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**THE DISTRIBUTION AND IMPORTANCE OF TURONIAN
FLINTS FROM THE NORTH-EASTERN MARGIN
OF THE HOLY CROSS MOUNTAINS
IN THE FLINT RAW MATERIAL ECONOMY
OF THE EARLIEST DANUBIAN COMMUNITIES**

ABSTRACT

M. Szeliga 2014. *The distribution and importance of Turonian flints from the north-eastern margin of the Holy Cross Mountains in the flint raw material economy of the earliest Danubian communities*, AAC 49: 77–112.

The article is an attempt to create a comprehensive analysis of the phenomenon of distribution of Turonian flints sourced on the north-eastern margin of the Holy Cross Mountains and to determine their actual participation and importance in the overall system of flint raw materials economy of the earliest Danubian communities residing both sides of the Carpathians. The research confirms the existence during the Linear Pottery Culture development period of a system of multidirectional and far-reaching distribution of this group of lithic resources (especially, Świeciechów flint), proceeding within a few basic, intermediate stages, characterized by a different form of the inflow, and by the extent to which these materials were processed within individual clusters of settlement. The analysis of the territorial dispersion of the finds, taking into account the stylistic diversity of ceramics discovered in the same context, indicates also the existence of telling distinct differences in the direction, intensity and forms of distribution of Świeciechów flint during the oldest, middle and younger stage of development of the Linear Pottery Culture. These differences are a reflection of some much more general phenomena and cultural transformations taking place in the upper basin of the Vistula River at the turn of 6th and 5th millennia BC.

Key words: Neolithic; Poland; Linear Pottery Culture; north-eastern margin of the Holy Cross Mountains; Turonian flints

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INTRODUCTION

The issue of the use of Turonian flints of the north-eastern margin of the Holy Cross Mountains during the oldest stage of the Neolithic has never been the subject of a separate and comprehensive analysis¹. All the interpretations of this

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phenomenon contained in extant literature were undertaken only on the margin of a broader study on the economy and distribution of the flint raw materials among the Linear Pottery Culture (further LPC) communities (e.g. Kozłowski 1970; Lech 1979; 2003; Balcer 1983; Caspar *et al.* 1989; Mateiciucová 2008), or in general among cultural groups continuing the Danubian traditions at large (e.g. Kaczanowska, Lech 1977; Kaczanowska 1985). Definitely in individual studies least attention was devoted to the technical and technological aspects of the processing of this group of raw materials. Authors have focused mostly on issues of their spatial distribution, which confirmed the existence of interregional contacts between LPC concentrations in southern Poland, and other — sometimes very distant — ecumene occupied by communities of the same culture during the oldest phase of its development (Kozłowski 1958; 1970; Lech 1979; 1989b; 2003; Kaczanowska, Kozłowski 2005). All of the earlier conclusions relate only to Świeciechów flint, for a long time, the only variety of Cretaceous flint sourced in the Holy Cross Mountains area documented and identified within individual lithic inventories. Its economic importance in the oldest phase of the Neolithic was usually defined as local, i.e. limited mostly to settlement centers in south-eastern Poland (mainly in the region of Rzeszów) and, at best, of secondary importance as compared to Jurassic-Cracow flint and Chocolate flint used extensively during this period (e.g. Kaczanowska, Lech 1977; Kulczycka-Leciejewiczowa 1979; Lech 1979; Kaczanowska 1985; Caspar *et al.* 1989; Kaczanowska, Kozłowski 2005; Mateiciucová 2008). Only in a very few cases Świeciechów flint has been a subject of a separate analysis which addressed the entire period of the development of Danubian culture groups in the area north of the Carpathians. However, these studies were purely regional, limited mostly to the area of the Lublin and the Sandomierz Upland (Kowalewska-Marszałek 2002; Zakościelna 2002), and to a much lesser extent, also to the western reaches of the historical regions of Lesser Poland and Kujavia (Domańska 2002; Górski, Trela 2002).

The most important reason for the outlined state of research has been, it seems, the very slow accretion of the source database, especially in areas lying in the immediate vicinity of outcrops of Turonian flints, and the generally poor and incomplete degree and rate of scientific description of successively acquired lithic inventories. These factors have prevented, on the one hand, the making of a full diagnosis of the scale, directions, the actual territorial range and the nature of the distribution of this lithic resource during the oldest phase of the Neolithic, on the other hand, limited significantly the assessment of its actual economic importance within individual centers of LPC settlement. A marked progress in research and the accretion of material sources noted over recent years created unprecedented opportunities for undertaking a comprehensive study of these issues while allowing also a major update, as well as a verification of the many opinions on their subject circulating in current literature. The present contribution attempts to fill in only the most significant gaps in this regard.

LOCATION OF TURONIAN FLINT DEPOSITS IN THE HOLY CROSS MOUNTAINS REGION

In their geological distribution the deposits of Turonian flints are limited to a relatively narrow region, found in the outlying area of the north-eastern, Mesozoic margin of the Holy Cross Mountains (Fig. 1). They coincide closely with the extent of two local tectonic structures, i.e. the Tarłów ditch, lying to the west of the Vistula (Samsonowicz 1934a; Pożaryski 1948), and the Rachów anticline, situated on the right bank of that river. The main components of the local Cretaceous layer took form as a result of sedimentation processes of the

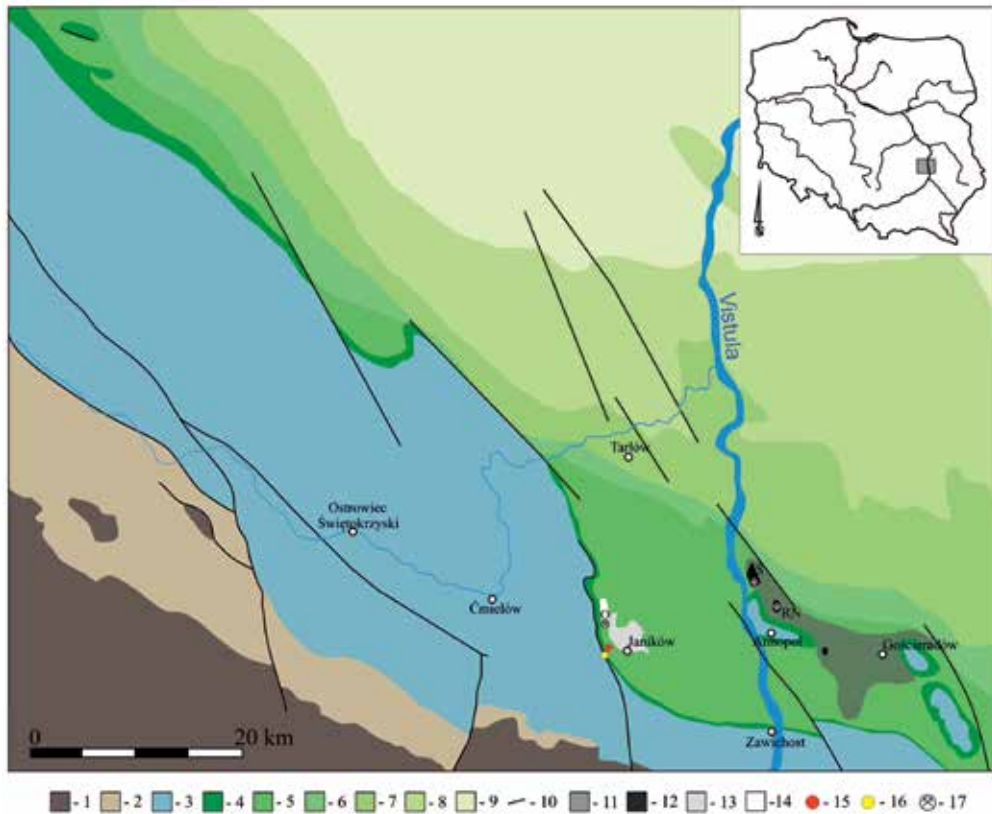


Fig. 1. The occurrence of basic varieties of Turonian flints on the background of geological structure of the pre-Quaternary sediments of north-eastern margin of the Holy Cross Mountains: 1 — Palaeozoic; 2 — Triassic; 3 — Jurassic; 4 — Lower Cretaceous and Cenomanian; 5–9 — Upper Cretaceous (5 — Turonian; 6 — Santonian and Coniacian; 7 — Campanian; 8 — Lower Maastrichtian; 9 — Upper Maastrichtian); 10 — major dislocations; 11 — Gościeradów flint; 12 — Świeciechów flint; 13 — Janików flint; 14 — Ożarów flint; 15 — Zawada flint; 16 — archaeological site No. 6 in Tominy; 17 — prehistoric Turonian flints mines (Ś — Świeciechów-Lasek; RN — Rachów Nowy; O — Ożarów, *Za Garnarczami* field; geological substrate on the basis of Pożaryski 1997, with modifications by the Author; flint deposit extent based on: Samsonowicz 1934b; Krzak 1970; Budziszewski 1986, 1995; Michniak, Budziszewski 1995; Libera, Zakościelna 2002).

Lower Turonian transgression, and are represented mainly by white and gray siliceous limestone and, to a lesser extent, also by detrital limestone bryozoans (Samsonowicz 1934a; 1934b; Pożaryski 1948; Złonkiewicz 1994; 1998; Michniak 1995). Flints occurring in these sediments are marked by a great diversity of their macroscopic features, especially the colour of their primary substance, which is in various shades of grey and black. These differences have been the main criterion in earlier classification attempts (e.g. Krukowski 1920; Krzak 1965; 1970; Balcer 1975; Libera, Zakościelna 2002) their result the identification of a number of local varieties with variously marked individual properties.

Some of these flint varieties have been provenanced to individual exposures (e.g. Zawada flint), other, to somewhat larger areas of Turonian outcrops (e.g. Gościeradów flint, Janików flint, Ożarów flint, Świeciechów flint; see Fig. 1). Individual varieties are at present available for observation both in the form of regular lodes, from exposures in a fairly large number of quarries (especially within Tarłów ditch), and as accumulations of fragmented subsurface concretions directly overlying the uppermost level of eroded rock and limestone, or alternately, redeposited somewhat in relation to their primary locations (Krukowski 1921; Balcer 1971; 1976; Michniak 1995; Libera, Zakościelna 2002; Budziszewski 1986; 1995). This type of secondary concentrations played a key role in the system of raw materials supply of prehistoric communities, including the oldest phase of the Neolithic, because of their ready availability and abundance of concretions and chunks of various lithic resource materials, generally of a good quality. This applies especially to the area of the Rachów anticline where many of these outcrops are found (i.a. Świeciechów flint and Gościeradów flint; cf. Balcer 1971; 1976; Libera, Zakościelna 2002). This region, to judge from what is known at present, would have been the main supply zone, the area where Turonian flints were sourced by LPC communities. Moreover, we cannot discount the possibility that local outcrops were exploited during this period also using basic mining methods².

