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Neolithic and Copper Age between the Carpathians and the Aegean Sea

Chronologies and Technologies from the 6th to the 4th Millennium BCE

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The Middle Neolithic and Chalcolithic Chipped Stone Assemblages of Transylvania: Their Exploitation, Manufacture and Trans-Carpathian Trade

Paolo Biagi

Abstract

This paper deals with the analysis of the chipped stone assemblages recovered from the Transylvanian sites of Miercurea Sibiului-Petriş and Peştera Ungurească in the Cheile Turzii Gorge. The sites were settled for different purposes during parts of the Neolithic and Chalcolithic periods. The industries practiced there have been studied from the points of view of (1) the exploitation and trade of raw materials, and (2) the typology of the chipped stone implements. Although the size of the complexes from the two sites is meagre, they show that the chippable stone resources varied throughout time, according to the different cultural aspects represented at each site. The procurement of raw materials did not depend exclusively upon geological and geographical factors, but also upon human choice. The most important exogenous sources are represented by Carpathian obsidians, "Balkan" and Volhynian flints.

Introduction

Between the middle of the sixth and the end of the fifth millennium BC important cultural and economic changes took place in the Balkans, and Transylvania in particular:[1] what was the role played by chipped stones in these centuries of great transformations?[2] Given that until a few years ago most archaeologists paid little or no attention to lithics, and that research on this topic is still in its infancy in Romania, we often have to revert to two classical authors to refresh our views on the "lithic factor". In effect it is thanks to the seminal work by Al. Păunescu[3] and E. Comşa[4] that we have achieved a reasonable knowledge about the distribution of chippable stone resources, raw material circulation and typology of Middle Holocene lithics, although we are still far from targeting most of the statements outlined by L. H. Barfield on the importance of chipped stone in the Neolithic and Chalcolithic prehistory of Europe.[5]

Research carried out in Transylvania during the last decades has been centred mainly on ceramic typology and pottery seriation,[6] while the importance of chipped stone assemblages was resumed only very recently.[7] A. Sherratt had already pointed out the economic role played by lithics in central-eastern Europe, schematised their main routes of circulation, and summarily quantified their variable percentages in the Neolithic and Chalcolithic trade, at least as regards obsidian and Moesian flint.[8]

The pattern described above is further complicated by the attitude of some Romanian prehistorians towards the description of some cultures, groups, complexes and phases, whose periodisation is based almost exclusively on the recurrence of characteristic vessel shapes and decorations within a limited geographic area,[9] often framed into sequential and chronological tables, whose scope is to synthesise the territorial distribution and interrelationships between different and similar aspects.[10]

This situation has improved slightly during the last two decades thanks to new series of radiocarbon dates,[11] which – although in most cases not consequent to any specific research project – show an increasing interest for the absolute chronology of the two periods.[12] Nevertheless, most of the Neolithic and Chalcolithic sequences for Transylvania are still based on pottery typology and the presence or absence of specific vessel shapes within excavated multi-layered typesites.[13] An updated summary chrono-typological table of the Neolithic-Chalcolithic sequence for Transylvania, compared with that of neighbouring Moldavia, has recently been published.[14]

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[1] Tringham 1971; Renfrew 1978; Sherratt 1984; Sherratt 1997; Kadrow 2011.
[2] Скакун 2006.
[3] Păunescu 1970.
[4] Comşa 1968; Comşa 1971a; Comşa 1971b; Comşa 1974; Comşa 1976; Comşa 1986.
[5] Balcer 1980; Barfield 2004, 75.
[6] See for instance Renfrew 1969; Lazarovici/Drașovean 1991; Lazarovici 1993; Maxim 1999; Luca 2001, Suciu 2009.
[7] Biagi/Voytek 2006; Biagi et al. 2007a; Biagi et al. 2007b; Crandell 2008; Biagi 2011.
[8] Sherratt 1976.
[9] See for instance Drașovean 1996; Drașovean 2009; Lazarovici/Maxim 1996; Maxim 1999; Luca 2006; Dammers 2009.
[10] Tringham 1971, Fig. 41; Paul 1992, Table 2; Iercoşan 2002, Fig. 152; Mantu 1999–2000, Table 2.
[11] Gläser 1996; Schier 1996; Biagi et al. 2005.
[12] Horváth 1991; Mantu 1998; 1999–2000; Lazarovici 2006; Lazarovici 2009; Luca et al. 2011a.
[13] See for instance Maxim 1999; Luca 2000; Drașovean 2002.
[14] Mischka 2009, Fig. 2.

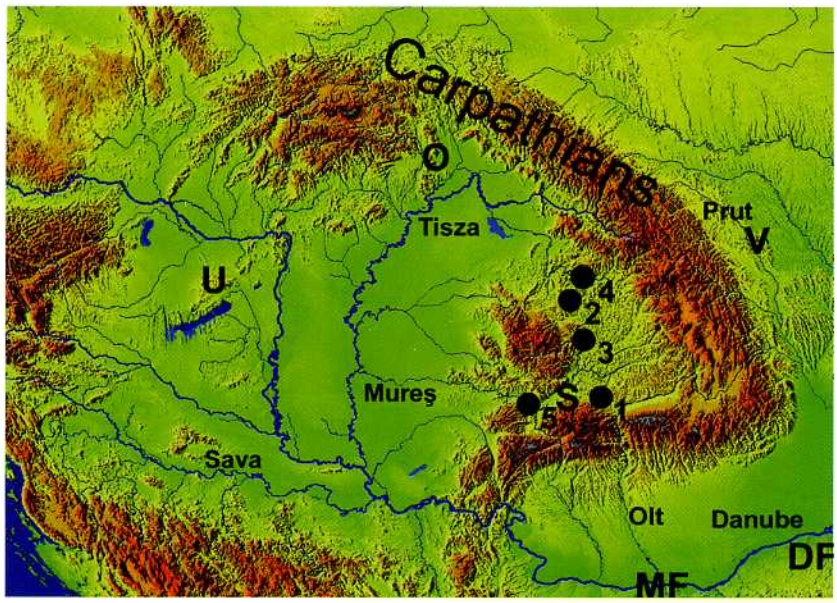

Fig. 1. Distribution map of archaeological sites and main raw material sources mentioned in the text: 1 Miercurea Sibiului-Petriş, 2 Peştera Ungurească, 3 Iclod, 4 Ţaga, 5 Cauce Cave. Carpathian 1 obsidian (O), Moesian "Balkan" flint (MF), Dobrogean "Balkan" flint (DF), Volhynian/Prut flint (V), Úrkút flint (U) and light grey silicified sandstone (S).

Fig. 2. Miercurea Sibiului-Petriş. The southwestern terrace of the Secaş River, upon which the settlement is located. The Secaşelor Upland is visible in the background (photo: P. Biagi).

Consequently the *de facto* underestimation of lithics and their importance in the economic strategy of the region under study, especially regarding the occurrence of primary raw material sources within a well-defined territory, has led to insufficient knowledge about important characteristics of each single aspect, given that "good quality flint had a role in anchoring cultural areas in their regional location and giving them an economic reality and a recognisable geographical shape",[15] considering that "the nature of exchange network was part of a radical re-ordering of settlement patterns and social structure".[16]

While research has greatly improved in the neighbouring countries,[17] our knowledge about the raw material sources utilised by Transylvanian Middle Neolithic and Chalcolithic farmers, the exploitation of these sources and the circulation of material, is still based almost exclusively on the data provided by E. Comşa,[18] apart from a few recent discoveries made by O. Crandell.[19] One of the very few exceptions is represented by the Middle Neolithic site of Iclod,[20] from which we have a description of the raw materials employed for making tools, the study of the provenance of the obsidian artefacts, and a typological list of the chipped stone artefacts.[21]

The sites

The lithic assemblages from two important sites in Transylvania are discussed in this paper: (1) Miercurea Sibiului-Petriş and (2) Peştera Ungurească in Cheile Turzii **(Fig. 1,1.2)**. Although they show very different characteristics, cultural attribution and chronology, these sites are the only ones excavated accurately enough to recover chipped stone tools.

