM=cut medium; CS=cut soft; CW=cut wood; SM=scrape medium; SH=scrape hard; si=sickle gloss (drawings by E. Starnini).

Figure 8. Gorzsa squares III, V, VI. Classic and Late Tisza Culture chipped stone tools. Used blades (1–8), flakes (9–12), splintered piece (13), end scraper (14): CG=cut grass; CH=cut hard; CM=cut medium; CS=cut soft; CW=cut wood; SM=scrape medium; SW=scrape wood; WM=work medium (drawings by E. Starnini).

Figure 9. Gorzsa squares III, V, VI. Classic and Late Tisza Culture cores, core fragments and crested blade (9). Obsidian (1–5, 8, 12), Mecsek radiolarites (6–7), Transdanubian radiolarites (11), central Banat chert (10–11) (drawings by E. Starnini).

Table 1. Gorzsa, squares III, V, VI. List of used artefacts and cores from the Early, Classic and Late Tisza Culture layers.

Square	Layer	Phase	Raw material	Typology (Laplace, 1964)	1use	2use	Hafting	Figure
Vb	18–19	Early Tisza	radiolarite	G1/end scraper	CW	SW		2/1
VI	15–16	Early Tisza	Central Banat chert	G1/end scraper	SH	CG		2/2
Va	17–18	Early Tisza	radiolarite	G1/end scraper	sickle	SW		2/3
Va	17–18	Early Tisza	Central Banat chert	G1/end scraper	SH			2/4
VI	12–13	Early Tisza	Transdanubian radiolarite	G3/end scraper	SH			2/5
VI	12–13	Early Tisza	Mecsek radiolarite	G3/end scraper	SH			2/7
Va	20	Early Tisza	radiolarite	G3/end scraper	SW		yes	2/8
VI	12–13	Early Tisza	Mecsek radiolarite	G3/end scraper	SM		yes	2/9
VI	15–16	Early Tisza	Central Banat chert	G3/end scraper	C-SH			2/10
VI	14–15	Early Tisza	Central Banat chert	G3/end scraper	SM			2/11
VI	12–13	Early Tisza	Mecsek radiolarite	G3/end scraper	SM			2/12
VI	15–16	Early Tisza	Central Banat chert	G3/end scraper	SH			2/13
VI	14–15	Early Tisza	Central Banat chert	G3/end scraper	SH			2/14
Va	20–21	Early Tisza	Central Banat chert	G3/end scraper	SHW			2/16
Va	18–19	Early Tisza	Tevel flint	G3/end scraper	SW	CM		2/17
Va	18–19	Early Tisza	Transdanubian radiolarite	G3/end scraper	SM			2/18
VI	15–16	Early Tisza	Central Banat chert	G3/end scraper	sickle			2/19
Va	16–17	Early Tisza	Transdanubian radiolarite	G3/end scraper	SM			2/20
Va	16–17	Early Tisza	Central Banat chert	G3/end scraper	sickle	SH		2/21
VI	16–17	Early Tisza	Transdanubian radiolarite	G3/end scraper	SM			2/22
VI	17–18	Early Tisza	radiolarite	G3/end scraper	SH			2/23
VI	17–18	Early Tisza	Central Banat chert	G3/end scraper	SH			2/24
Va	18–19	Early Tisza	Tevel flint	G3/end scraper	SH			2/25
Va	18–19	Early Tisza	Central Banat chert	G3/end scraper	sickle	SH		2/26
Va	18–19	Early Tisza	red radiolarite	G3/end scraper	sickle			2/27
Va	18–19	Early Tisza	Central Banat chert	G3/end scraper	SM			2/28
Va	18–19	Early Tisza	Central Banat chert	G3/end scraper	CH		yes	2/29
Va	19–20	Early Tisza	Mecsek radiolarite	G3/end scraper	SW			2/30
Va	17–18	Early Tisza	White flint	G3/end scraper	SH			2/31
Va	20–21	Early Tisza	Central Banat chert	G3/end scraper	SM		yes	3/1
Va	19–20	Early Tisza	Transdanubian radiolarite	G3/end scraper	WM			3/2
Va	19–20	Early Tisza	Transdanubian radiolarite	G3/end scraper	SM			3/3
Vb	19–20	Early Tisza	Central Banat chert	G3/end scraper	sickle	wear		3/4
Vb	21–22	Early Tisza	Central Banat chert	G3/end scraper	none			3/5
Vb	22 House	Early Tisza	Central Banat chert	G3/end scraper	SM		yes	3/6
Va	19–20	Early Tisza	White flint	G3.T2/end scraper and truncation	C/SW		yes	3/7
VI	12–13	Early Tisza	Mecsek radiolarite	T2/truncation	sickle	SH		3/8
Vb	19–20	Early Tisza	Central Banat chert	T2/truncation	sickle			3/9
Vb	22–23	Early Tisza	Limnoquartzite	T2/truncation	sickle	SM	yes	3/10
Va	16–17	Early Tisza	Mecsek radiolarite	Bc2/borer	BH		yes	3/11
VI	16–17	Early Tisza	Tokaj limnoquartzite	Bc2/borer	BH			2/12
Va	17–18	Early Tisza	Mecsek radiolarite	Bc0/borer	BH			2/13
Vb	18–19	Early Tisza	Transdanubian radiolarite	L1-0/inframarginal retouched blade	WW	CW		2/14
VI	16–17	Early Tisza	Central Banat chert	L0/unretouched blade	CS			3/15
VI	14–15	Early Tisza	Central Banat chert	L0/unretouched blade	CS			3/16
VI	15–16	Early Tisza	Central Banat chert	L0/unretouched blade	sickle			3/17
VI	15–16	Early Tisza	radiolarite	L0/unretouched blade	sickle			3/18
VI	15–16	Early Tisza	radiolarite	L0/unretouched blade	sickle			3/19
Va	19–20	Early Tisza	Mecsek radiolarite	L0/unretouched blade	sickle			3/20
Vb	19–20	Early Tisza	Mecsek radiolarite	L0/unretouched blade	CS			3/21
Va	17–18	Early Tisza	Central Banat chert	L0/unretouched blade	sickle		yes	3/22