The occurrence of secondary concentrations of Holy Cross Mountains Turonian flints has been documented also at a much greater distance from their geological deposits. The presence of surface accumulations of concretions and chunks of the

² Past excavations of the prehistoric Turonian flint mines at Świeciechów-Lasek and Ożarów (*Za Garncarzami* field), have allowed the correlation of the main mining and processing activities undertaken at these sites with, especially, culture groups of the Middle Neolithic (Balcer 1971; 1976) and also, with those of the Bronze and the Early Iron Age (Budziszewski 1980; 1986; 1997; Bargieł, Libera 1995; 1996). At the same time, they failed to retrieve unambiguous evidence on the mining of the local deposits during the oldest phase of the Neolithic. Even so, the feasibility that LPC communities used simple mining methods when they sourced the Turonian flints (especially Świeciechów flint) may be considered as quite likely. This is supported indirectly by extensive studies on early Neolithic quarrying of the Jurassic-Cracow flint (Lech 1979; 1980; 1981; 2011), and by excavated evidence from e.g., the Chocolate flint mines at Tomaszów (Schild *et al.* 1985), or chert mines in the region of the Krumlov Forest in Moravia (Oliva 2004; 2011). These finds confirm the familiarity with and the use of methods of mining of various siliceous rocks, already at the stage of LPC communities development.

dark gray variety (i.a. Gościeradów flint) was recorded within the sand and clay deposits of the Odranian Glaciation, in the northern part of the Sandomierz Basin (Libera *et al.* 1993; Libera 2002; 2005)³. The most remote secondary deposits of natural chunks of the Świeciechów flint were recorded within the glacial deposits of the South-Polish Glaciation on the Upper Vistula, i.e. at Zakrzów in Niepołomice commune and Ściewojowice in Liszki commune (Kozłowski 1960), and also in the Niepołomice Forest (Mikulski *et al.* 2011)⁴. The number and morphological variety of artifacts struck from this material observed in inventories from western Lesser Poland leads us to seriously question the likelihood of exploitation of these secondary deposits by LPC communities.

AN OVERVIEW OF THE SOURCE DATABASE

Flint finds distribution and diversity

According to current research, the period of the development of LPC and related Eastern Linear groups is documented by at least 54 archaeological sites⁵ which produced artifacts struck from Turonian flints sourced in the Holy Cross Mountains. These finds are a very heterogeneous group, in terms of quantity and quality, which includes both single artifacts and inventories featuring a larger number of morphologically diverse forms (Table 1) spread over a broad territory on both sides of the Carpathians (Fig. 2). The quantitative and qualitative properties of these finds indicate a territorial pattern dependent to a significant extent on the distance of individual sites from the outcrops of the Turonian flints. The least numerous and least varied inventories derive from locations found at a greatest distance from this source area (approximately between 200 and 500 km), situated on the inner (Lower Austria, Czech Republic, Eastern Slovakia) and the outer (Kujavia, Chełmno Land) side of the Carpathians (Table 1; Fig. 2).

³ The likelihood that LPC communities of south-eastern Poland visited these surface concentrations and sourced them for chunks is very high. This is intimated by the small number of these lithic finds and, on occasion, also by the quality of the natural surfaces which survive on artifacts struck from dark gray and black varieties of Turonian flint recorded in the Rzeszów settlement concentration of this culture (Table 1).

⁴ The presence of secondary concentrations of lithic raw materials from the Holy Cross Mountains region within glacial formations in the Vistula headwaters region, is not limited to Turonian flints only. The best example of this would be the occurrence in the vicinity of Kraków of whole flint concretions and chunks of Chocolate flint, something that was observed already early into the second half of the last century (Kozłowski 1960), and recently complemented by the discovery of a major concentration of this material in the Niepołomice Forest (Górski *et al.* 2006; Wilczyński 2008).

⁵ They include mostly inventories from regular archaeological excavation. The only departure from this pattern are finds — just a handful — obtained during a series of field surveys carried out in eastern Slovakia, in the region of Spiš (Spišský Štiavnik, Rakúsy/Spišská Bela, Veľka Lomnica). Given the nature of the Slovak fieldwork — very meticulous and repeated — and also, the morphology and metrology of artifacts struck from Świeciechów flint, they are likely to belong to the early Neolithic occupation horizon associated with LPC communities identified in these sites (Soják 2000b).

Table 1

The size and basic raw material diversity of Turonian flint artifacts of north-eastern margin of the Holy Cross Mountains related to LPC within particular sites; prepared by M. Szeliga.

Lp.	Localization and number of archaeological site	The number of flint artifacts		LPC phase	Bibliography
		Świeciechów flint	Other Turonian flints		
The inventories from northern side of the Carpathians — Poland (p. — powiat; w. — województwo)					
1.	Albigowa 1, p. Łańcut, w. podkarpackie	22	–	II, III	Przybyła 2002; 2005
2.	Albigowa 38, p. Łańcut, w. podkarpackie	18	1	II	Kadrow 1992
3.	Boguchwała 1, p. Rzeszów, w. podkarpackie	14	–	II	Dzieduszycka- -Machnikowa 1960; Aksamit 1962
4.	Bogucin 6, p. Lublin, w. lubelskie	77	–	II, III	Gawryjolek- Szeliga, Szeliga 2012
5.	Bolechowice-Zielona 9, p. Kraków, w. małopolskie	4	–	II	Breitenfellner, Rook 1991
6.	Brześć Kujawski 4*, p. Włocławek, w. kujawsko-pomorskie	7	–	III	Grygiel 1976; 2004; Balcer 1983; Lech, Małecka-Kukawka 1987
7.	Chlewiska 132*, p. Inowrocław, w. kujawsko-pomorskie	2	–	II	Rzepecki 2013
8.	Cieszacin Wielki 41, p. Jarosław, w. podkarpackie	2	–	II	M. Dębiec (pers. comm.)
9.	Fredropol 2, p. Przemysł, w. podkarpackie	2	–	II	Aksamit 1968; Dębiec 2003
10.	Fredropol-Kormanice 1, p. Przemysł, w. podkarpackie	55	–	II	Kozłowski 1970; Balcer 1983; Kaczanowska 1985
11.	Gorliczyna 20, p. Przeworsk, w. podkarpackie	3	–	III	W. Pasterkiewicz (pers. comm.)
12.	Jankowice 9, p. Jarosław, w. podkarpackie	35	1	III	M. Dębiec (pers. comm.)

Lp.	Localization and number of archaeological site	The number of flint artifacts		LPC phase	Bibliography
		Świeciechów flint	Other Turonian flints		
13.	Jurkowice 1*, p. Opatów, w. świętokrzyskie	16	–	III	Podkowińska 1959
14.	Kazimierza Mała 1*, p. Kazimierza Wielka, w. małopolskie	X	–	I	Lech 2003; Mateiciucová 2008
15.	Kraczkowa 1, p. Łańcut, w. podkarpackie	38	2	III	Aksamit 1964; Kulczycka- Leciejewiczowa 1979; Kaczanowska 1985
16.	Kraków-Nowa Huta- Bieńczyce 12, p. Kraków, w. małopolskie	1	–	II	Hachulska-Ledwos 1963; Godłowska 1976
17.	Kraków-Nowa Huta- Mogiła 53*, p. Kraków, w. małopolskie	X	–	III	Kozłowski 1970; Godłowska 1976
18.	Kraków-Olszanica 4, p. Kraków, w. małopolskie	2	–	II	Milisauskas 1986
19.	Kruszyn 10, p. Włocławek, w. kujawsko-pomorskie	7	–	II	Siciński <i>et al.</i> 2012
20.	Krzywosądz 3*, p. Radziejów, w. kujawsko-pomorskie	5	–	II	Komorowski 1959; Kabaciński 2010
21.	Ludwinowo 7*, p. Włocławek, w. kujawsko-pomorskie	1	–	III	Kabaciński 2010
22.	Łańcut 3, p. Łańcut, w. podkarpackie	154	1	II, III	Gruszczynska 1991; 1992; Dębiec 2006
23.	Nowy Dwór 9, p. Golub-Dobrzyń, w. kujawsko-pomorskie	1	–	II	Małecka-Kukawka 2008
24.	Olchowa 20, p. ropczycko- sędziszowski, w. podkarpackie	46	1	II, III	Mitura, Zych 1999; Mitura 2003
25.	Pawłosiów 55, p. Jarosław, w. podkarpackie	1	–	II	M. Dębiec (pers. comm.)

Lp.	Localization and number of archaeological site	The number of flint artifacts		LPC phase	Bibliography
		Świeciechów flint	Other Turonian flints		
26.	Puławy-Włostowice 3, p. Puławy, w. lubelskie	24	3	II	Zakościelna 1981; 2002
27.	Rzeszów 3, p. Rzeszów, w. podkarpackie	15	–	II	Kaczanowska 1985; Kadrow 1997
28.	Rzeszów 16, p. Rzeszów, w. podkarpackie	147	2	II, III	Kozłowski 1970; Kadrow 1990a
29.	Rzeszów 34, p. Rzeszów, w. podkarpackie	17	–	II	Talar 1971
30.	Rzeszów 55, p. Rzeszów, w. podkarpackie	9	–	III	Mitura 2006
31.	Rzeszów 117, p. Rzeszów, w. podkarpackie	15	–	III	Czopek <i>et al.</i> 2007; 2012
32.	Samborzec I*, p. Sandomierz, w. świętokrzyskie	12	–	I, II, III	Kulczycka-Leciejewiczowa 2008; Lech 2008
33.	Samborzec II*, p. Sandomierz, w. świętokrzyskie	2	–	I	
34.	Sandomierz 5*, p. Sandomierz, w. świętokrzyskie	3	–	III	Kowalewska-Marszałek 1993
35.	Sandomierz 8, p. Sandomierz, w. świętokrzyski	3	–	II	Burchard 1960
36.	Sandomierz-Kruków 20, p. Sandomierz, w. świętokrzyskie	151	1	II, III	Ścibior, Taras 1995
37.	Szewna 6, p. Ostrowiec Świętokrzyski, w. świętokrzyskie	17	–	II	A. Jedynak (pers. comm.)
38.	Świerszczów 28, p. Hrubieszów, w. lubelskie	1	–	II	Gawryjolek-Szeliga 2009
39.	Świlcza 22, p. Rzeszów, w. podkarpackie	27	–	II, III	R. Zych (pers. comm.)

Lp.	Localization and number of archaeological site	The number of flint artifacts		LPC phase	Bibliography
		Świeciechów flint	Other Turonian flints		
40.	Tarnoszyn 1, p. Tomaszów Lubelski, w. lubelskie	1	–	II	Zakościelna 1981; 2002
41.	Tominy 6, p. Opatów, w. świętokrzyskie	1761	496	II, III	Szeliga, Zakościelna 2007; Szeliga 2008; 2013
42.	Tominy 12*, p. Opatów, w. świętokrzyskie	X	X	II, III	P. Olejarczyk (pers. comm.)
43.	Trzebiesławice 1, p. Sandomierz, w. świętokrzyskie	58	–	II	Burchard 1959; Kaczanowska 1985
44.	Zwiężczyca 3, p. Rzeszów, w. podkarpackie	90	3	II	Dębiec <i>et al.</i> 2006
The inventories from southern side of the Carpathians (AT — Austria; CZ — Czech Republic; SK — Slovakia; B. — Bezirk; o. — okres)					
45.	Asparn an der Zaya-Schletz*, B. Mistelbach, AT	1	–	III	Mateiciucová 2008
46.	Brunn zm Gebirge IV*, B. Mödling, AT	1	–	I	Mateiciucová 2008
47.	Bylany I*, o. Kutná Hora, CZ	1	–	I	Lech 1988; 1989a; 1989b
48.	Humenné, <i>Pod Sokolom*</i> , o. Humenne, SK	1	–	B	Kaczanowska, Kozłowski 2002
49.	Mohelnice*, o. Šumperk, CZ	X	–	I	Kozłowski 1958; 1970; Mateiciucová 2008
50.	Poprad – Matejovce*, o. Poprad, SK	X	–	II	Novotný 1982; Soják 2000b
51.	Rakúsy/Spišská Belá <i>Kahlenberg (Stirn)*</i> , o. Kežmarok, SK	4	–	II	Soják 2000b; 2002b
52.	Spišský Štiavnik*, o. Poprad, SK	1	–	II	Soják 1993; 1999b; 2000b; 2003
53.	Strané pod Tatrami <i>Pod Kameným vrchom I*</i> , o. Kežmarok, SK	2	–	II	Soják 1993; 1998; 1999a; 2000a; 2000b; 2002a
54.	Vel'ká Lomnica*, o. Kežmarok, SK	1	–	II	Soják 1999b, 2000a; 2000b; 2000c

Present catalogue contains findings which were published or mentioned in literature until the end of 2013. X — confirmed, number of artifacts unknown; * — data only from literature; pers. comm. — oral inform; I–III — range of stylistic diversity of LPC pottery (I — pre-music note phase; II — music note phase; III — late phase); B — Bükk culture, classic phase. Site numbers as in Figures 2, 6, 8.