Miercurea Sibiului-Petriş

Miercurea Sibiului-Petriş is located in the Apoldului depression, between the Secaşelor Upland in the North and the Cindrelului Mountains in the South, and at an altitude of some 450 metres. It lies on a southwestern terrace of the Secaş River **(Fig. 2)**, close to the incision of a small stream flowing from the South that joins the Secaş at the eastern end of the site, some 30 km east of its confluence with the Mureş River. Although we know little about the geography of the territory surrounding the settlement[22] and its catchment, this terrace must have attracted Neolithic and Chalcolithic people for a number of reasons, given that it was repeatedly settled throughout a period of some 1500 years. Geomagnetic surveys conducted in 2007 and 2008[23] revealed the extension of the site, where systematic excavations had started in 1997.[24] It consists of three main settlements, the oldest of which belongs to the First Temperate Neolithic (henceforth: FTN) Criş culture.[25] This is followed by a Middle Neolithic Vinča site, settled in two main periods of phases Vinča A and B.[26] Its eastern edge is delimited by a palisade **(Fig. 3)** and a series of defensive ditches.[27] This settlement is

[15] Barfield 2004, 76.
[16] Sherratt 1987, 200.
[17] Lech 1997; Biró 1998; Mateiciucová 2008; Коробкова et al. 2009; Starnini et al. 2013.
[18] Comşa 1987, Figs. 7; 25.
[19] Crandell 2008.
[20] Maxim 1999; Mischka 2010.
[21] Bobos/Avram 1990; Kalmar/Stoicoviciu 1990; Maxim 1999, 109–110.
[22] Kruk 1980.
[23] Mischka 2008; Mischka 2009.
[24] Luca et al. 2007.
[25] Luca et al. 2008.
[26] Luca et al. 2011b, 109.
[27] Mischka 2008, Fig. 5.

sealed by a Chalcolithic Petreşti occupancy,[28] which yielded remains of three habitation structures. The first two Neolithic sites are characterised mainly by pits of different types, sizes and probably function.

According to radiocarbon results, the area was first inhabited around the beginning of the FTN Criş culture,[29] re-settled around the middle of the sixth millennium BC Vinča period and again during the last two centuries of that millennium by people of the same culture.[30] **(Tab. 1; Fig. 4)** Of major interest are the AMS dates from Pit 18 **(Fig. 5)**, a structure excavated in phase IIa, just below Pit 11 (phase IIb),[31] which suggests that the structure had been refilled during the Vinča B settlement. Although no radiocarbon assay is available so far for the Petreşti culture horizon at Miercurea Sibiului-Petriş, a *Bos* tibia dated from the Cauce cave (Hunedoara),[32] collected at a depth of -50 cm in a Petreşti layer, yielded the result of 5760 ± 40 uncal BP (GrN-28994), which fits well into the chronological frame of this aspect in the Banat.[33] At present this is the only radiocarbon date available for a site of this culture in the region.

A few soil samples from both Criş and Vinča culture pits were flotated and sieved with a 2-mm grid. They yielded a small, yet nevertheless important collection of charcoals and charred seeds,[34] very few bone fragments, but no chipped stone artefacts or shatters, suggesting that the collection of the lithics made during excavation by visual and dry sieving led to the (almost) complete recovery of the chipped stone artefacts.

The lithic industries of the FTN Criş culture's occupation of Miercurea Sibiului-Petriş have already been studied and discussed.[35] The results of the analysis of the Vinča lithic industries greatly contrast with those of the early First Temperate Neolithic layer and pit structures, mainly because of the intensive exploitation of light grey silicified sandstone and brown/yellow radiolarites **(Fig. 6)**, which together represent 57.06 % (105) of the total assemblage; they are followed by obsidian (39: 21.19 %) and "Balkan" flint (21: 11.41 %), most probably from the Nikopol sources in Bulgaria,[36] otherwise called Moesian flint.[37] Furthermore, the presence of a very small number of artefacts made from mate-

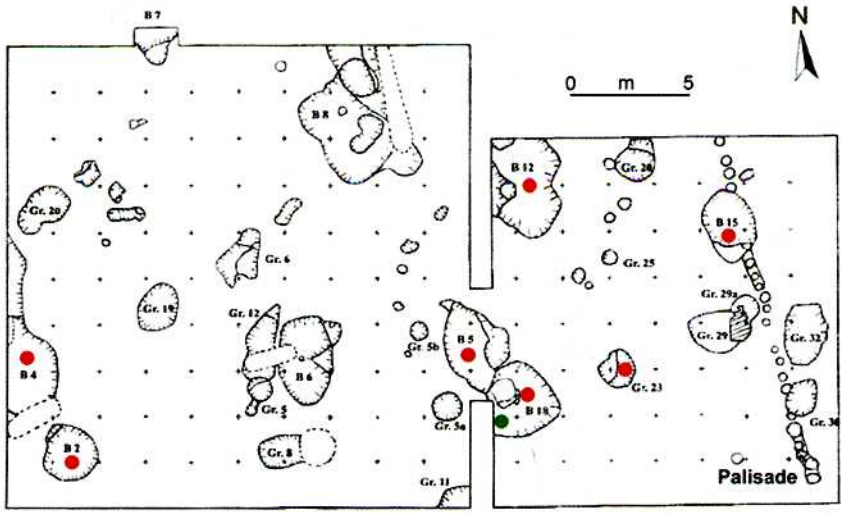

Fig. 3. Miercurea Sibiului-Petriş. Plan of Vinča A layer IIa, indicating the pit structures that yielded lithic remains (red dots), and the samples collected for radiocarbon dating from Pit 18 (green dot) (after Luca et al. 2007, Plan 5 with variations).

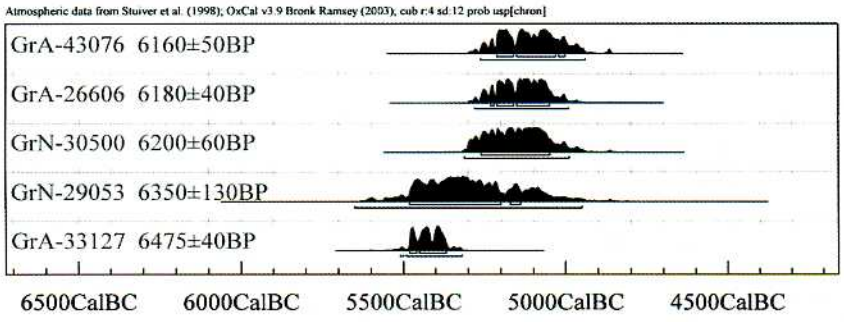

Fig. 4. Miercurea Sibiului-Petriş. Plot of the calibrated dates the Vinča phases in Table 1.

[28] Vlassa 1962; Paul 1969; Paul 1992.
[29] Biagi et al. 2005; Biagi 2011, table 1.
[30] Luca et al. 2011b, table 7.
[31] Luca et al. 2007, 20; Mischka 2008, Fig. 5.
[32] Luca et al. 2004.
[33] Lazarovici 2006, 287.
[34] Nisbet 2009.
[35] Biagi et al. 2007a–b; Biagi 2011.
[36] Biagi/Starnini 2010; Biagi/Starnini 2011.
[37] Gurova/Nachev 2008, 34; Nachev 2009.

Lab.-No.	BP	calBC 2σ	Material	Structure	Phase
GrA-43076	6160 ± 50	5260–4940	Food residue from pot	Pit 18	IIa
GrA-26606	6180 ± 40	5280–4990	*Bos* mandible	Pit 9	below I
GrN-30500	6200 ± 60	5310–4990	*Cervus* astragalus	Pit 3	IIb
GrN-29053	6350 ± 130	5650–4950	*Bos* calcaneum	Pit 11	IIb
GrA-33127	6475 ± 40	5490–5320	*Triticum dicoccum*	Pit 18	IIa

Table 1. Miercurea Sibiului-Petriş. List of the radiocarbon dates obtained from the Vinča structures.

Fig. 5. Miercurea Sibiului-Petriş. Pit 18 with the precise location of the two samples taken for AMS dating (white circles). The Vinča B secondary discarding (GrA-43076) is clearly visible, indicated by several horizontal and vertical ceramic potsherds inside the Vinča A original pit fill (GrA-33127) (photo: P. Biagi).

Fig. 6. Miercurea Sibiului-Petriş. An example of the raw materials employed during the Vinča period: Carpathian 1 obsidians (A), Moesian "Balkan" flints (B), and light grey silicified sandstones (C) (photo: P. Biagi).