Table 1. Gorzsa, squares III, V, VI. List of used artefacts and cores from the Early, Classic and Late Tisza Culture layers. (Continued).

Square	Layer	Phase	Raw material	Typology (Laplace, 1964)	1use	2use	Hafting	Figure
Vb	18–19	Early Tisza	Limnoquartzite	L0/unretouched blade	CW			3/23
Va	18–19	Early Tisza	Central Banat chert	L0/unretouched blade	CG			3/24
Va	16–17	Early Tisza	Mecsek radiolarite	L0/unretouched blade	CW			3/25
Vb	18–19	Early Tisza	Transdanubian radiolarite	L0/unretouched blade	CM		yes	3/27
VI	14–15	Early Tisza	Mecsek radiolarite	R1-0/inframarginal side scraper	GH			3/29
Vb	19–20	Early Tisza	radiolarite	R0/unretouched flake	CM			3/30
Vb	18–19	Early Tisza	Transdanubian radiolarite	core	none			4/1
VI	15–16	Early Tisza	Transdanubian radiolarite	core fragment	none			4/2
VI	14a–15	Early Tisza	Mecsek radiolarite	core	none			4/3
VI	14–15	Early Tisza	Central Banat chert	core	none			4/4
Va	16–17	Early Tisza	Tevel flint	core	none			4/5
VI	15–16	Early Tisza	obsidian	core fragment	none			4/7
Vb	11–12	Classic Tisza	Transdanubian radiolarite	G1/end scraper	SH			5/1
Va	11–12	Classic Tisza	Mecsek radiolarite	G1/end scraper	SM	CM		5/2
Va	11–12	Classic Tisza	Mecsek radiolarite	G1/end scraper	SH	CS		5/3
Va	11–12	Classic Tisza	Mecsek radiolarite	G1/end scraper	SW			5/6
Va	11–12	Classic Tisza	Mecsek radiolarite	G1/end scraper	SW			5/9
Va	10–11	Classic Tisza	Mecsek radiolarite	G1/end scraper	SH	CM		5/11
Va	10–11	Classic Tisza	Mecsek radiolarite	G2/end scraper	SM			5/5
VI	13–14	Classic Tisza	radiolarite	G3/end scraper	SH		yes	2/6
VI	13–14	Classic Tisza	Mecsek radiolarite	G3/end scraper	SM			2/15
Va	11–12	Classic Tisza	Mecsek radiolarite	G3/end scraper	SW			5/13
Vb	10–11	Classic Tisza	Transdanubian radiolarite	G3/end scraper	SM		yes	5/14
Vb	10–11	Classic Tisza	Mecsek radiolarite	G3/end scraper	SW	CW		5/15
Va	10–11	Classic Tisza	Mecsek radiolarite	G3/end scraper	CH	CH		5/17
Va	11–12	Classic Tisza	Central Banat chert	G3/end scraper	CM			5/19
Vb	12–13	Classic Tisza	Mecsek radiolarite	G3/end scraper	SH			5/23
Va	11–12	Classic Tisza	Mecsek radiolarite	G3/end scraper	WH		yes	5/24
Vb	11–12	Classic Tisza	Central Banat chert	G3/end scraper	SM			5/25
Va	11–12	Classic Tisza	Central Banat chert	G3/end scraper	SM			5/26
Va	11–12	Classic Tisza	Transdanubian radiolarite	G3/end scraper	SM		yes	5/27
Va	11–12	Classic Tisza	Mecsek radiolarite	G3/end scraper	SM			5/28
Vb	11–12	Classic Tisza	Central Banat chert	G3/end scraper	SW			5/29
Vb	18–19	Classic Tisza	Central Banat chert	G3/end scraper	SW			5/30
Vb	11–12	Classic Tisza	Central Banat chert	G3/end scraper	SM			5/31
Vb	11–12	Classic Tisza	Central Banat chert	G3/end scraper	SH			6/1
V	11–12	Classic Tisza	Central Banat chert	G3/end scraper	SM	SH	yes	6/2
Vb	14–15	Classic Tisza	obsidian	G3/end scraper	SH			6/3
Vb	12–13	Classic Tisza	Central Banat chert	G3/end scraper	SW	CW		6/4
Vb	14–15	Classic Tisza	Transdanubian radiolarite	G3/end scraper	SH		yes	6/5
Vb	16–17	Classic Tisza	Mecsek radiolarite	G3/end scraper	SW			6/6
Vb	17–18	Classic Tisza	Central Banat chert	G3/end scraper	SM			6/7
Vb	14–15	Classic Tisza	Central Banat chert	G3/end scraper	SH			6/8
Vb	17–18	Classic Tisza	Mecsek radiolarite	G3/end scraper	CG	SW		6/9
Va	10–11	Classic Tisza	Mecsek radiolarite	G5/end scraper	CW		yes	5/12
Vb	17–18	Classic Tisza	Central Banat chert	fr G/fr. of end scraper	SH			6/10
Va	10–11	Classic Tisza	radiolarite	T2/truncation	CHW	CHW		6/11
Vb	10–11	Classic Tisza	Central Banat chert	T2/truncation	CG			6/12
Vb	10–11	Classic Tisza	green radiolarite	T2/truncation	SM			6/13
Va	11–12	Classic Tisza	Transdanubian radiolarite	T2/truncation	CG	CG		6/14
Va	11–12	Classic Tisza	Central Banat chert	T2/truncation	CG		yes	6/15
Va	11–12	Classic Tisza	Mecsek radiolarite	T2/truncation	CW			6/16