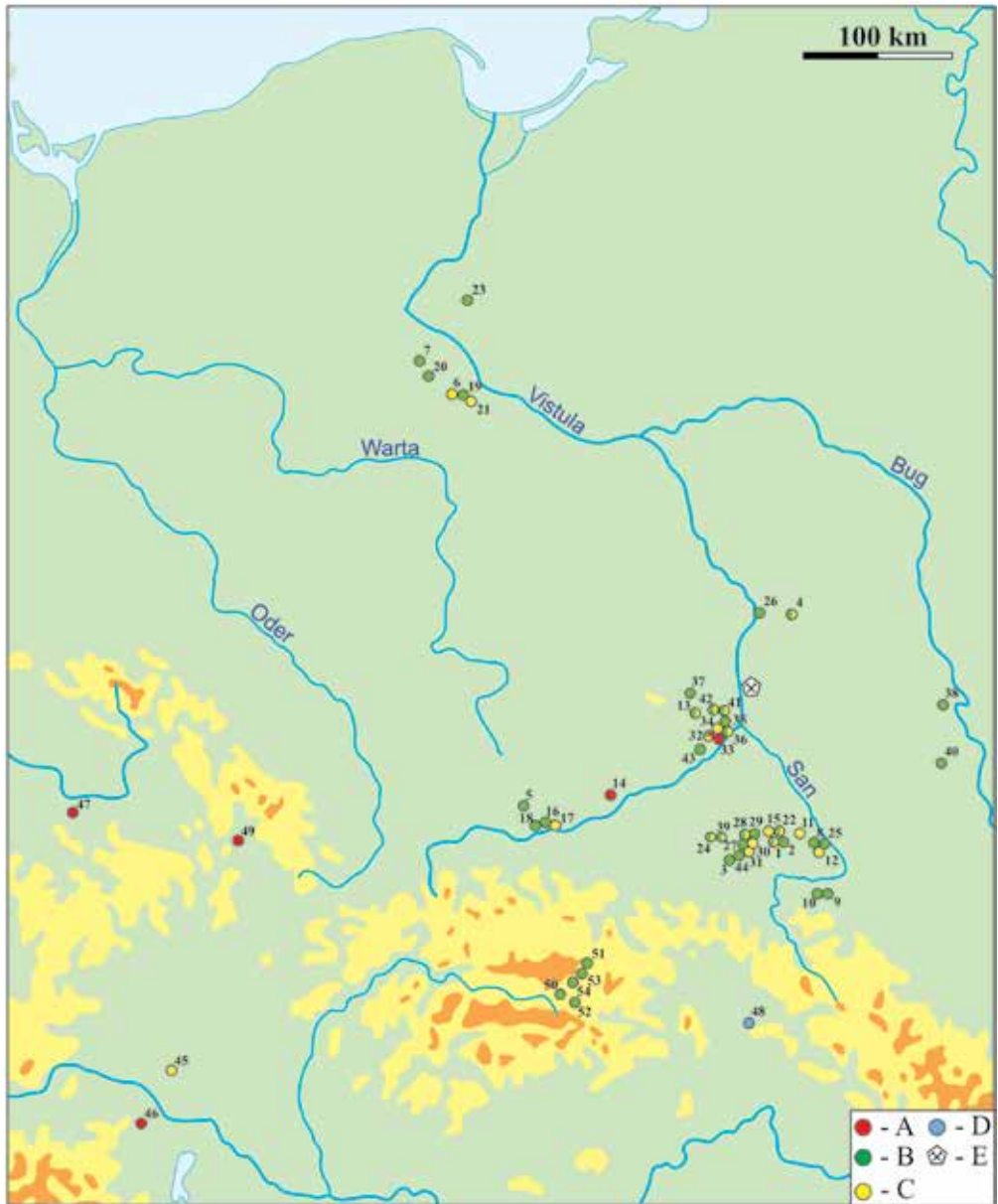


Fig. 2. The territorial spread of early-Neolithic Turonian flint findings of north-eastern margin of the Holy Cross Mountains, and the range of stylistic diversity of accompanying ceramic materials; prepared by M. Juran and M. Szeliga.

A-C — Linear Pottery Culture (A — phase I; B — phase II; C — phase III); D — Bükk culture, classic phase; E — location of Świeciechów flint outcrop. Site numbers as in Table 1.

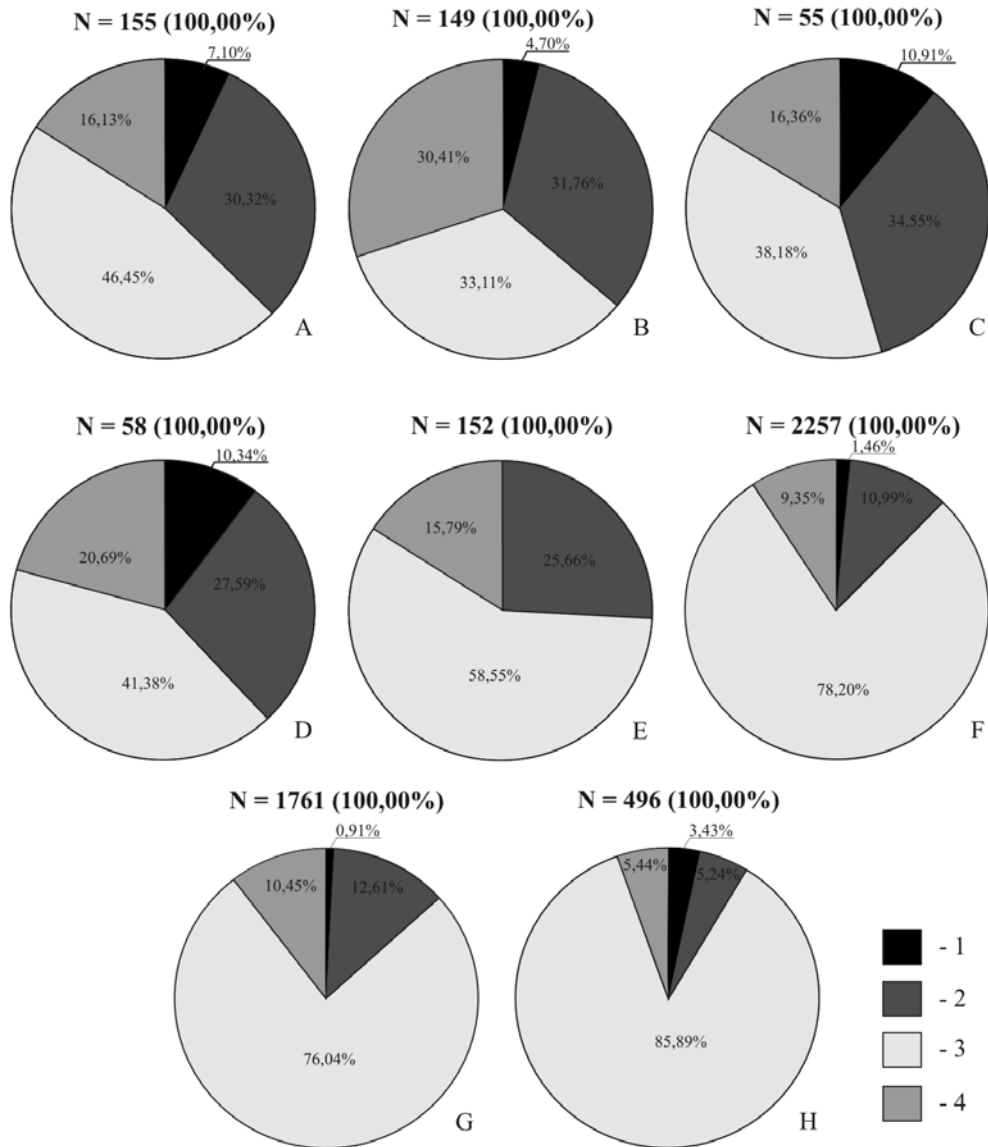


Fig. 3. The morphological structure of Turonian flint products from north-eastern margin of the Holy Cross Mountains, discovered on selected LPC sites; prepared by M. Szeliga.

A — Łańcut, powiat Łańcut, województwo podkarpackie, site No. 3; B — Rzeszów, powiat Rzeszów, województwo podkarpackie, site No. 16; C — Fredropol-Kormanice, powiat Przemyśl, województwo podkarpackie, site No. 1; D — Trzebieszawice, powiat Sandomierz, województwo świętokrzyskie, site No. 1; E — Sandomierz-Kruków, powiat Sandomierz, województwo świętokrzyskie, site No. 20; F–H — Tominy, powiat Opatów, województwo świętokrzyskie, site No. 6, seasons 2006–2009 (F — all artifacts made of Turonian flints; G — Świeciechów flint; H — other Turonian flint variety).

1 — pre-core forms, cores and hammerstones; 2 — blades; 3 — flakes, chips and spalls; 4 — retouched tools.

There are some equally modest finds from sites found a little closer to the outcrops, in western Lesser Poland and eastern parts of the Lublin Upland. From all these areas we currently have a record on only single artifacts and small groups of a few specimens at most, mostly blades, flakes or retouched tools⁶. All of them were struck from Świeciechów flint.

An apparent increase in the number of finds of worked Turonian flints is noted in the immediate vicinity of the area with the deposits of this lithic resource, in the Sandomierz Upland and its foreground, and in the western part of the Lublin Upland (Table 1; Fig. 2). A similar pattern is noted also in sites identified in the Subcarpathian region, more precisely, in the Rzeszów concentration of LPC settlements, described unanimously in current literature as a zone of the most intense influx and use of this group of materials during the oldest phase of the Neolithic (e.g. Kozłowski 1970; Lech 1979; Balcer 1983; Kaczanowska 1985; Caspar *et al.* 1989). Inventories from these areas are marked by the highest morphological diversity and quite often include lithic forms from every stage of the core preparation and reduction, blanks modification and tool production process (Fig. 3:A–E). Of these the most outstanding is the inventory from site No. 6 at Tominy (Szeliga, Zakościelna 2007; Szeliga 2008), currently the richest assemblage of worked flints struck from the discussed materials in the entire documented area of their use during the oldest phase of the Neolithic (Table 1). When it comes to its morphological structure, the inventory from site No. 6 at Tominy is dominated by the group of flake forms, which vastly outnumber blades and retouched tools, and the frequency of cores is minimal (Fig. 3:F). It is notable that these frequencies were found to be very similar for the inventories of Świeciechów flint and other varieties of Turonian flint (Fig. 3:G–H). It is safe therefore to interpret the site at Tominy as a flintworking settlement, the structure of its inventory evidently similar to the structure of inventories from other settlements of this type identified at e.g., Kraków-Olszanica and Vedrovice-Zábrdovice (Lech 1982; 2003; 2008).

Turonian flint varieties in LPC lithic inventories

Regardless of their territorial location, when analyzed for lithic resources used, the inventories revealed, every time, an overwhelming predominance of the Świeciechów flint with, usually only a very minor percentage of other Turonian flint varieties. The latter were documented for 11 sites only (Table 1) and were represented mostly by very small groups of artifacts, or even just a single one (mostly flakes), struck from uncharacteristic varieties of dark gray flint which

⁶ The list of these most remote finds is completed by some splintered pieces recovered at a number of sites in the historical region of Kujavia in Poland (Domńska 2002).