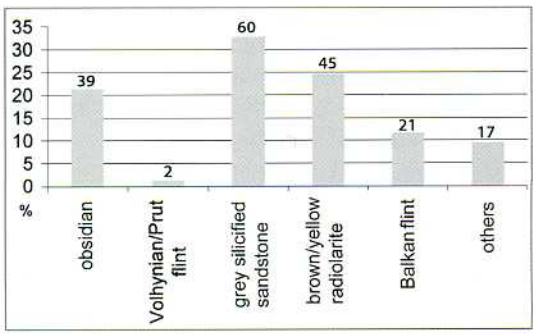

Fig. 7. Miercurea Sibiului-Petriş. Number and percentage of the lithic raw materials from the Vinča occupation layer and structures (diagram: P. Biagi).

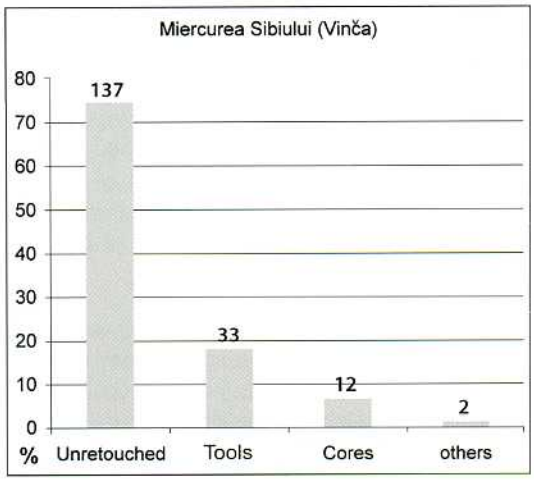

Fig. 8. Miercurea Sibiului-Petriş. Number and percentage of the different types of lithic artefacts from the Vinča occupation layer and structures (diagram: P. Biagi).

rial known as Volhynian or Prut flint[38] (2: 1.08 %) **(Fig. 7)** shows that trade in this material from Trans-Carpathian sources was already active around the middle of the sixth millennium BC.

The Vinča culture chipped stone assemblage recovered during the excavations carried out until 2005 was found in a very few pits **(Tab. 2)**. It is represented mainly by unretouched artefacts (137: 74.45 %), a few cores or pre-cores (12: 5.52 %) and tools (33: 17.93 %) **(Fig. 8)**. Among the latter are long and short end-scrapers, utilised for both scraping and cutting **(Fig. 9,1–5)**, snapped or more rarely truncated bladelets, obliquely inserted as sickle blades (**Fig. 9,6–14**), a few truncations, retouched bladelets and denticulated scrapers (**Fig. 9,15**). The blanks were detached from different types of cores, the platform of which had been precisely prepared by removing small flakes by centripetal strokes **(Fig. 10,1–5)**, similar to a few specimens from Gomolava.[39] The distribution of the tools and cores recovered from each structure, as well as different raw materials utilised for making tools, is provided in **tables 3 and 4**. Chipped stones were discarded in only a few pits, mainly pit numbers 2 and 11, although the attribution of a few artefacts to their exact settlement phase is sometimes uncertain.

Most of the sickles are made from grey silicified sandstone bladelets, whose sources are located between Sebeş and Orăştie, some 25–60 km west of the site.[40] This distinctive raw material

[38] Muraru 1986; Ryzhov et al. 2005, Fig. 3.

[39] Kaczanowska/Kozłowski 1986, Pl. 1.

[40] Crandell 2008.

Feature/ Phase	Raw material	Typology (Laplace 1964)	Sizes (mm)	Condition	Analytical method	Figure	^{14}C date
Pit2/IIa	"Balkan" flint	flakelet	30×18×3	complete			
Pit2/IIa	yellow radiolarite	bladelet	(27)×14×2	distal fragment			
Pit2/IIa	"Balkan" flint	bladelet	(30)×17×4	mesial fragment			
Pit2/IIa	grey sil. sandstone	T3 dist [Apd]/Smm dex. sickle gloss sen obl prox	(26)×14×3	fragment (fl)		9,7	
Pit2/IIa	Volhynian/Prut flint	G3	21×24×7	complete			
Pit2/IIa	brown radiolarite	microflakelet	24×23×7	complete, corticated			
Pit2/IIa	grey radiolarite	microflakelet	(10)×16×4	fragment			
Pit2/IIa	light grey sil. sandstone	microflakelet	(23)×18×5	distal fragment			
Pit2/IIa	light grey sil. sandstone	G2/[Apd dex]-sickle gloss sen	40×20×8	complete			
Pit2/IIa	yellow radiolarite	microflakelet	18×19×10	complete, corticated			
Pit2/IIa	yellow flint	microflakelet	23×14×5	complete			
Pit2/IIa	Carpathian 1 obsidian	bladelet	(24)×8×2	proximal fragment	XRF-116		
Pit2/IIa	Carpathian 2E obsidian	microflakelet	13×9×3	complete	XRF-117		
Pit2/IIa	Carpathian 1 obsidian	T3 prox [Apd]/Spm bil	(25)×10×3	proximal fragment	XRF-118		
Pit2/IIa	Carpathian 1 obsidian	T2 dist [Apd]/L1–0 sid bi	(30)×211×5	distal fragment	XRF-119		
Pit2/IIa	Carpathian 1 obsidian	microflakelet	15×20×2	complete	XRF-120		
Pit2/IIa	Carpathian 1 obsidian	microbladelet	(18)×9×2	proximal fragment	XRF-121		
Pit2/IIa	Carpathian 1 obsidian	bladelet	(28)×10×2	proximal fragment	XRF-122		
Pit2/IIa	Carpathian 1 obsidian	microbladelet	(10)×11×2	mesial fragment	XRF-123		
Pit2/IIa	Carpathian 1 obsidian	bladelet	(17)×9×3	proximal fragment	XRF-124		
Pit2/IIa	Carpathian 1 obsidian	bladelet	(22)×7×1	mesial fragment	XRF-125		
Pit2/IIa	Carpathian 1 obsidian	L1 [Smi dist dex]	36×10×4	complete	XRF-126		
Pit4/IIa	red radiolarite	flake	47×41×8	complete, corticated			
Pit5/IIa	grey sil. sandstone	subconical bladelet core on river pebble	37×42×44	complete, corticated		10,2	
Pit11/IIb	light grey sil. sandstone	flake	48×57×17	complete			GrN-29053
Pit11/IIb	brown radiolarite	D2 bil [Spd]	50×56×15	complete, corticated		9,15	GrN-29053
Pit11/IIb	green radiolarite	flake	71×47×29	complete, corticated			GrN-29053
Pit11/IIb	light grey sil. sandstone	discoidal flakelet core	50×47×27	complete		10,3	GrN-29053
Pit11/IIb	light grey sil. sandstone	polyhedric flakelet core	28×36×34	complete		10,4	GrN-29053
Pit11/IIb	brown radiolarite	pre-core	52×53×62	corticated			GrN-29053
Pit11/IIb	red radiolarite	flake	63×(31)×12	fragment, corticated			GrN-29053
Pit11/IIb	microquartzite	B1dex	36×24×9	complete			GrN-29053
Pit11/IIb	light grey sil. sandstone	micrpbladelet	(18)×15×3	mesial fragment			GrN-29053
Pit11/IIb	light grey sil. sandstone	L1 [Smd dex]	(31)×21×5	proximal fragment			GrN-29053
Pit11/IIb	light grey sil. sandstone	bladelet	(25)×13×3	distal fragment			GrN-29053
Pit11/IIb	light grey sil. sandstone	bladelet	(26)×15×5	proximal fragment			GrN-29053
Pit11/IIb	light grey sil. sandstone	L0 [sickle gloss sen obl]	(24)×10×3	proximal fragment		9,8	GrN-29053

Table 2. Miercurea Sibiului-Petriş. List of the chipped stone artefacts and their characteristics from the Vinča structures and occupation layers.