Table 1. Gorzsa, squares III, V, VI. List of used artefacts and cores from the Early, Classic and Late Tisza Culture layers. (Continued).

Square	Layer	Phase	Raw material	Typology (Laplace, 1964)	1use	2use	Hafting	Figure
Vb	11–12	Classic Tisza	Central Banat chert	T2/truncation	SW		yes	6/17
Vb	11–12	Classic Tisza	Mecsek radiolarite	T2/truncation	CM		yes	6/18
Vb	11–12	Classic Tisza	obsidian	T2/truncation	none		yes	6/19
Vb	13–14	Classic Tisza	Mecsek radiolarite	Bc2/borer	WW		yes	6/22
Vb	16–17	Classic Tisza	Tokaj limnoquartzite	Bc2/borer	BH			6/23
Vb	15–16	Classic Tisza	Central Banat chert	Gm6/trapezoidal geometric	none		yes	6/24
Vb	11–12	Classic Tisza	Transdanubian radiolarite	Gm6/trapezoidal geometric	impact?			6/25
Vb	10–11	Classic Tisza	Mecsek radiolarite	Gm6/trapezoidal geometric	none			6/26
Vb	14–15	Classic Tisza	Central Banat chert	L1/retouched blade	SH	SH		7/1
Vb	16–17	Classic Tisza	Mecsek radiolarite	L1-0/inframarginal retouched blade	SH			7/2
Vb	11–12	Classic Tisza	Central Banat chert	L1-0/inframarginal retouched blade	CG			7/4
Vb	10–11	Classic Tisza	Mecsek radiolarite	L1-0/inframarginal retouched blade	CG			7/5
VI	14a	Classic Tisza	Central Banat chert	L0/unretouched blade	CW	CW		3/26
Va	14–15	Classic Tisza	Mecsek radiolarite	L0/unretouched blade	CS			3/28
Vb	10–11	Classic Tisza	Mecsek radiolarite	L0/unretouched blade	CW			7/3
Va	11–12	Classic Tisza	Mecsek radiolarite	L0/unretouched blade	CW			7/6
Vb	11–13	Classic Tisza	Mecsek radiolarite	L0/unretouched blade	CS			7/8
Vb	18–19	Classic Tisza	Central Banat chert	L0/unretouched blade	CS			7/9
Vb	15–16	Classic Tisza	Transdanubian radiolarite	L0/unretouched blade	CG	CG		7/10
Vb	10–11	Classic Tisza	Mecsek radiolarite	L0/unretouched blade	CS			7/11
Vb	12–13	Classic Tisza	Mecsek radiolarite	L0/unretouched blade	CS		yes	7/12
Va	11–12	Classic Tisza	Central Banat chert	L0/unretouched blade	sickle			7/13
Vb	10–11	Classic Tisza	Mecsek radiolarite	L0/unretouched blade	sickle		yes	7/14
Vb	11–12	Classic Tisza	Mecsek radiolarite	L0/unretouched blade	CS			7/15
Va	11–12	Classic Tisza	Mecsek radiolarite	L0/unretouched blade	CS		yes	7/16
Va	11–12	Classic Tisza	Central Banat chert	L0/unretouched blade	sickle		yes	7/19
Vb	10–11	Classic Tisza	Mecsek radiolarite	L0/unretouched blade	CS			7/20
Va	11–12	Classic Tisza	Mecsek radiolarite	L0/unretouched blade	CS			7/21
Vb	16–17	Classic Tisza	Transdanubian radiolarite	L0/unretouched blade	CM		yes	7/22
Vb	12–13	Classic Tisza	Mecsek radiolarite	L0/unretouched blade	CS			7/23
Vb	14–15	Classic Tisza	Central Banat chert	L0/unretouched blade	CS			8/1
Vb	14–15	Classic Tisza	Central Banat chert	L0/unretouched blade	CG			8/2