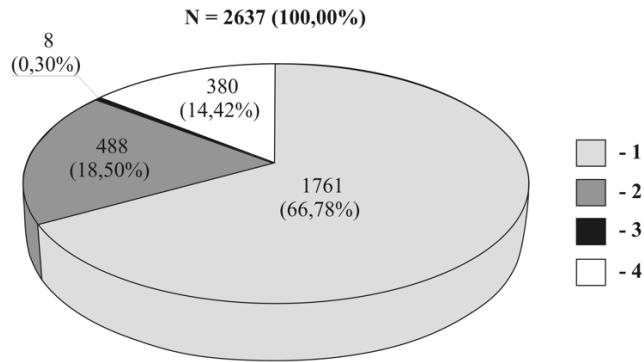


Fig. 4. Tominy, powiat Opatów, województwo świętokrzyskie, site No. 6. The share of Turonian flint of north-eastern margin of the Holy Cross Mountains in the cumulative material structure of LPC inventory, collected in 2006–2009; prepared by M. Szeliga.

- 1 — Świeciechów flint; 2 — dark-grey Turonian flints (mainly Zawada flint); 3 — Ożarów flint; 4 — other flint raw materials and obsidian.

could not be identified conclusively as to its material⁷. The only exception of this is the inventory from mentioned site 6 in Tominy where, beside the dominant position of Świeciechów flint (66.78%), also other varieties of Turonian flints have reached high participation, taking the second position in the culmulative, raw material structure of collection, prior to participation of other materials, i.e. Chocolate flint and Jurassic-Cracow flint (Fig. 4)⁸. The vast majority of these artifacts were struck from dark grey flints, which share many of their macroscopic properties with the variety known as Zawada flint (Budziszewski, Michniak 1989; Budziszewski 1995), available from outcrops found right next to the site at Tominy, approximately 100 meters to the north of it (Fig. 5:A–B)⁹. Only exceptionally an inventory included Ożarów flint (Fig. 4), a variety marked by the irregular colour of its primary substance, in various shades of gray, resulting in a unique mottled pattern (Krzak 1970; Budziszewski 1980; 1986).

The presence in inventories of different flint resources, and their different frequencies, suggests that in selecting individual varieties of Turonian flints sourced in the Holy Cross Mountains region the people of different LPC communities were guided by specific preferences; their main focus was sourcing and working the Świeciechów variety; in general, other varieties were used by them only on a very minor scale if their deposits were found in the neighborhood or only a small distance away (Sandomierz Upland, western part of the Lublin

⁷ E.g. the lithic resource of an industrial chunk from Sandomierz-Kruków (Table 1) was identified in its source publication as Gościeradów flint (Michalak-Ścibior, Taras 1995). In my view the macroscopic properties of this specimen do not allow such a detailed identification.

⁸ These data refer to LPC features excavated in 2006–2009.

⁹ The macroscopic description of the Zawada flint is as follows: dark grey in colour, with numerous lighter speckles (Diam. ranging between 1 and up to 20 mm), a characteristic, fairly narrow (2 to 4 mm wide) dark purple streak divides the cortex from the main substance of the flint (Fig. 5: C–D).

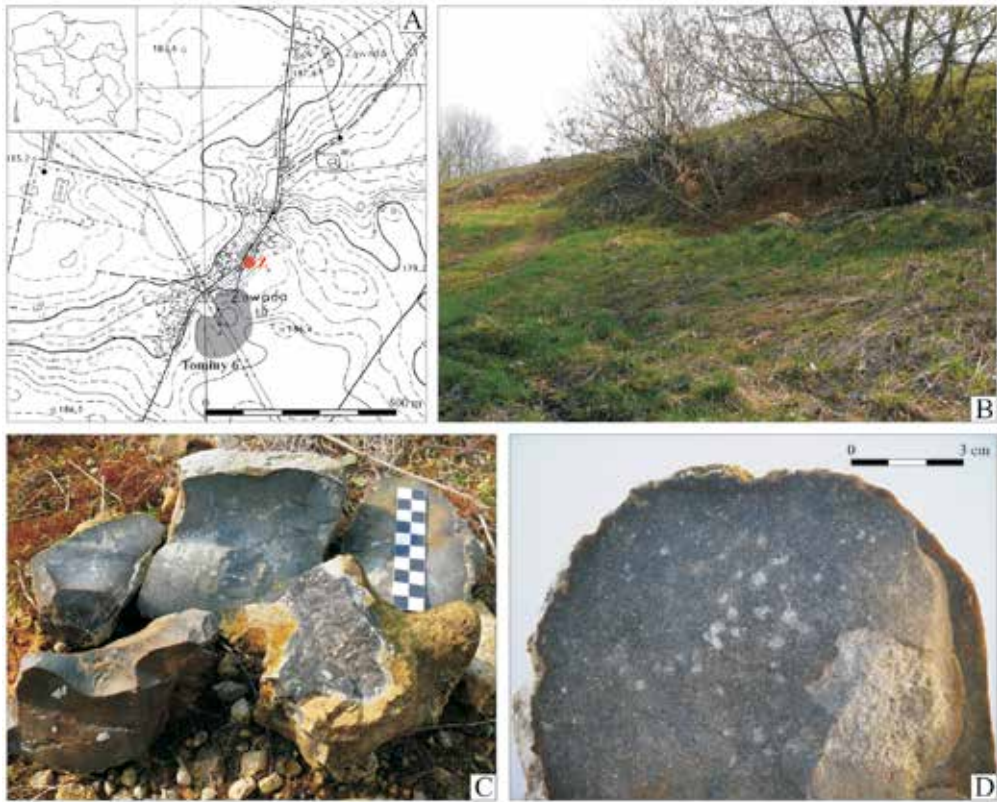


Fig. 5. The archaeological site No. 6 at Tominy, powiat Opatów, województwo świętokrzyskie and the outcrop of Zawada flint; Photo by M. Szeliga.

A — Location of the archaeological site No. 6 at Tominy and the outcrop of Zawada flint (Z); B — SW view of the area of the quarry backfilled in 2006, with primary deposit of Zawada flint; C — fragmented concretions of Zawada flint, collected from surface of outcrop in spring 2010; D — macroscopic properties of Zawada flint.

Upland and the Subcarpathian region). These differences are reflected also by the substantially different nature and the range of working individual flint varieties. Morphological analyses of inventories taken into account in the present study (first of all, the largest assemblage, from Tominy) validate the conclusion that the working of dark grey flint (including Zawada flint) involved primarily the reduction of cores to obtain flakes and Świeciechów flint — at least at the initial stage of core reduction — was almost always worked to obtain blades (Szeliga 2013).

Classification of finds and internal periodization of LPC

According to the current research status artifacts made of Turonian flints sourced in the north-eastern margin of the Holy Cross Mountains were recorded in

contexts with pottery representative for every phase of LPC development: the pre-music note (I), music note (II), and late LPC (III), in its two separate variants, phases Želiezovce and Šárka. A closer taxonomic classification of pottery found in inventories from the upper basin of the Vistula helps us to refer the phenomenon of Turonian flint use and distribution (especially the Świeciechów variety) to between the older stage of the pre-music note phase (i.e. Gniechowiec phase; Kulczycka-Leciejewiczowa 1979; 1983; 1987) and the younger segment of the Želiezovce phase (i.e. Želiezovce IIb; see Pavúk 1969; Kadrow 1990a; 1990b). This corresponds, at this time, to the full range of the stylistic development of LPC in the study area (Kadrow, Zakoscielna 2000; Czekaj-Zastawny 2008; Nowak 2009). Nevertheless, the full scale of the stylistic and typological range of pottery concurrent with Turonian flint artifacts is now documented only in the Sandomierz region (to be exact, on at Samborzec I; see Kulczycka-Leciejewiczowa 2008; Lech 2008). In the other enclaves of LPC settlement the pottery found in context with Turonian flints is limited in its style to the classic and late stages of LPC development (Fig. 2).

The analysis of all the available inventories reveals quite sharp disproportions in the frequency of assemblages corresponding to individual developmental stages of LPC. Its oldest phase is documented only by a very small number of finds, all of them made of Świeciechów flint (Table 1). Definitely the largest group are inventories attributed to the music note phase, which also map out the maximum distribution range of this lithic resource during the early Neolithic (see Fig. 2). The nature and the size of these inventories demonstrate, as compared to the earlier period, the growing role in the economy and resource distribution systems of LPC of Świeciechów flint and other varieties of Turonian flint sourced in the north-eastern margin of the Holy Cross Mountains (see Lech 2008; Matejciucová 2008). Finds associated with the music note phase definitely have a higher frequency than assemblages from the late phase of LPC, all of them except one in the Želiezovce style, the exception being one inventory with pottery in an early Šárka style (Brześć Kujawski, Site No. 4; see Grygiel 1976; 2004). However, these disproportions may not be interpreted automatically as an index of the decrease in the intensity of use and distribution of Turonian flints at the late stage of development LPC. This is because they may reflect a broader cultural shift taking place in the region bordering the Carpathians in the north and the north-east ever since the onset of the music note phase. This shift involved a gradual weakening, and with time, a complete waning in this region of impact from the former cultural centre in south-western Slovakia which, in these communities, put a stop to the stylistic and typological development of the pottery (Kozłowski 1985). The main implication of these processes in the study area postulated in literature was a further, long-term stagnation of music note traditions in the pottery production and decoration, which proceeded parallel to the impact, limited geographically in its range, from Želiezovce styles, and was spread out in time as far as the decline of LPC (Kadrow, Zakoscielna 2000;

Zakościelna 2007)¹⁰. Because of the general scarcity of absolute dates there is no way at present to make a chronological classification of individual lithic inventories basing only on the stylistic differences of pottery finds discovered in the same context. Consequently, we cannot hope to make a correct assessment of the actual intensity of use and the scale of distribution of the Turonian flints over the entire early period of development of LPC identified with the music note and the Želiezovce style of vessel decoration.

DYNAMICS OF DISTRIBUTION AND ECONOMIC IMPORTANCE OF TURONIAN FLINTS OVER THE DURATION OF LPC DEVELOPMENT

Interpretation constraints outlined earlier permit only an assessment of the economic importance of the Turonian flints from the north-eastern margin of the Holy Cross Mountains and a reconstruction of the scale, nature and principal directions of distribution of this lithic resource only within two main chronological horizons which correspond to the older phase and, jointly, to the middle and the younger phases of LPC development. These horizons reflect some evident differences in the use and distribution of Turonian flints, which closely correspond to the phenomena and culture change observed in the southern region of Poland at the turn of the sixth and the fifth millennium BC.

The older horizon

At present it is safe to attribute to this period only six LPC sites where the lithic inventory consisted entirely of Świeciechów flints (Table 1). These sites are recorded on a very broad territory which takes in areas on both sides of the Carpathians (Fig. 6). In the upper basin of the Vistula this horizon is represented, on the one hand, by very modest groups of artifacts from Samborzec; these include: a blade with a broken tip, a sidescraper and a splintered piece (site No. I; see Fig. 7: 1, 3–4), an endscraper on a cortical blade and a chip (site No. II; Lech 2008), on the other hand, by the inventory from Kazimierza Mała I, having an unknown quantitative and qualitative structure (Lech 2003; Mateiciucová 2008). These finds are complemented by a very modest series from the region on the other side of the Carpathian range: a single blade discovered at Brunn am Gebirge IV (Mateiciucová 2008) and a broken endscraper with harvesting polish from Bylany I (Fig. 7:2). On the basis of the latter find the percentage of

¹⁰ This concept would also be an alternative interpretation of the problem of the so-called “stylistic gap” observed in pottery finds from the upper basin of the Vistula river, between LPC and the earliest of the post-linear formations; it challenges the widely accepted argument on a settlement hiatus in the region during the first quarter of the fifth millennium BC (e.g. Kozłowski 1985; 2004; Godłowska *et al.* 1987; Kamińska, Kozłowski 1990; Kaczanowska, Kozłowski 1994).