Feature/ Phase	Raw material	Typology (Laplace 1964)	Sizes (mm)	Condition	Analytical method	Figure	^{14}C date
Pit11/IIb	light grey sil. sandstone	L0 [sickle gloss sen dist obl]	(35)×13×3	proximal fragment		9,12	GrN-29053
Pit11/IIb	light grey sil. sandstone	L0 [sickle gloss sen dist obl]	(23)×13×5	mesial fragment		9,10	GrN-29053
Pit11/IIb	light brown radiolarite	L0 [sickle gloss sen dist obl]	(15)×12×4	proximal fragment		9,11	GrN-29053
Pit11/IIb	grey radiolarite	flakelet	41×25×6	complete, corticated			GrN-29053
Pit11/IIb	dark grey sil. sandstone	flakelet	29×31×9	complete, corticated			GrN-29053
Pit11/IIb	light grey sil. sandstone	L0 [sickle gloss sen dist obl]	(30)×16×4	burnt, proximal fragment		9,13	GrN-29053
Pit11/IIb	yellow radiolarite	flakelet	31×27×9	complete, corticated			GrN-29053
Pit11/IIb	yellow radiolarite	flakelet	39×29×11	complete, corticated			GrN-29053
Pit11/IIb	light grey sil. sandstone	flakelet	(22)×21×4	proximal fragment			GrN-29053
Pit11/IIb	light grey sil. sandstone	flakelet	(18)×17×4	proximal fragment			GrN-29053
Pit11/IIb	light grey sil. sandstone	flakelet	(23)×14×4	proximal fragment			GrN-29053
Pit11/IIb	light grey sil. sandstone	microbladelet	(15)×14×4	proximal fragment			GrN-29053
Pit11/IIb	light grey sil. sandstone	microbladelet	(12)×12×4	proximal fragment			GrN-29053
Pit11/IIb	light grey sil. sandstone	microbladelet	(21)×12×5	mesial fragment			GrN-29053
Pit11/IIb	brown radiolarite	microflakelet	(21)×20×4	proximal fragment			GrN-29053
Pit11/IIb	brown radiolarite	microflakelet	(10)×10×5	proximal fragment			GrN-29053
Pit11/IIb	brown radiolarite	hypermicroflakelet	(10)×9×2	proximal fragment			GrN-29053
Pit11/IIb	brown radiolarite	L0 [sickle gloss sen dist obl]	(28)×14×4	proximal fragment		9,9	GrN-29053
Pit11/IIb	"Balkan" flint	bladelet	(29)×9×3	mesial fragment			GrN-29053
Pit11/IIb	"Balkan" flint	microflakelet	(18)×17×2	proximal fragment			GrN-29053
Pit11/IIb	"Balkan" flint	microflakelet	18×16×3	proximal fragment			GrN-29053
Pit11/IIb	"Balkan" flint	microflakelet	23×(21)×4	distal fragment			GrN-29053
Pit11/IIb	"Balkan" flint	microbladelet	22×10×3	complete			GrN-29053
Pit11/IIb	microquartzite	microflakelet	20×20×7	complete, corticated			GrN-29053
Pit11/IIb	"Balkan" flint	flakelet	33×39×8	complete			GrN-29053
Pit11/IIb	light grey sil. sandstone	microflakelet	20×18×6	complete			GrN-29053
Pit11/IIb	light grey sil. sandstone	microflakelet	15×18×5	complete			GrN-29053
Pit11/IIb	light grey sil. sandstone	flakelet	27×28×10	complete, corticated			GrN-29053
Pit11/IIb	light grey sil. sandstone	flakelet	29×20×5	complete, corticated			GrN-29053
Pit11/IIb	light grey sil. sandstone	flakelet	33×23×10	complete			GrN-29053
Pit11/IIb	light grey sil. sandstone	flakelet	28×26×16	complete			GrN-29053
Pit11/IIb	light grey sil. sandstone	microflakelet	25×22×8	complete			GrN-29053
Pit11/IIb	brown radiolarite	microflakelet	15×18×5	complete			GrN-29053
Pit11/IIb	brown radiolarite	microflakelet	14×12×4	complete			GrN-29053
Pit11/IIb	dark brown radiolarite	bladelet	37×16×5	complete			GrN-29053
Pit11/IIb	grey radiolarite	bladelet	28×14×3	complete			GrN-29053
Pit11/IIb	greenish radiolarite	bladelet	33×12×4	complete			GrN-29053
Pit11/IIb	light brown radiolarite	microflakelet	15×17×3	complete			GrN-29053
Pit11/IIb	light grey sil. sandstone	bladelet	26×12×3	burnt, proximal fragment			GrN-29053

Table 2. (continued).

Feature/ Phase	Raw material	Typology (Laplace 1964)	Sizes (mm)	Condition	Analytical method	Figure	^{14}C date
Pit11/IIb	light grey flint	G1	40×22×12	distal fragment		9,1	GrN-29053
Pit11/IIb	brown radiolarite	G2/Apd dex	15×14×4	distal fragment			GrN-29053
Pit11/IIb	"Balkan" flint	G3	21×20×6	complete		9,4	GrN-29053
Pit11/IIb	"Balkan" flint	microbladelet	11×10×2	mesial fragment			GrN-29053
Pit11/IIb	Carpathian 2E obsidian	microflakelet	13×5x2	complete	LA-ICP-MS-MSPV1		GrN-29053
Pit11/IIb	Carpathian 2E obsidian	microbladelet	(13)×13×2	proximal fragment	LA-ICP-MS-MSPV2		GrN-29053
Pit11/IIb	Carpathian 1 obsidian	microbladelet	(22)×12×3	proximal fragment	LA-ICP-MS-MSPV3		GrN-29053
Pit11/IIb	Carpathian 1 obsidian	microflakelet	14×15×3	complete	LA-ICP-MS-MSPV4		GrN-29053
Pit11/IIb	Carpathian 1 obsidian	bladelet	(13)×10×2	proximal fragment	LA-ICP-MS-MSPV5		GrN-29053
Pit11/IIb	Carpathian 1 obsidian	microbladelet	(13)×8×3	proximal fragment	LA-ICP-MS-MSPV6		GrN-29053
Pit11/IIb	Carpathian 1 obsidian	microbladelet	14×7x2	mesial fragment	LA-ICP-MS-MSPV7		GrN-29053
Pit11/IIb	Carpathian 1 obsidian	flakelet	(13)×17×3	proximal fragment	XRF-131		GrN-29053
Pit12/IIa	yellow radiolarite	microflakelet prismatic core	30×36×40	complete, corticated		10,5	
Pit12/IIa	light grey sil. sandstone	L0 [sickle gloss sen]	18×19×5	mesial fragment			
Pit12/IIa	"Balkan" flint	G4/Spd sen	17×18×8	complete		9,5	
Pit12/IIa	grey radiolarite	bladelet	27×15×7	complete, corticated			
Pit12/IIa	brown radiolarite	crested blade	35×13×7	complete, corticated			
Pit12/IIa	Carpathian 1 obsidian	L1 [Smm bil]	35×13×4	complete	XRF-130		
Pit13/IIb	grey radiolarite	R2 lat [Spd sen]	33×42×14	complete			
Pit13/IIb	grey radiolarite	G1	30×37×10	complete		9,3	
Pit13/IIb	grey radiolarite	flakelet	35×32×15	complete			
Pit13/IIb	light grey sil. sandstone	flakelet	(20)×22×6	proximal fragment, corticated			
Pit13/IIb	dark grey sil. sandstone	microflakelet	16×19×9	complete			
Pit13/IIb	light brown radiolarite	bladelet	(25)×18×5	mesial fragment			
Pit13/IIb	Carpathian 1 obsidian	hypermicroflakelet	9×8×1	mesial fragment	LA-ICP-MS-MSPV8		
Pit13/IIb	Carpathian 1 obsidian	microflakelet	12×15×3	complete	LA-ICP-MS-MSPV9		
Pit13/IIb	Carpathian 1 obsidian	T2 obl prox [Apd]	(12)×13×4	proximal fragment	LA-ICP-MS-MSPV10		
Pit14/IIb	light grey sil. sandstone	blade core on pebble	73×62×83	complete		10,1	
Pit14/IIb	brown radiolarite	bladelet	(37)×18×5	proximal fragment			
Pit14/IIb	light grey sil. sandstone	bladelet	24×12×5	complete			
Pit14/IIb	light grey sil. sandstone	bladelet	(34)×17×4	mesial fragment			
Pit14/IIb	light grey sil. sandstone	flakelet	(20)×20×7	proximal fragment			
Pit14/IIb	light grey sil. sandstone	flakelet	(19)×25×9	proximal fragment			

Table 2. (continued).