Vb	15–16	Classic Tisza	Mecsek radiolarite	L0/unretouched blade	CM	CM		8/3
Va	11–12	Classic Tisza	Mecsek radiolarite	L0/unretouched blade	CV	CW		8/6
Vb	17–18	Classic Tisza	Central Banat chert	L0/unretouched blade	CW			8/7
Va	11–12	Classic Tisza	Mecsek radiolarite	R0/unretouched flake	CG			8/10
Va	11–12	Classic Tisza	Central Banat chert	R0/unretouched flake	CM	SW		8/11
Vb	11–12	Classic Tisza	Mecsek radiolarite	R0/unretouched flake	CM			8/12
VI	12–13	Classic Tisza	Transdanubian radiolarite	core	none			4/6
VI	12–13	Classic Tisza	Transdanubian radiolarite	core	none			4/8
Va	10–11	Classic Tisza	obsidian	core	none			9/1
Va	11–12	Classic Tisza	obsidian	core	none			9/2
VI	11–12	Classic Tisza	obsidian	core	none			9/3
VI	11–12	Classic Tisza	obsidian	precore	none			9/4
Va	11–12	Classic Tisza	obsidian	core	none			9/5
Vb	15–16	Classic Tisza	Mecsek radiolarite	core	none			9/6
Vb	18–19	Classic Tisza	Mecsek radiolarite	core	none			9/7
Va	11–12	Classic Tisza	Central Banat chert	crested blade	none			9/9
Va	11–12	Classic Tisza	Central Banat chert	core	none			9/10
Vb	11–12	Classic Tisza	Transdanubian radiolarite	core fragment	none			9/11

Table 1. Gorzsa, squares III, V, VI. List of used artefacts and cores from the Early, Classic and Late Tisza Culture layers. (Continued).

Square	Layer	Phase	Raw material	Typology (Laplace, 1964)	1use	2use	Hafting	Figure
VI	11–12	Classic Tisza	obsidian	core	none			9/12
Vb	9–10	Late Tisza	Central Banat chert	G1/end scraper	SH			5/4
Va	9–10	Late Tisza	Central Banat chert	G1/end scraper	SH	CW		5/8
Vb	9	Late Tisza	Mecsek radiolarite	G3/end scraper	CM		yes	5/16
V	9–10	Late Tisza	Central Banat chert	G3/end scraper	SH			5/21
V	9–10	Late Tisza	Central Banat chert	G3/end scraper	SM			5/22
VI	layer 8	Late Tisza	Prut flint	G3/end scraper	WM			8/14
Vb	9–10	Late Tisza	Mecsek radiolarite	T2/truncation	SH			6/20
VI	9–11	Late Tisza	Mecsek radiolarite	T2/truncation	CSW	CSW		6/21
Va	9–10	Late Tisza	Mecsek radiolarite	Bc2/borer	BH			6/27
Vb	9	Late Tisza	Central Banat chert	L0/unretouched blade	CG			7/7
V	9–10	Late Tisza	Transdanubian radiolarite	L0/unretouched blade	CS		yes	7/17
V	9–10	Late Tisza	Central Banat chert	L0/unretouched blade	CW			7/18
Vb	9–10	Late Tisza	Prut flint	L0/unretouched blade	CS		yes	7/24
VI	layer 11	Late Tisza	Mecsek radiolarite	L0/unretouched blade	CG	CG		8/8
V	9–10	Late Tisza	Mecsek radiolarite	L0/unretouched blade	CW			8/4
Vb	9–10	Late Tisza	Mecsek radiolarite	L0/unretouched blade	CG			8/5
Vb	9–9a	Late Tisza	obsidian	R1-0/inframarginal side scraper	SM			8/9
V	9–10	Late Tisza	Central Banat chert	PE/splintered piece	CH	CH		8/13
Vb	7–9	Late Tisza	obsidian	core	none			9/8