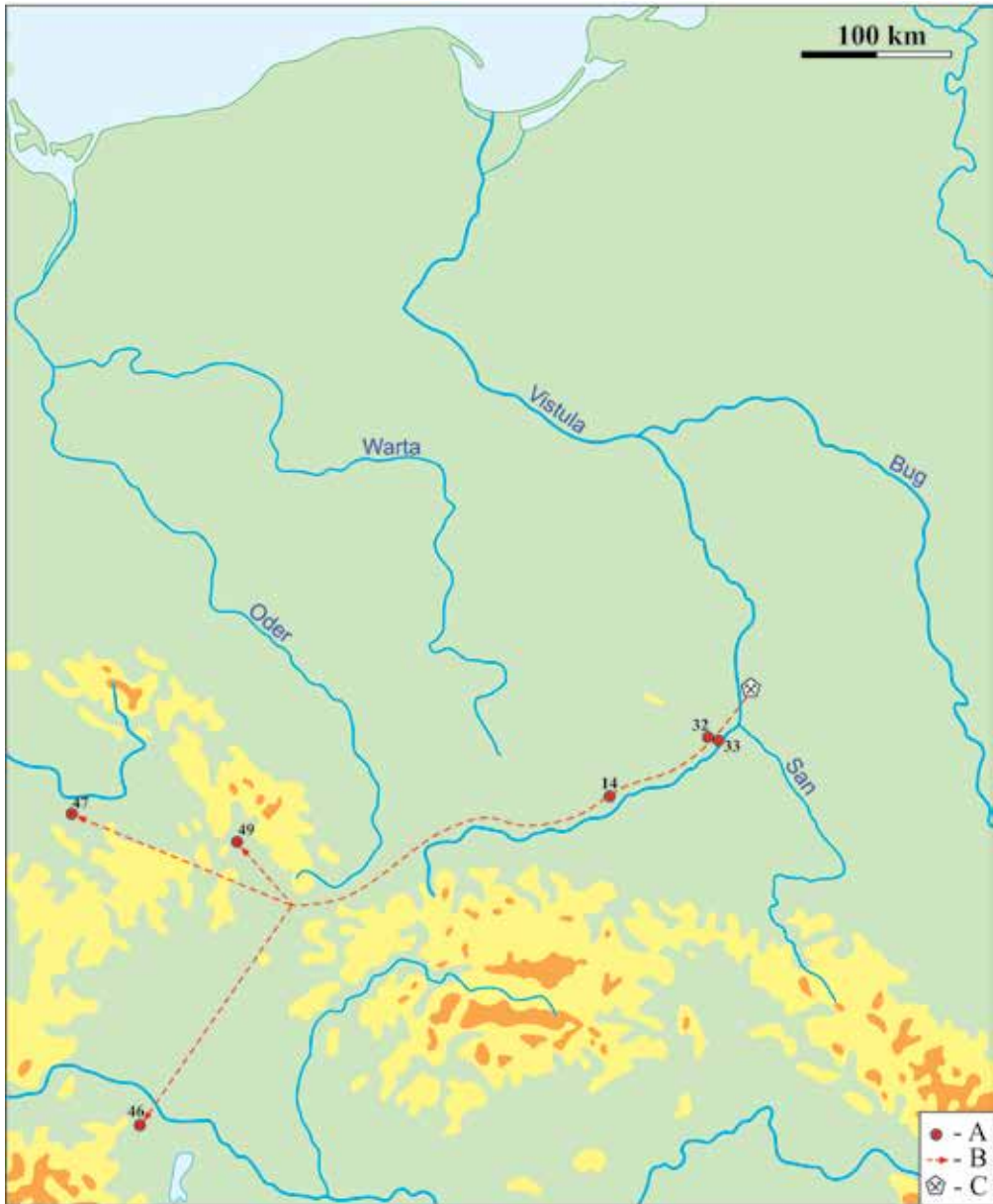


Fig. 6. The distribution of Świeciechów flint in the older horizon of the LPC development; prepared by M. Juran and M. Szeliga.

A — finds attributed to LPC pre-music note phase; B — conjectured direction of distribution;
C — location of outcrops. Site numbers as in Table 1.

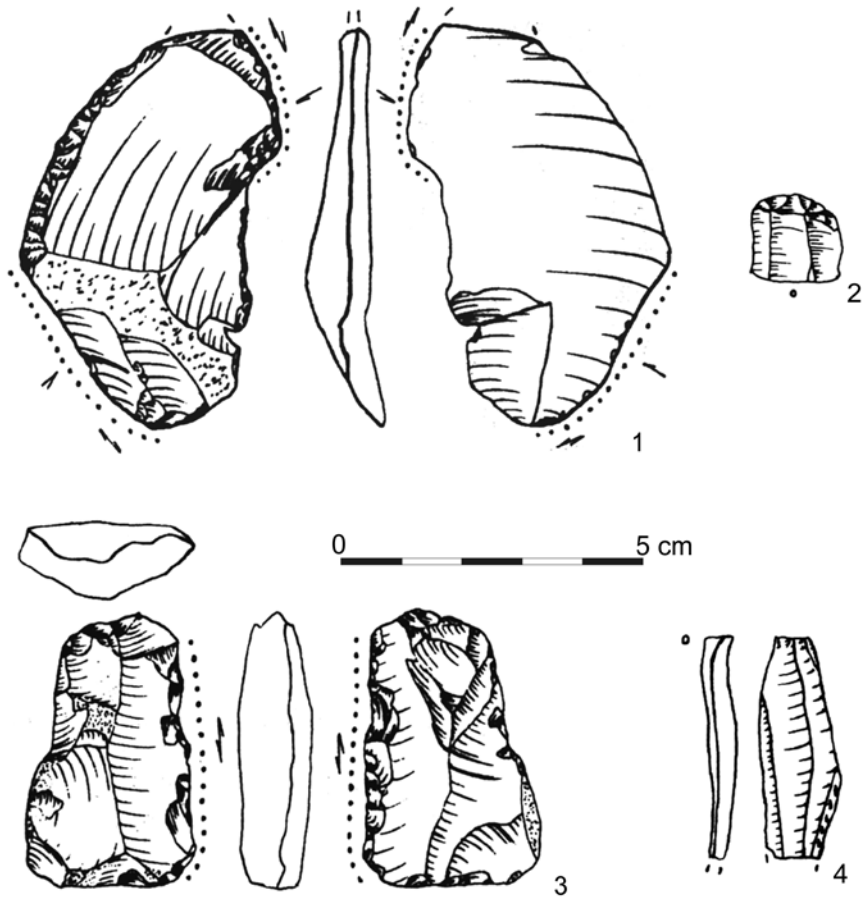


Fig. 7. A selection of Świeciechów flint artifacts, LPC pre-music note phase; prepared by M. Juran and M. Szeliga.

1, 3-4 — Samborzec, powiat Sandomierz, województwo świętokrzyskie, site No. I; after J. Lech (2008, Fig. 2: d; 4: e-f); 2 — Bylany, okres Kutná Hora, site No. I; after J. Lech (1989b, Fig. 14: b).

Świeciechów flint in this inventory, assigned to the oldest occupation horizon at Bylany site No. I was estimated as a mere 0,9% (Lech 1988; 1989a). A very small number of artifacts made of Świeciechów flint, one of them a slim perforator, were discovered also at Mohelnice (Kozłowski 1958; 1970).

Data invoked here suggest a generally sporadic economic importance of the Świeciechów flint everywhere in the area where its use and distribution during the oldest phase of LPC development is documented. The seriously limited scope of the source evidence, in the absence of a scientific description of a significant part of this material, precludes at present an unambiguous assessment of the nature and the actual scale of the distribution of Świeciechów flint in the upper basin of the Vistula, and especially, the patterns of its inflow to areas in

the immediate vicinity of its geological source, i.e. in the Sandomierz Upland. A significant impediment in this regard is the very poor recognition of the actual intensity of the oldest LPC settlement in this area, due to the very low frequency of most local finds and their nature, which usually renders them of little use in this respect¹¹. Using the conclusions reached for the younger horizon it may be safe to assume that the LPC communities of the Sandomierz settlement concentration had direct access to the outcrops of Świeciechów flint and that it occupied an important position in the system of its distribution to much more distant areas (Lech 2008).

The distribution of sites under discussion suggests that during the oldest phase of LPC development the distribution of the Świeciechów flint only had a south-western direction and was exported along the the upper course of the Vistula River to the Moravian Gate, and on to the more distant areas of Bohemia and Moravia and Lower Austria (see Fig. 6). At the same time, the morphological diversity of the finds recoded in the region beyond the Carpathian range (looking from Poland) shows that Świeciechów flint entered this area only as blades and prepared tool forms. They spread across the region through exchange, in several stages, from one group to the next, within a system which was centered mainly on the distribution of Jurassic-Cracow flint (e.g. Lech 1987; 1990; 2003; Janák, Přichystal 2007; Mateiciucová 2008). The nature of these finds and, each time, the marginal (<1%) frequency of Świeciechów flint, confirm the non-economic basis of phenomena associated with and directly related to its exchange.

The younger horizon

The bulk of artifacts made of Turonian flints from the north-eastern margin of the Holy Cross Mountains are attributed to the younger horizon, on correlated chiefly with the middle and the late phase of LPC, and the classic stage of Bükk culture development. Materials classified in this manner derive from jointly 49 sites (Table 1) which have a territorial spread definitely much more extensive than during the preceding period (Fig. 8). Compared to this earlier period they reflect a significant increase in the importance of Świeciechów flint in the raw materials economy of communities of that age, complete with the continued development of the multidirectional and far-reaching system of its distribution (Lech 2008; Mateiciucová 2008). The presence of a larger variety of flints in the inventories from this horizon confirms the awareness and the use during this period also of other varieties of Turonian lithics, like Zawada flint and

¹¹ Other than Samborzec site No. I, the best recognized in this regard and most extensively explored (Kamieńska, Kulczycka-Leciejewiczowa 1970; Kulczycka-Leciejewiczowa 2008), LPC pre-music note stage occupation in the Sandomierz Upland is documented by a modest group of pottery finds recovered from only a small number of sites either as stray finds or residual intrusive finds (Michalak-Ścibior 1993).