Feature/ Phase	Raw material	Typology (Laplace 1964)	Sizes (mm)	Condition	Analytical method	Figure	^{14}C date
Pit15/IIa	Carpathian 1 obsidian	microbladelet	(15)×11×2	mesial fragment	XRF-mlp		
Pit18/IIa	grey radiolarite	L1 [Smi dex]	(23)×15×4	proximal fragment			GrA-33127; GrA-43076
Pit22/IIa	brown radiolarite	L1 [Smd dex]	(20)×10×3	proximal fragment			
Pit23/IIa	brown radiolarite	G1 prox	41×24×9	complete		9,2	
layer	light grey radiolarite	flakelet	50×38×17	complete			
layer	white milky quartz	flakelet	42×33×12	complete			
layer	brown radiolarite	flakelet	42×35×12	burnt, complete			
layer	brown radiolarite	flakelet	34×38×15	complete, corticated			
layer	brown radiolarite	flakelet core on river pebble	42×47×70	complete, corticated			
layer	green radiolarite	raw material piece	58×71×44	complete, corticated			
layer	yellow radiolarite	flakelet	49×21×15	complete			
layer	yellow radiolarite	micro flakelet core on river pebble	32×41×44	complete, corticated			
layer	brown radiolarite	polyhedric flakelet core reused as a hammerstone	47×38×32	complete, corticated			
layer	brown radiolarite	core piece	35×35×18	complete, corticated			
layer	brown radiolarite	flakelet	31×(20)×5	proximal fragment			
layer	yellow radiolarite	flakelet	29×27×11	complete			
layer	"Balkan" flint	R1 lat [Smd dex] -sickle gloss dist	34×19×4	complete		9,14	
layer	Volhynian/Prut flint	L1 [Smm bil]	33×13×3	mesial fragment			
layer	grey radiolarite	T2 dist [Apd]	(11)×17×4	distal fragment			
layer	brown radiolarite	flakelet	(34)×25×6	proximal fragment			
layer	"Balkan" flint	R2 lat [Spi]	39×24×5	complete			
layer	"Balkan" flint	hypermicroflakelet	12×13×4	complete			
layer	light grey radiolarite	bladelet	45×20×7	complete			
layer	brown radiolarite	flakelet	20×(20)×5	proximal fragment			
layer	light grey radiolarite	flakelet	50×(25)×10	proximal fragment			
layer	light grey radiolarite	bladelet	(45)×20×9	proximal fragment			
layer	light grey radiolarite	flakelet	22×(20)×12	proximal fragment			
layer	"Balkan" flint	flakelet	(30)×27×7	distal fragment			
layer	"Balkan" flint	microflakelet	12×(11)×2	proximal fragment			
layer	microquartzite	flakelet	(16)×27×7	proximal fragment			
layer	brown radiolarite	bladelet	14×18×3	mesial fragment			
layer	brown radiolarite	bladelet	29×16×5	mesial fragment			
layer	reddish brown radiolarite	flakelet	25×19×4	mesial fragment			
layer	greenish radiolarite	flakelet	(24)×20×3	proximal fragment			
layer	yellow radiolarite	bladelet	(34)×13×3	proximal fragment			
layer	grey radiolarite	flakelet	(22)×11×4	distal fragment			
layer	dark grey radiolarite	flakelet	(18)×19×5	distal fragment			

Table 2. (continued).

Feature/ Phase	Raw material	Typology (Laplace 1964)	Sizes (mm)	Condition	Analytical method	Figure	^{14}C date
layer	grey microquartzite	flakelet	36×23×12	complete			
layer	"Balkan" flint	flakelet	26×20×7	complete			
layer	"Balkan" flint	flakelet	34×36×12	complete			
layer	"Balkan" flint	flakelet	39×30×8	complete			
layer	light grey sil. sandstone	flakelet	31×26×6	complete, corticated			
layer	light grey sil. sandstone	flakelet	27×34×7	complete			
layer	light grey sil. sandstone	microflakelet	17×15×4	complete			
layer	light grey sil. sandstone	flakelet	34×17×7	complete			
layer	brown radiolarite	flakelet	40×26×11	complete			
layer	brown radiolarite	flakelet	29×27×14	complete, corticated			
layer	brown flint	bladelet	44×15×4	burnt, complete, corticated			
layer	brown flint	microflakelet	15×12×2	complete			
layer	yellow radiolarite	flakelet	36×18×10	complete, corticated			
layer	yellow radiolarite	flakelet	28×19×4	complete, corticated			
layer	yellow radiolarite	flakelet	25×14×5	complete, corticated			
layer	yellow radiolarite	flakelet	16×25×6	complete			
layer	white milky quartz	flakelet	26×25×7	complete			
layer	white milky quartz	flakelet	23×25×7	complete			
layer	brown radiolarite	flakelet	(29)×22×5	proximal fragment			
layer	yellow radiolarite	L1 [Smd dex mes]	(37)×15×3	proximal fragment			
layer	brown radiolarite	bladelet	(30)×16×4	proximal fragment			
layer	light grey sil. sandstone	L0 [sickle gloss prox dex obl]	28×15×4	complete		9,6	
layer	"Balkan" flint	G1	27×16×7	complete			
layer	Carpathian 1 obsidian	microbladelet	(16)×10×3	proximal fragment	XRF-104		
layer	Carpathian 1 obsidian	microbladelet	25×12×4	complete	XRF-105		
layer	Carpathian 1 obsidian	microbladelet	(12)×9×3	mesial fragment	XRF-106		
layer	Carpathian 1 obsidian	microbladelet	(15)×8×2	mesial fragment	XRF-107		
layer	Carpathian 1 obsidian	microflakelet	(19)×21×6	proximal fragment	XRF-108		
layer	Carpathian 1 obsidian	microbladelet	(15)×9×2	proximal fragment	XRF-109		
layer	Carpathian 1 obsidian	flakelet	22×16×3	complete	XRF-110		
layer	Carpathian 1 obsidian	bladelet core flake	27×(19)×7	proximal fragment	XRF-111		
layer	Carpathian 1 obsidian	flakelet	(13)×20×5	mesial fragment	XRF-112		
layer	Carpathian 1 obsidian	microflakelet	(8)×13×3	proximal fragment	XRF-113		
layer	Carpathian 1 obsidian	bladelet	(21)×15×4	proximal fragment	XRF-114		
layer	Carpathian 1 obsidian	L2 [Spi sen]	(24)×11×4	proximal fragment	XRF-115		
layer	Carpathian 1 obsidian	microflakelet core	13×18×18	complete	XRF-127		
layer	Carpathian 1 obsidian	flakelet	27×38×12	complete	XRF-128		
layer	Carpathian 1 obsidian	bladelet	(30)×11×5	distal fragment	XRF-129		
palisade	"Balkan" flint	flakelet	21×12×6	complete			

Table 2. (continued).

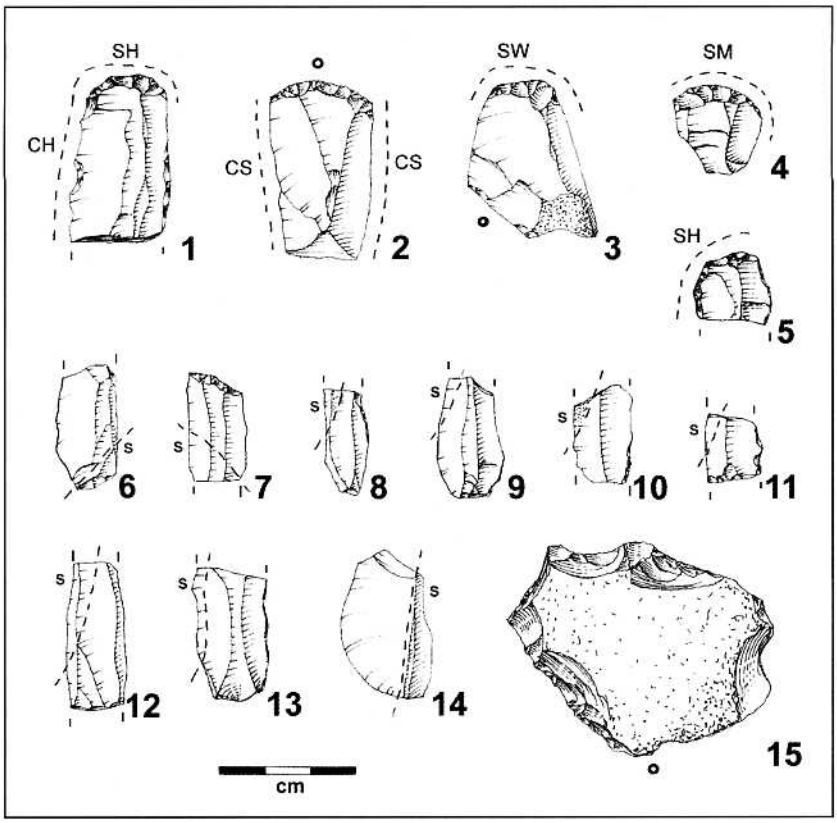

Fig. 9. Miercurea Sibiului-Petriş. Chipped stone implements from the Vinča occupation layer and structures: 1–3 long end scrapers, 4–5 short end scrapers, 6–14 sickle inserts, 15 denticulated scraper. Abbreviations: CH = cut wood, CS = cut soft, SW = scrape wood, SM = scrape medium, SH = scrape hard, s = sickle gloss, small dot = percussion bulb (drawings P. Biagi, inking G. Almerigogna).