remaining tools had been used in a variety of tasks, mainly scraping.

Breaking out the three types of radiolarites that we introduced above, we found that the use of the Central Banat chert may reflect a preference for this rock in certain activities. Of the total, 26% had been used to cut vegetation that contained silica and 24% had been used to scrape hard

or resistant materials such as bone or antler. Another 17% had been used in activities that involved scraping medium resistant materials such as hides, while 5% had been used for cutting wood. The balance was spread fairly evenly over other activities involving cutting and scraping. As mentioned above in the section on Tool Types, the blades of Central Banat chert also suggested a preference for certain tasks.

Figure 10. Map of the Carpathian Basin with the location of the tell- site Gorzsa and the possible directions of provenances of the raw materials for the polished, ground (orange and red boxes) and chipped (white boxes) stone tools, in relationship with the cultural provinces (from Szakmány *et al.* 2009, Figure 6).

The sample of Szentgál or Transdanubian radiolarite is particularly small (18 pieces) which of course skews any calculations. We can, however, report that there is once again suggestion of preferred usage. Of the total, 22% had been used to scrape medium resistant materials such as hides, while 16% had been used to scrape hard materials. The percentage used to cut silica-based vegetation was 11%. Another 22% comprised cores and core fragments which is important information although not exactly related to tool use. The balance of the tools is spread over several activities including one piece which had been an armature.

Finally, we considered the Mecsek radiolarite which is the most numerous lithic raw material on the site. Again, the larger sample does tend to smooth out the percentages thus it is less likely that any activity would measure much higher than any other. And in fact, we did determine that a range of activities characterized the use of this material. Fourteen percent of the tools had been used in cutting soft or less resistant materials, while 11% had been used in cutting silica-based vegetation. Another 8% had been used in each of the following activities: scraping wood, scraping medium, and scraping hard. Six percent had been used for cutting medium while the rest were spread over various activities.

4. Conclusions

Although the sample used in this study is small and the differential quantities of the raw materials clearly affect the results, several observations can be made which lead to future directions for research. None of the raw materials appear to have been chosen for specific usage and/or types, suggesting that the choice of material had not been based on its quality or properties. The lack of correlation between material and usage suggests that ease of access, both physical and social, had been a major factor in the choice of rock.

Thus far, and in our limited sample, little evidence has been found for very long-distance trade of chipped stone materials from northern regions (*i.e.* Prut and chocolate flint and obsidian) during the earlier phases of the archaeological culture. Regarding lithic assemblages further south, associated with the Vinča archaeological culture, studies have shown that over time, local and nearby rock sources had been used more and more frequently during the Neolithic (Voytek 1990). At Gorzsa a similar pattern may be discerned. Along these lines, local cultural ties would have intensified as populations grew and spread into new regions of the landscape, solidifying "landscape relationships" (Zvelebil *et al.* 1992:194). Extended kinship patterns would be the beginning of tribal associations beyond the limits of individual settlements and individual households.

Concerning ease of physical access, and taking into account the geographical location of all the possible sources of lithic raw materials, both for chipped and polished/ground stone tools employed at Gorzsa (Figure 10), we would consider riverine travel and transport to have been of considerable value. The Maros River would have served as a potential

E-W transport corridor, not only for raw materials such as the Central Banat chert, but also for the cultural contacts and interaction that exchange would represent, together with the Tisza River, acting as a major N-S connection axis.

In summary, the research into the lithic assemblage from Gorzsa is ongoing. Many questions remain unanswered but the data are there. Ideally, along with our detailed investigation, we hope to examine the organization of technology on a regional level. An individual site is a clear beginning but regional studies have been shown to be more effective in patterning ancient human behaviour (Zvelebil *et al.* 1992:196).

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