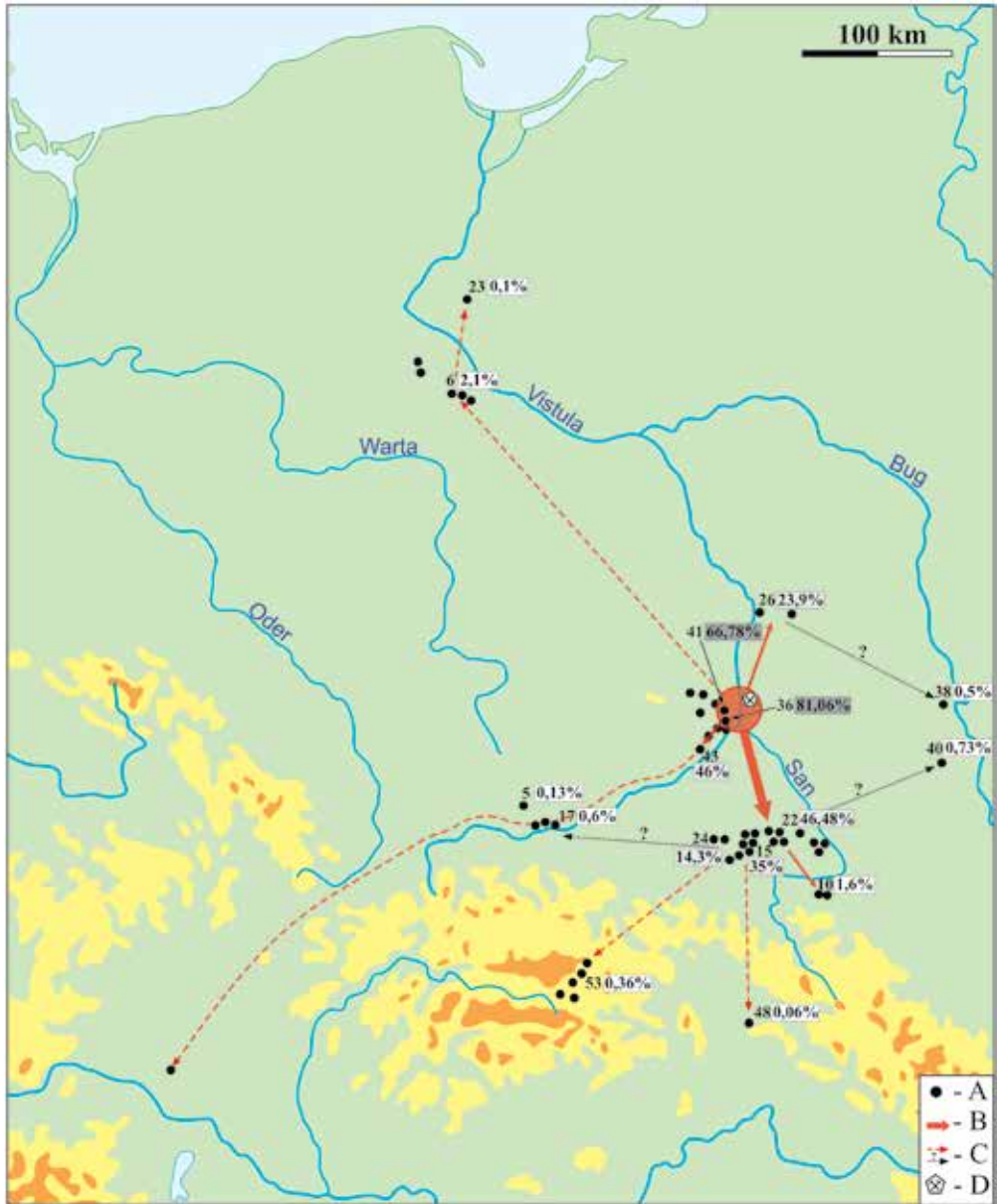


Fig. 8. The distribution of Świeciechów flint in the younger horizon of the LPC development; prepared by M. Juran and M. Szeliga.

A — finds attributed to the classic and the late phase of LPC and the classic phase of Bükk culture (Humenné) with the percentage of this material in selected inventories; B — distribution of pre-core forms and prepared blade cores; C — certain and putative directions of distribution of blades, flakes and retouched tools; D — location of outcrop. Percentages from publications presented in Table 1; Site numbers as in Table 1.

Ożarów flint (Table 1; Fig. 4). At the same time, the ways and the extent to which they were worked, as well as their frequencies observed in individual assemblages, indicate that their economic significance was never more than local and usually marginal (except for the settlement at Tominy; see Fig. 3–4); their participation in the distribution system was altogether minimal — and not more than hypothetical (see Footnote 3).

An analysis of the dispersion of finds assigned to the classic and the late stages of LPC development reveals their highest concentration in south-eastern Poland, and a far lower frequency in other clusters of settlement (Fig. 2). So far, the highest percentage of Turonian flints from the north eastern margin of the Holy Cross Mountains is recorded in inventories from the northern area of the Sandomierz Upland and its northern foreland, lying right next to their geological deposits (Fig. 8). At Sandomierz-Kruków, site No. 20, out of the total number of flint finds attributed to the LPC occupation horizon the percentage of Świeciechów flint has been estimated at approximately 81,10% (Michalak-Ścibior, Taras 1995), for site No. 6 at Tominy — at approximately 66,78% (see Fig. 4). These frequencies show clearly the strategic importance of this lithic resource in the local production and make the local communities its most important users during this period. The size and the morphology of the inventory from Tominy confirm moreover the comprehensive range and the higher than average scale of working of the Świeciechów flint within the settlement, where it was brought as pre-core forms with evidence of only very limited preparation (Szeliga 2013)¹².

The functioning of production settlements close to the deposits of Świeciechów flint, confirmed by finds from Tominy, suggests that their communities played a leading role in the system of distribution of this resource and that they produced a surplus of a wide selection of lithic forms¹³, exchanged in due course with communities established at a greater distance from the deposits, most notably, those in the Sandomierz Upland and the Rzeszów region (Fig. 8). The richest inventories recovered there display fairly varied frequencies of this material, ranging from a dozen-odd (Olchowa, site No. 20 — 14.3%; Rzeszów, site No. 3 — 17.24%; see Kadrow 1997; Mitura, Zych 1999) to a several dozen percent (Kraczkowa, site No. 1 — 32.00%; Łañcut, site No. 3 — 43.12%; Trzebieszawice — about 46.48%; see Kulczycka-Leciejewiczowa 1979; Kaczanowska 1985; Gruszczyńska 1992). They indicate, each time, the essential, or even, the most important (Łañcut, site No. 3) role played by the Świeciechów flint in the local system of lithic resources supply and reduction.

¹² The scale of exploitation and the ways in which this resource entered the LPC settlement at Sandomierz-Kruków, site No. 20 cannot be determined conclusively because the LPC lithic inventory was eroded to an unknown extent when the same site was occupied by communities of Malice culture (Michalak-Ścibior, Taras 1995; Szeliga 2013).

¹³ The production of surplus flint products is documented for some settlements in the Western European zone of LPC (e.g. Verlainne in Limburg; see Allard 2005; Allard, Burnez-Lanote 2006). A similar character is postulated also for workshop-settlements which relied on Jurassic-Cracow flint, known from Kraków-Olszanica and Bolechowice-Zielona (Lech 2003).

The results of morphological analysis of individual assemblages suggest that the bulk of Świeciechów flint artifacts introduced into the region in question was as pre-core forms and initially prepared blade cores (Fig. 9). They found their way to at least a few of the “central settlements” (e.g. Łañcut, site No. 3; Rzeszów, site No. 16; Trzebieszławice, site No. 1; Zwiężczyca, site No. 3) where they were worked in a comprehensive range of ways to obtain blanks (both blades and flakes) and to manufacture tools. The same sites also played a leading role in the later distribution of these resources, both locally and outside the region, mainly in the form of blades, flakes and retouched tools (Fig. 8). Apparently, only occasionally the redistribution of the Świeciechów flint took place as pre-core forms and cores. This is indicated by the inventory from Fredropol-Kormanice, site No. 1 containing a few specimens of this description, and also by a few refittings from the initial steps of reduction of this resource in that site (Fig. 10). The lowest percentage of Świeciechów flint in the sum total of the lithics identified in the inventory from Fredropol-Kormanice, site No. 1 (1,6%; see Kozłowski 1970) add weight to the argument that the inflow of this flint to the site took place through the communities established in the Rzeszów region (see Fig. 8).

Everywhere else in the northern foreland of the Carpathians the intensity of distribution and the economic importance of Świeciechów flint were much lower. This is indicated unambiguously by the frequencies of this resource, as a rule not more than 1%, which are observed in inventories recorded in the regions Kujavia, Chełmno Land, western Lesser Poland and eastern Lublin Region (*cf.* Fig. 8)¹⁴. The contents of these inventories and the nature of finds from individual sites indicate that Świeciechów flint entered these areas always occasionally and completely devoid of any economic justification, as flakes, blades, and tools fashioned from them (Fig. 11); in the case of Kujavia, also as an occasional splintered piece (e.g. Kruszyn, site No. 10; Krzywosądź, site No. 3; see Komorowski 1959; Domańska 2002; Kabaciński 2010). At the same time, the unambiguous identification of the source areas, especially for the finds from western Lesser Poland and eastern Lublin Region is quite complicated. In the case of Lesser Poland the most likely direction of inflow would be the north-eastern (Milisauskas 1986); this is supported by the situation observed during the pre-music note phase of LPC development (Fig. 6). Nevertheless, eastern provenance cannot be discounted entirely, namely that blanks and tools entered by way of the communities established in the Rzeszów region (Fig. 8). This would be justified by the very intensive exchange and connections documented in the archaeological record for these two settlement regions. This give and take is expressed, on the one hand, by an intense inflow of Jurassic-Cracow flint into settlements on the Middle Wisłok River (e.g. Kozłowski 1970; Lech 1979; Kaczanowska 1985; Caspar *et al.* 1989), and on the other hand, by the intermediate position of LPC groups

¹⁴ The only departure from this pattern, an irrelevant one from the economic point of view, would be the inventory from Brześć Kujawski, site No. 4 where the frequency of Świeciechów flint is estimated at 2.1% (Lech, Małecka-Kukawka 1987).

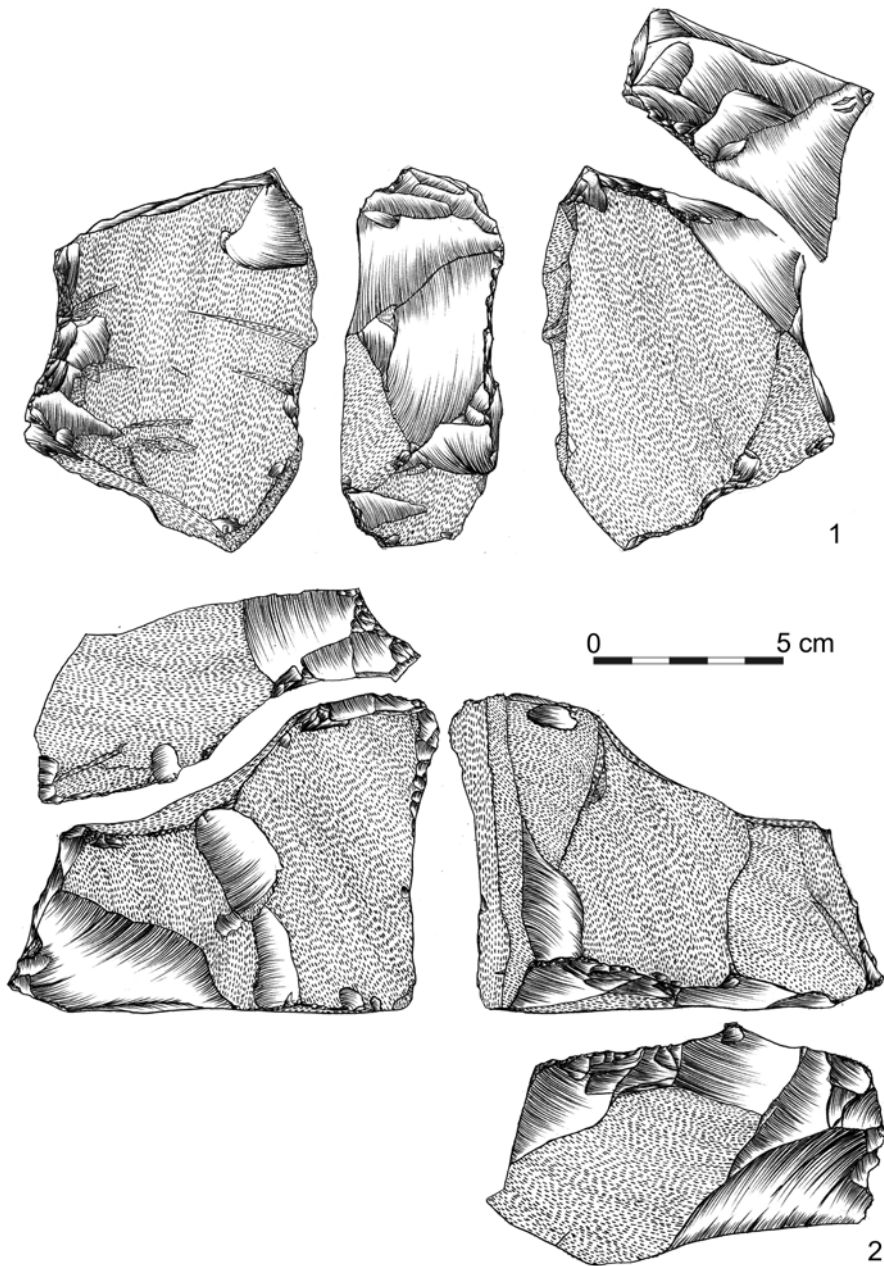


Fig. 9. Łańcut, powiat Łańcut, województwo podkarpackie, site No. 3. Two pre-core forms from pit No. 63; drawn by M. Szeliga; first publication M. Dębiec (2006).