was carefully chosen, because of its unique characteristics, rough-surfaced and opaque, evidently ideal for the specific task[41] of harvesting crops. It is important to point out that the oblique gloss covers a small part of the tool, either at the proximal (**Fig. 9,6.7**) or distal edge of the snapped bladelet (**Fig. 9,8–13**). Only one sickle insert is on a small flake (**Fig. 9,14**). Light grey silicified sandstone is the material more commonly employed for making tools (13: 7.06 %), followed by obsidian (6: 3.26 %),[42] Moesian "Balkan" flint (5: 2.71 %), brown and yellow radiolarite (5: 2.71 %). Cores are mainly from brown and yellow radiolarite (6: 3.26 %), light grey silicified sandstone (5: 2.71 %), and obsidian (2: 1.08 %). The above data would suggest that the Vinča culture inhabitants preferably exploited sources located at a short-distance, within 1–2 days' walk, from the site, although long-distance contacts are indicated by the presence of obsidian and Balkan flint. Further, tools were evidently manufactured inside the settlement area or very close to it. Obsidian is mainly from the Carpathian 1 source: 35 out of 38 pieces, five of which are tools, and two are related to the local manufacture of the tools (core fragments).

The Chalcolithic Petreşti House 1 yielded a much poorer assemblage **(Tab. 5)**. It is represented by different raw material types among which are "Balkan" flint (2), Carpathian 1 obsidian (2) and light grey silicified sandstone (2). Three specimen are retouched, one is a splintered piece from a small pebble of light grey silicified sandstone **(Fig. 11,3)**, and two show utilisation marks. Of major importance is a handled long blade fragment, with trapezoidal cross-section, obtained from Dobrogean "Balkan" flint,[43] with

[41] Hayden 1989, 9.

[42] Biagi et al. 2007b, 314.

[43] Gurova/Nachev 2008, 33.

Structure/ Phase	Burins	End scrapers	Trun-cations	Ret. Blades	Sickles	Scrapers	Cores	Precores	Crested B.
Pit 2/IIa	0	2	3	1	2	0	0	0	0
Pit 4/IIa	0	0	0	0	0	0	0	0	0
Pit 5/IIa	0	0	0	0	0	0	1	0	0
Pit 12/IIa	0	1	0	1	1	0	1	0	1
Pit 15/IIa	0	0	0	0	0	0	0	0	0
Pit 18/IIa	0	0	0	1	0	0	0	0	0
Pit 22/IIa	0	0	0	1	0	0	0	0	0
Pit 23/IIa	0	1	0	0	0	0	0	0	0
Totals	***0***	***4***	***3***	***4***	***3***	***0***	***2***	***0***	***1***
Pit 11/IIb	1	3	0	1	6	1	2	1	0
Pit 13/IIb	0	1	1	0	0	1	0	0	0
Pit 14/IIb	0	0	0	0	0	0	1	0	0
Totals	***1***	***4***	***1***	***1***	***6***	***2***	***3***	***1***	***0***

Table 3. Miercurea Sibiului-Petriş. List of the tools and cores from the Vinča structures.

an abrupt retouch along both sides, one of which was used for scraping (**Fig. 11,1**).

This type of long blade finds parallels in the Balkan-Black Sea technocomplex, which marks the appearance of a new technique of long blade manufacture (see contribution by Gatsov/Nedelcheva in this volume). Its distribution covers the regions just to the west of the Black Sea coast and the lower course of the Danube.[44] The specimen from Miercurea Sibiului are very similar and chronologically more or less contemporaneous with those in Varna[45] and other Chalcolithic steppe cemeteries excavated farther east, where long blades are well represented and probably originated.[46] Given the exogenous provenance and the suggested route of diffusion of this type of blade, their presence in a Petreşti culture site in Transylvania is very indicative, since it testifies the movement of high-quality specific tools and their trade across the eastern Carpathians.

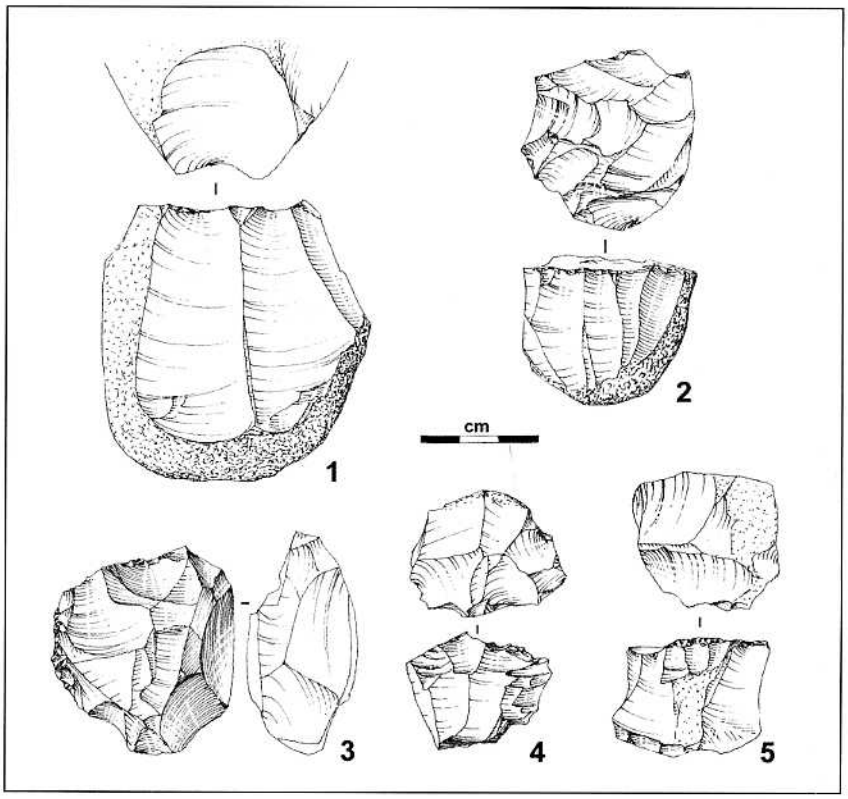

Fig. 10. Miercurea Sibiului-Petriş. Different types of cores from the Vinča occupation layer and structures (1–5) (drawings P. Biagi, inking G. Almerigogna).

Peştera Ungurească

The site of Peştera Ungurească is a cave that is not easy to access: it opens at an altitude of some 500 metres, at the base of the Eagles Cliff within Cheile Turzii, a narrow gorge cut by the Hăşdatelor River, 9 km west of Turda[47] **(Fig. 12)**. The excavations carried out in 2003–2004 brought to light the Chalcolithic complex of Toarte Pastilate (Bodrogkeresztúr)[48] and a Petreşti sequence, radiocarbon-dated to the second half of the fifth millennium BC.[49] All of the excavated sediments were water-sieved with a

[44] Kaczanowska/Kozłowski 1997, Fig. 2.
[45] Higham et al. 2008; Manolakakis 2008, Skakun 2005–2008, Fig. 3.
[46] Котова 2006; Skakun 2008.
[47] Lazarovici et al. 1995.
[48] Luca 1999.
[49] Biagi/Voytek 2006, table 1; Nisbet 2009, 169.