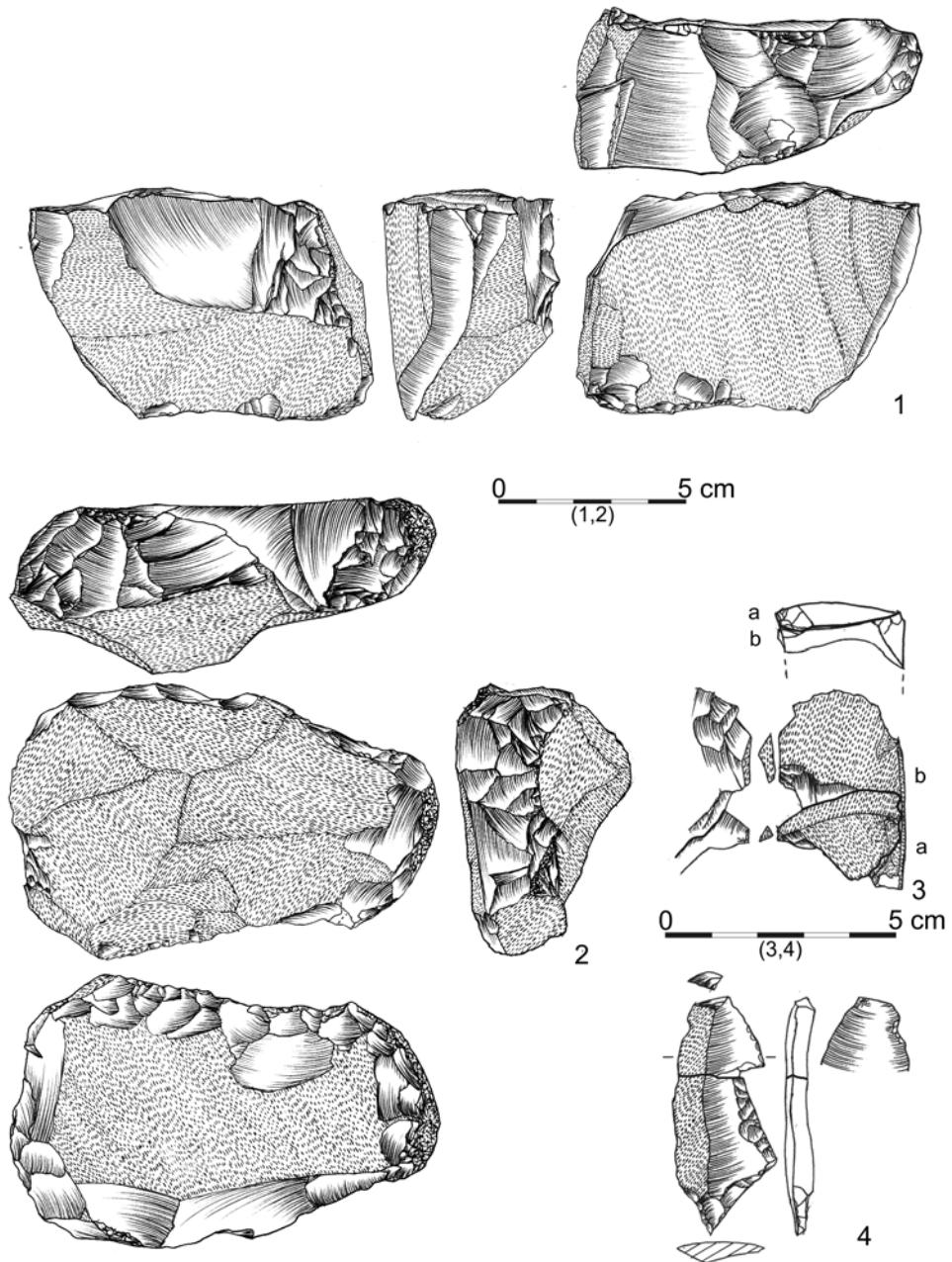


Fig. 10. Fredropol-Kormanice, powiat Przemyśl, województwo podkarpackie, site No. 1.
Selection of Świeciechów flint artifacts; drawn by M. Szeliga.

1-2 — pre-core forms; 3-4 refittings of debitage from striking platform preparation (3) and early phase of exploitation (4) of blade cores.

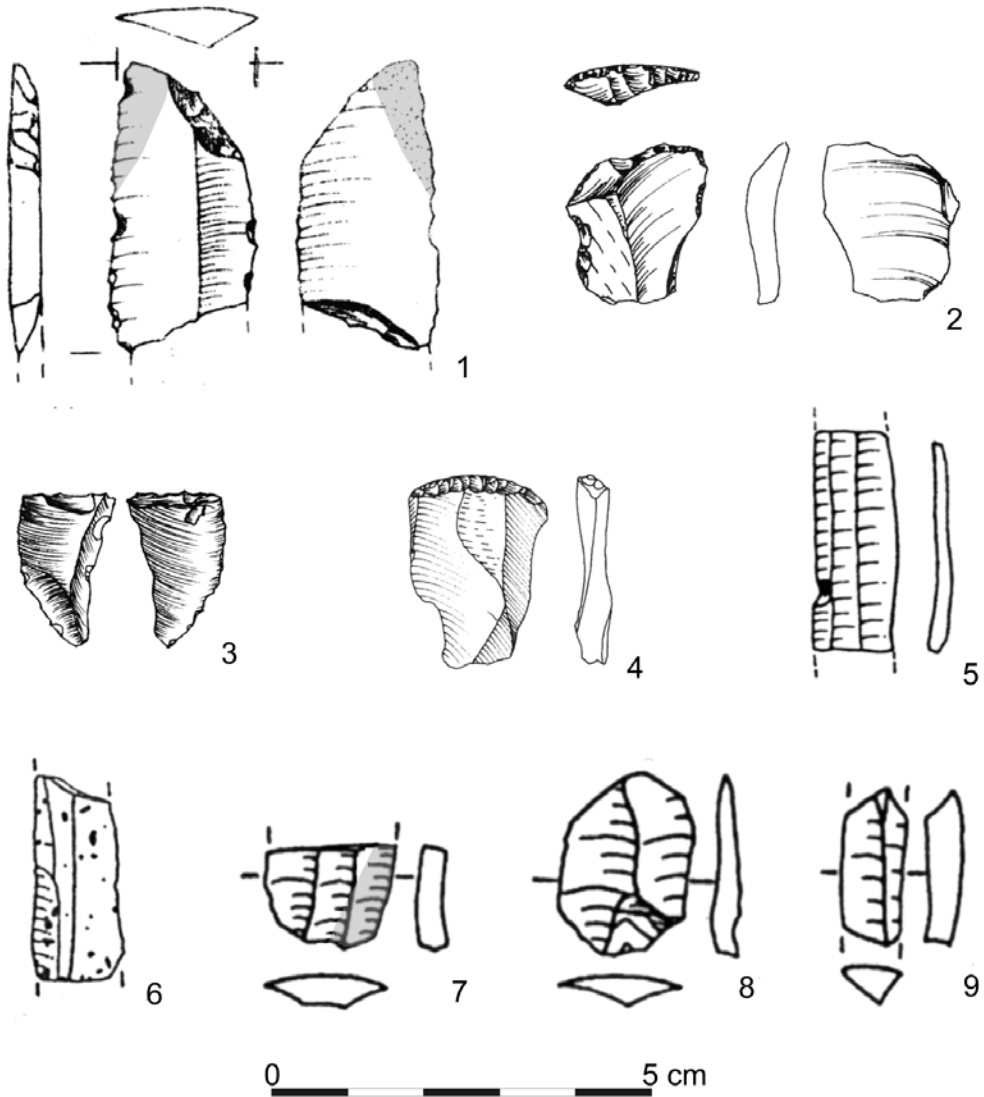


Fig. 11. A selection of artifacts from the most distant areas of the distribution of Świeciechów flint, covered by this material, during LPC development period: 1 — Tarnoszyn, powiat Tomaszów Lubelski, województwo lubelskie, site No. 1; after A. Zakościelna (1981); 2 — Brześć Kujawski, powiat Brześć Kujawski, województwo kujawsko-pomorskie, site No. 4; after R. Grygiel (2004); 3 — Świeraszów, powiat Hrubieszów, województwo lubelskie, site No. 28; after K. Gawryjolek-Szeliga (2009); 4 — Ludwinowo, powiat Włocławek, województwo kujawsko-pomorskie, site No. 7; after J. Kabaciński (2010); 5 — Humenné, okres Humenné, site *Pod Sokolom*; after M. Kaczanowska, J. K. Kozłowski (2002); 6 — Strané pod Tatrami, okres Kežmarok, site *Pod Kamenným vrchom I*; after M. Soják (1999a); 7-9 — Rakúsy/Spišská Belá, okres Kežmarok, site *Kahlenberg* (Stirn); after M. Soják (2000b).

of the Rzeszów region in supplying the communities in western Lesser Poland with the Slovak-Hungarian obsidian (Milisauskas 1986; Szeliga 2009). As for the single finds of Świeciechów flint recorded in the eastern Lublin Region (Świerszczów, site No. 28; Tarnoszyn, site No. 1), their likely source area could both be the cluster of settlement in the western part of the Lublin Upland and the one in the Rzeszów region (Fig. 8). This question cannot be resolved easily given the considerable distance which divides the sites under discussion from the settlement clusters and the very poor understanding of the intensity and the nature of LPC settlement in the vast territory found between them.

The last group of finds associated with the chronological-cultural horizon of interest are artifacts recorded in the region on the inner side of the Carpathian arc, centered around two separate zones, i.e. the western and the eastern (see Fig. 8). In the first of these areas the distribution of Świeciechów flint is a direct continuation of processes initiated during the pre-note phase (Fig. 6). This lithic resource, and also the slightly better represented Chocolate flint, continue to be only a marginal addition accompanying the main supplies of Jurassic-Cracow flint from the LPC clusters of western Lesser Poland (e.g. Kaczanowska 1985; Lech 1989a; 2003; Mateiciucová 2001; 2008; Janák, Přichystal 2007). Nevertheless, in comparison to the earlier period, the influx of Świeciechów flint to these areas seems to be somewhat weakened. This would be suggested by its only sporadic occurrence, confirmed so far only at Asparn an der Zaya-Schletz in Lower Austria (Kaczanowska, Kozłowski 2005; Mateiciucová 2008)¹⁵. A vast majority of Transcarpathian finds originates from north-eastern and eastern Slovakia, where they are mostly recorded in the clusters of LPC settlement in Spiš, and on a single occasion, also in the area occupied by the communities of the classic phase of Bükk Culture (Fig. 8). Similarly as in the western zone, the influx of Świeciechów flint to these areas completely lacked economic justification and was only in the form of blades, flakes and finished tools (Fig. 11), which at individual sites are represented usually by a single specimen or only a small group of these artifacts (Table 1). The participation of this lithic resource in local inventories has been estimated at only 0.06% — Humenné, site *Pod Sokolom* (Kaczanowska, Kozłowski 2002); 0.36% — Strané pod Tatrami, site *Pod Kamenným vrchom I*; 0.9% — Rakúsy/Spišská Belá, site *Kahlenberg* (Stirn; cf. Soják 1999a; 2000b).