Structure/ Phase	Totals	Balkan f.	C Obsidian 1	C Obsidian 2E	Vol/Prut f.	Grey silic. sand.	B/Y/R rad.	Others
Pit 2/IIa	22	2	10	1	1	4	3	1
Pit 4/IIa	1	0	0	0	0	0	1	0
Pit 5/IIa	1	0	0	0	0	1	0	0
Pit 12/IIa	6	1	1	0	0	2	2	0
Pit 15/IIa	1	0	1	0	0	0	0	0
Pit 18/IIa	1	0	0	0	0	1	0	0
Pit 22/IIa	1	0	0	0	0	0	1	0
Pit 23/IIa	1	0	0	0	0	0	1	0
Totals	***34***	***3***	***12***	***1***	***1***	***8***	***8***	***1***
Pit 11/IIb	64	8	6	2	0	26	15	7
Pit 13/IIb	9	0	3	0	0	5	1	0
Pit 14/IIb	6	0	0	0	0	5	1	0
Totals	***79***	***8***	***9***	***2***	***0***	***36***	***17***	***7***

Table 4. Miercurea Sibiului-Petriş. List of the raw materials employed for making artefacts from the Vinča structures.

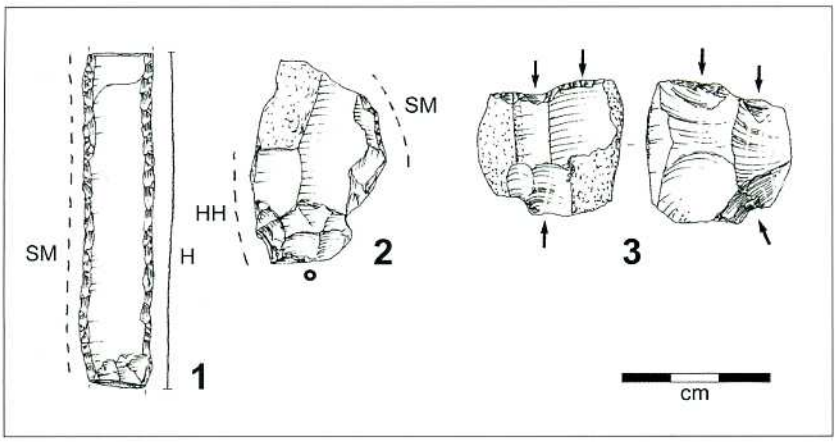

Fig. 11. Miercurea Sibiului-Petriş. Chipped stone implements from House 1 of the Petreşti culture: 1 "Balkan" flint, retouched long blade, 2 side scraper, 3 splintered piece. Abbreviations: SM = scrape medium, H = haft, HH = handhold pressure; small dot = percussion bulb (drawings P Biagi, inking G. Almerigogna).

Fig. 12. Peştera Ungurească. Cheile Turzii gorge, where the cave opens at the base of the cliff; view from the east (photo: P. Biagi).

1-mm grid. This method led to the recovery of an impressive amount of macrobotanical remains,[50] land snails,[51] and micromammal bones,[52] which favoured the reconstruction of the landscape exploited by the Chalcolithic inhabitants, and a very rich assemblage of material culture remains, both potsherds and lithics.

The discovery of a small kiln, with gold beads, gold leaf and gold plaques scattered around it, shows that during the Toarte Pastilate (Bodrogkeresztúr) period, the smelting of this precious mineral and the production of prestige items took place in the cave,[53] as confirmed by the results of soil micromorphological analyses.[54]

The chipped stone artefacts are represented almost exclusively by artefacts and debitage made from two distinctive, high-quality, exogenous raw materials, whose sources are located within a radius of some 500 km from the cave: Carpathian 1 obsidian and Volhynian flint **(Fig. 13).**[55] The presence of an impressive number of shatters **(Fig. 14)** demonstrates that the tools, mainly end scrapers, trapezoidal geometrics and retouched blades, were locally manufactured. The preliminary results of the excavations show the complex history of this unique

[50] Nisbet 2008–2009; 2009.
[51] Girod 2008–2009.
[52] Bartolomei 2012.
[53] Lazarovici/Lazarovici 2012.
[54] Boschian 2008–2009.
[55] Biagi/Voytek 2006.

Feature	Raw material	Typology	Sizes (mm)	Condition	Analytical method	Wear-traces	Figure
House 1	light grey sil. sandstone	flake	(43)×36×16	fragment, corticated			
House 1	light grey sil. sandstone	E1	30×29×8	complete, corticated			11,3
House 1	brown radiolarite	R1 [Smd bil]	45×27×7	complete, corticated		Hand hold pressure/Scrape medium	11,2
House 1	grey flint	flakelet	40×19×12	complete, corticated			
House 1	brown radiolarite	flakelet	17×17×5	complete			
House 1	"Balkan" flint	flakelet	(15)×16×5	fragment, corticated			
House 1	yellow radiolarite	bladelet	(24)×11×4	proximal fragment, corticated			
House 1	"Balkan" flint	LD2 [Apd bil]	(71)×16×5	proximal fragment		Haft/Scrape medium	11,1
House 1	Carpathian 1 obsidian	L1 [Smd sen prox]	(20)×10×2	proximal fragment	XRF-133		
House 1	Carpathian 1 obsidian	bladelet	(18)×11×1	mesial fragment	XRF-132		

Table 5. Miercurea Sibiului-Petriş. List of the chipped stone artefacts and their characteristics from House 1 of the Petreşti culture.

multi-purpose site and confirm the practise of gold smelting in Transylvania during the second half of the fifth millennium BC.

Discussion

The study of the chipped stone assemblages from the two sites contributes to the definition of (1) the typological characteristics of lithic implements of the Neolithic and Chalcolithic periods in Transylvania, (2) some of the activities practised at the sites, (3) the variability of the raw material sources exploited for making tools during the Neolithic and Chalcolithic periods, and (4) the mechanisms of procurement and trade in Carpathian obsidians, "Balkan" and Volhynian flints. The data from Miercurea Sibiului-Petriş show that changes took place in the typology and manufacture of chipped stone tools throughout three Neolithic (FTN early Criş, Vinča A and B) as well as Chalcolithic settlement periods (Petreşti). The Vinča assemblages consist of a limited number of types, chipped from bladelets, blade-like flakelets and flakes, long and short end scrapers of variable shape, sickle inserts, mainly on snapped bladelets with an oblique silica gloss on one corner, a few truncations, and a few types of side scrapers. The core platforms were prepared by flaking for the detachment of both flakes and blades, according to their shape and size. The presence of tested pebbles, pre-cores and cores, although not shatters, indicates that tool production took place within the site. This observation does not fit into the general pattern, which at present is available for sites of the Vinča culture in Serbia,[56] although a few exceptions are known. One exception is Gomolava, for instance,[57] although the study of the chipped stone assemblages from that site shows a great functional variability between the different excavated areas.[58]

Broadly speaking, the tool types described above characterise the Vinča culture assemblages,[59] even though some implements, among which borers and isosceles trapezes retouched from bladelets, are not represented in the excavated part of the site. This might be due to the small surface area excavated so far,[60] the restricted number of tools collected from only few pit structures (Table 3), and the activities practised within the investigated area, which related mainly to agriculture[61] and woodworking (see **Fig. 9**). The sickles are very similar to those from

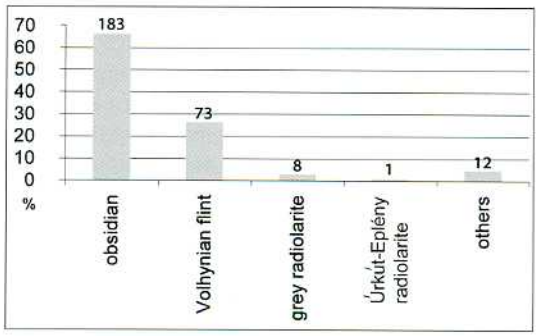

Fig. 13. Peştera Ungurească. Number and percentage of the lithic raw materials from Toarte Pastilate (Bodrogkeresztúr) layers (diagram: P. Biagi).

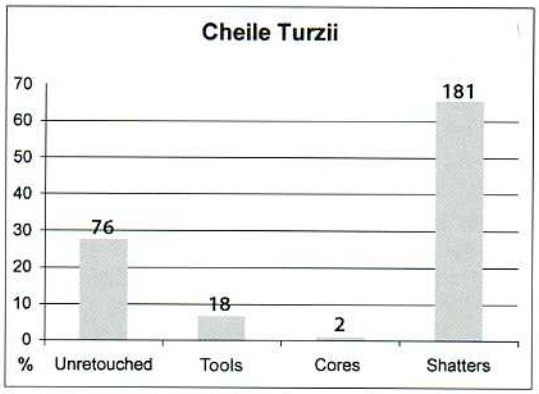

Fig. 14. Peştera Ungurească. Number and percentage of the different types of lithic artefacts from Toarte Pastilate (Bodrogkeresztúr) layers (diagram: P. Biagi).

Fig. 15. Necropolis of Varna. Carpathian 1 bladelet (photo: P. Biagi).

[56] Kaczanowska/Kozłowski 1990, 45.
[57] Voytek 2001, 292.
[58] Kaczanowska/Kozłowski 1986, 135–136.
[59] Păunescu 1970, 160–162; see also Lazarovici 1979, Pl. XI for the Banat.
[60] Mischka 2008; Mischka 2009.
[61] Nisbet 2009, 167.

Selevac,[62] Gomolava[63] and Maroslele-Pana,[64] while they differ greatly from those in Divostin.[65] This might indicate variable harvesting techniques practised during different Vinča phases in the territory covered by the same cultural aspect, or it might depend upon the soil characteristics of the Apoldului depression and the climatic regime in the region: "most inappropriate for the successful cultivation of cereal crops".[66]

The Miercurea Sibiului assemblages contribute little to the debate concerning the local[67] or non-local[68] origin of the Vinča complexes because of (1) the very poor industry recovered from the early FTN Criş site,[69] (2) the chronological gap of at least 500 years between the FTN Criş culture[70] and the earliest Vinča A settlement (**Fig. 4**), and (3) the different raw material procurement strategies of the above two Neolithic periods. In effect, while a few data point to a continuity, among which are the similarities noted between sickle blades with oblique gloss, the recurrence of subconical bladelet cores with a prepared platform and the presence of Moesian "Balkan" flints, other data, namely the typology of formerly unknown end scrapers and the differences in the raw materials exploitation, by contrast, would point to a discontinuity.

The two small Petreşti culture assemblages mark an important change in raw material procurement, typology and style of chipped stone tools. One retouched long blade made of Dobrogean "Balkan" flint comes from Miercurea Sibiului House 1, while the systematic import of Volhynian flint for the on-site manufacture of tools is attested in layer 3 of Peştera Ungurească. Of major importance is the presence of a characteristic, triangular, short end scraper on a flake,[71] very similar to some specimens from the contemporary Sălcuţa culture in Oltenia and the Banat.[72] Both "Balkan" and Volhynian finds point out that the access routes across the southeastern edge of the Carpathians[73] were already open for the trade of sophisticated, high-quality raw materials well before the middle of the fifth millennium BC.

The chipped stone assemblage from the Chalcolithic Toarte Pastilate (Bodrogkeresztúr) levels in Peştera Ungurească was analysed just a few years ago.[74] An amount of 82.77 % of the artefacts was obtained from long-distance raw materials. Excellent quality sources were precisely selected; flint nodules and obsidian "bombs" were transported or traded to the cave, where the on-site tools manufacture took place, as is shown by the presence of core trimming flakes and shatters (181: 65.34 %) (**Fig. 14**). Among the exogenous materials are Carpathian 1 obsidian (183: 66.06 %), Volhynian flints (73: 26.35 %) and one corticated piece of Úrkút-Eplény radiolarite[75] (0.36 %) (**Fig. 13**). The Chalcolithic import of massive quantities of Volhynian flint had already been observed at Bodrogkeresztúr sites in the Körös river valley in Hungary.[76]

The implements from Peştera Ungurească consist mainly of end scrapers and trapezoidal geometrics retouched from obsidian bladelets, the latter representing the most common tools. Although displaying different typological and technological characteristics, they occur in many Neolithic and Chalcolithic cultures of Romania[77] and Hungary.[78] In southeastern Romania their manufacture seems to have ceased with the Chalcolithic Gulmeniţa culture[79], when instruments retouched from larger blanks, foliate arrowheads and other flat-retouched weapons started to be produced.

Conclusion

The lithic assemblages from the two Transylvanian sites discussed in this paper provide us with new information regarding the raw material variability throughout the long time span from the beginning of the Neolithic to the Middle Chalcolithic. They not only reconfirm the importance of retrieval systems, the accuracy of which can transform our knowledge about the economic activities of excavated sites, but also point out once again that the exploitation of lithic resources was not dependent exclusively upon geographic and geologic factors, but also upon human choice.[80]

As reported above, the evidence from Miercurea Sibiului shows the importance of the Carpathian 1 obsidian sources, located north of the boundary that had been reached during the dissemination of the earliest First Temperate Neolithic farmers, and the exploitation of the Danubian Nikopol "Balkan" flint outcrops[81] since the end of

[62] Voytek 1990, Fig. 12,7.8.
[63] Kaczanowska/Kozłowski 1986.
[64] Kaczanowska et al. 2011.
[65] Tringham 1988, Fig. 8.14.
[66] Jarman et al. 1982, 227.
[67] Păunescu 1987, 91.
[68] Kaczanowska/Kozłowski 1991.
[69] Biagi et al. 2007a.
[70] Biagi et al. 2005.
[71] Biagi/Voytek 2006, Fig. 8, n. 7.
[72] Berciu 1961, examples in Figs. 50; 52; 53.
[73] Budziszewski 2006.
[74] Biagi/Voytek 2006.
[75] Biró 1998, 35; Elekes et al. 2000, table 1.
[76] Sherratt 1987.
[77] Păunescu 1970; see also Comşa 1971a, 104.
[78] Bondár/Raczky 2009.
[79] Comşa 1993.
[80] Wilson 2011, 171.
[81] Biagi/Starnini 2010; 2011.

the seventh millennium BC.[82] This pattern changed around the middle of the sixth millennium BC, when outcrops available within 1–2 days' walk were preferably sought by Vinča farmers because of the unique characteristics of some raw materials, ideal for the manufacture of specific types of sickle bladelets, and when trans-Carpathian Volhynian or Prut sources began to be exploited. The pattern changed again just before the middle of the fifth millennium BC, when long blades of Dobrogean "Balkan" flint began to be traded by the Petreşti communities or their contemporaries. During this restless and complex period, the inhabitants of unique sites, one of them Peştera Ungurească, were engaged in the procurement of very high-quality materials from distant sources.[83]

Apart from the general pattern outlined above, the "Balkan" flint outcrops, whose exploitation varied in extent throughout the Neolithic and Chalcolithic, according to the specific characteristics of the chippable resources, played a unique role.[84] The importance of Carpathian 1 obsidian continued during the late fifth millennium BC Toarte Pastilate (Bodrogkeresztúr) period, during which it was traded even for the production of specific cutting tools, among which are trapezoidal geometrics. By that time the southeasternmost distribution of Carpathian 1 obsidian reached the western Black Sea shore, east of the boundary suggested just a few years ago,[85] in view of the presence of at least one Carpathian 1 bladelet in the Varna necropolis (**Fig. 15**). During the Neolithic and Chalcolithic periods obsidian was traded in the form of "bombs" for the on-site production of functional tools, as shown by finds from Iclod and Ţaga (**Fig. 1,3.4**),[86] for instance, and also Peştera Ungurească. Although we know very little about the trade and exchange models[87] for the above materials, a comparable, simplified pattern for the periods discussed in this paper was already proposed for Hungary years ago.[88]

The study of the lithics from Miercurea Sibiului-Petriş and Peştera Ungurească contributes to the knowledge about the circulation and trade of chippable raw materials across southeastern Europe during the Neolithic and Chalcolithic periods. It partly completes the data already available from other countries in this region of Europe.[89]

[82] Biagi et al. 2007a.
[83] Biagi/Voytek 2006.
[84] Gurova/Nachev 2008, Fig. 5.
[85] Hauzeur 2004, Fig. 2.
[86] Biagi et al. 2007b, Fig. 4.
[87] Renfrew 1975.
[88] Sherratt 1982, table 2.1.
[89] Starnini 1996; Kaczanowska/Kozłowski 1997; Mateiciucová et al. 2006; Mateiciucová 2008; Kaczanowska et al. 2009; Starnini et al. 2013.

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