The location, form and frequency of Slovak finds invoked here leads us to identify their source areas in the clusters of LPC settlement in south-eastern Poland (Kaczanowska 1985; 1986; Soják 2000b; 2001), first and foremost, the Rzeszów region. This is confirmed also by the quite frequent occurrence in north-eastern and eastern Slovakia, and in north-eastern Hungary too, of specimens made of other, “northern” lithic resources, such as Chocolate flint and Volhynian flint. Their presence has been recorded in inventories associated

¹⁵ Moreover, I. Mateiciucová (2008) attributes to the late LPC horizon some specimens struck from this resource discovered at Mohelnice.

with both the LPC (the Spiš cluster) and the Eastern Linear culture groups (e.g. Kaczanowska 1976; 1985; Kaczanowska, Kozłowski 1997; Biró 1998; Soják 2000b; 2001). The frequencies of these resources in individual inventories are marginal, very similar to those of the Świeciechów flint, and indicate that like in its case, the mechanisms which motivated and regulated their distribution to this region had an entirely non-economic background.

The influx and spread to Slovakia and Hungary of artifacts made of varieties of flint sourced in the north-eastern margin of the Holy Cross Mountains and in Volhynia are a part of a much broader context of intercultural phenomena; they are a direct reflection of intensive contacts initiated during the music note phase by LPC communities from the concentration established in southern Poland with the Eastern Linear groups living on the other side of the Carpathians (e.g. Kaczanowska 1976; Godłowska 1982; Kozłowski 1985; Kadorow, Zakościelna 2000). To the north of the Carpathians this exchange is documented in the material record both by numerous finds of imported Slovak-Hungarian obsidian, the result of an intensive influx (Szeliga 2007; 2009, with a list of references) and the frequent presence in LPC sites of stylistic references in pottery vessel decoration to Eastern Linear styles, and even of imports from that environment (Kulczycka, Kozłowski 1960; Godłowska 1982; Kaczanowska, Godłowska 2009). The dispersion and the presence of obsidian in individual inventories from the upper basin of the Vistula confirm the leading role played by the communities living in the Rzeszów region in the redistribution of this resource to other areas of southern and south-eastern Poland (Szeliga 2009). This agrees very well with the postulated, previously leading position of the local ecumene in the process of the emergence and development of the network of long-distance, Transcarpathian, intercultural exchange going back to the classic phase of LPC development.

CONCLUSION

The evidence presented so far confirms the existence, during the period of LPC development, of an extensive system of territorial distribution of Świeciechów flint, which proceeded in a number of basic intermediate stages. These stages differed in their spatial extent, which finds expression in the irregular distribution of this lithic resource and the differences in the ways and the extent to which it was processed within individual settlement clusters and areas. This system was an element of a much more extensive network of interregional exchange of flint raw materials functioning on both sides of the Carpathians starting from the oldest phase of LPC development and took in all of the flint resources used in these areas by the early farming communities (e.g. Lech 1979; 1987; 2003). The main ground of this exchange of various materials — setting aside any subsequent technological and economic implications apart because their nature seems to be secondary and far less important — were interregional contacts and

socio-cultural ties. They determined both the main directions and the scope and the course of the distribution process and the resulting circulation of individual resources (see Małecką-Kukawka 1994 [with a list of references]). One perceptible manifestation might be the earlier discussed varied dynamics and zonality of the spread of the Świeciechów flint during LPC development allowing us to examine this phenomenon in terms much broader than simply as an effect of action taken to meet the demands of the local economy. This is confirmed further by observation of other varieties of flint and obsidian involved in the system of raw materials exchange in the northern foothills region of the Carpathians. They are a vivid indicator of the intensity of contacts and ties between individual groups, both at a local (e.g. between communities of the Sandomierz and the Rzeszów clusters) and an interregional level (e.g. between the Rzeszów cluster and the Eastern Linear groups). At the same time, the nature of these contacts and the ways in which they unfolded are part of a much more broader context of the cultural phenomena and change mentioned earlier at work in the upper basin of the Vistula river at the turn of the sixth and the fifth millennium BC consisting of a gradual decline and, in due course, the full waning of the former culture centre in south-western Slovakia (resulting in a gradual decline of the stylistic development of linear pottery in the region) and an observable increase in the influence and impact from the Eastern Linear cultures (Kozłowski 1985; Zakóscielna, Kadrow 2000). The focusing of the main influx of the Świeciechów flint on settlement clusters in south-eastern Poland (most notably, Rzeszów cluster) observable during the classic and late phase of LPC development, and also, the evident shift of its receiver zone across the Carpathians to eastern and south-eastern Slovakia, occupied by i.a., Eastern Linear communities, might be one of the most important and archaeologically best documented manifestations of these cultural processes.

REFERENCES

- Aksamit T.
 1962 *Sprawozdanie z badań archeologicznych w Boguchwale powiat Rzeszów, w roku 1962*, Sprawozdanie Rzeszowskiego Ośrodka Archeologicznego za rok 1962, p. 11–13.
 1964 *Badania archeologiczne na osadzie neolitycznej w Kraczkowej (stanowisko nr 1) pow. Łańcut w roku 1964*, Sprawozdanie Rzeszowskiego Ośrodka Archeologicznego za rok 1964, p. 15–19.
 1968 *Prace wykopaliskowe na osadzie neolitycznej we Fredropolu, pow. Przemyśl*, MSROA za rok 1966, p. 116–123.
- Allard P.
 2005 *Surplus Production of Flint Blades in the early Neolithic of Western Europe: new Evidence from Belgium*, *European Journal of Archaeology* 8, p. 205–223.
- Allard P., Burnez-Lanote L.
 2006 *Surplus Production in the Belgian Linearbandkeramik: blade debitage at Verlaine "Petit Paradis" (Verlaine, Hesbaye, Belgium)*, *Der Anschnitt. Zeitschrift für Kunst und Kultur im Bergbau* 19, p. 37–54.

- Balcer B.
1971 *Kopalnia krzemienia w Świeciechowie-Lasku, pow. Kraśnik w świetle badań 1967 r.*, WA 36, p. 71–132.
1975 *Krzemień świeciechowski w kulturze pucharów lejkowatych. Eksploatacja, obróbka i rozprzestrzenienie*, Wrocław-Warszawa-Kraków-Gdańsk.
1976 *Position and Stratigraphy of Flint Deposits, Development of Exploitation and Importance of the Świeciechów Flint in Prehistory*, AAC 16, p. 179–199.
1983 *Wytwórczość narzędzi krzemiennych w neolicie ziem Polski*, Wrocław–Warszawa–Kraków–Gdańsk–Łódź.
- Bargieł B., Libera J.
1995 *Drugi sezon badań pracowni przykopalnianych kultury łużyckiej w Kopcu*, Sprawozdania z badań terenowych Katedry Archeologii UMCS w 1994 roku, Lublin, p. 13–16.
1996 *Wyniki badań pracowni nakopalnianej w Nowym Rachowie*, Archeologia Polski Środkowo-wschodniej 1, p. 35–48.
- Biró K. T.
1998 *Lithic implements and the circulation of raw materials in the Great Hungarian Plain during the Late Neolithic Period*, Budapest.
- Breitenfellner A., Rook E.
1991 *Sprawozdanie z badań osady kultury ceramiki wstęgowej rytej w Bolechowicach–Zielonej, gm. Zabierzów, woj. Kraków, stanowisko 9*, Spraw. Arch. 43, p. 9–20.
- Budziszewski J.
1980 *Ożarów, Gemeinde Lęce, "Za garncazami", Wojw. Tarnobrzeg*, [in:] G. Weisgerber (ed.), *5000 Jahre Feuersteinbergbau. Die Suche nach dem Stahl der Steinzeit*, Bochum, p. 603–605.
1986 *Exploration of the mining field "Za garncazami" in Ożarów, Tarnobrzeg voivodship. Preliminary report*, [in:] K.T. Biró (ed.), *Papers for the 1st International Conference on Prehistoric Flint Mining and Lithic Raw Material Identification in the Carpathian Basin, Budapest–Sümeg, 20–22 May, 1986*, Budapest, vol. I, p. 69–82.
1995 *Exposure with Lower Turonian flints in Karsy, Tarnobrzeg district*, [in:] J. Budziszewski, R. Michniak (eds.), *VIIth International Flint Symposium. Warszawa-Ostrowiec Świętokrzyski. September 1995. Guide-Book of Excursion 2: Northern Footholds of Holy Cross Mountains*, Warszawa, p. 45–47.
1997 *C-14 dating of shallow flint mine sites. Case study from the "Za Garncazami" mining field in Ożarów (Central Poland)*, [in:] R. Schild, Z. Sulgostowska (eds.), *Man and Flint*, Warszawa, p. 49–55.
- Budziszewski J., Michniak R.
1989 *Z badań nad występowaniem, petrograficzną naturą oraz prahistoryczną eksploatacją krzemieni pasiastych w południowym skrzydle niecki Magoń-Folwarczyńska*, WA 49 (1983), p. 151–190.
- Burchard B.
1959 *Stanowisko kultury ceramiki wstęgowej rytej w Trzebieśławicach, pow. Sandomierz*, Mat. Arch. 1, p. 13–22.
1960 *Ziemiarki kultury ceramiki wstęgowej rytej z Sandomierza-Krakówki*, Mat. Arch. 2, p. 5–9.
- Caspar J. P., Kaczanowska M., Kozłowski J. K.
1989 *Chipped Stone Industries of the Linear Band Pottery Culture (LBP): Techniques, Morphology and Function of the Implements in Belgian and Polish Assemblages*, Hellinium 29, p. 157–205.
- Czekaj-Zastawny A.
2008 *Osadnictwo społeczności kultury ceramiki wstęgowej rytej w dorzeczu górnej Wisły*, Kraków.
- Czopek S., Niemasiak D., Pasterkiewicz W.
2007 *Sprawozdanie z badań wykopaliskowych prowadzonych na stan. 117 w Rzeszowie*, MSROA 28, p. 91–96.
2012 *Wstępne wyniki badań wykopaliskowych przeprowadzonych na stanowisku 117 w Rzeszowie zlokalizowanym na obwodnicy miasta, Raport 2007–2008*, vol. 1, p. 577–594.

- Dębiec M.
2003 *Materiały kultury malickiej na stanowisku Fredropol 2*, MSROA 24, p. 5–25.
2006 *Osada kultury ceramiki wstęgowej rytej w Łańcucie stanowisko 3 (badania z roku 1987 i 1989). Część pierwsza — materiały*, MSROA 27, p. 27–64.
- Dębiec M., Dzbyński A., Pelisiak A.
2006 *Drugi sezon badań wykopaliskowych na stanowisku 3 w Zwiężycy, gm. Boguchwała*, MSROA 27, p. 247–252.
- Domańska L.
2002 *Rola krzemienia świeciechowskiego w gospodarce surowcowej neolitycznych społeczności Kujaw*, [in:] B. Matraszek, S. Sałaciński (eds.), *Krzemień świeciechowski w pradziejach*, Studia nad gospodarką surowcami krzemiennymi w pradziejach 4, Warszawa, p. 147–154.
- Dzieduszycka-Machnikowa A.
1960 *Stanowisko kultury ceramiki wstęgowej rytej w Boguchwale, pow. Rzeszów*, Mat. Arch. 2, p. 11–22.
- Gawryjolek-Szeliga K.
2009 *Materiały kultur naddunajskich ze stanowiska 28 w Świerszczowie, pow. Hrubieszów* (unpublished graduate dissertation, archive of the Institute of Archaeology, Maria Curie-Skłodowska University in Lublin).
- Gawryjolek-Szeliga K., Szeliga M.
2012 *Kultura ceramiki wstęgowej rytej*, [in:] *Dokumentacja końcowa z ratowniczych badań archeologicznych stanowiska nr 6 w Bogucinie, gm. Garbów, powiat Lublin, województwo lubelskie wykonywanych w związku z realizacją drogi ekspresowej S17 na odcinku Kurów–Lublin–Piaski — od węzła „Sielce” do węzła „Bogucin”*, Lublin, p. 33–73 (unpublished typescript stored in Voivodship Office of Protection of Historical Monuments in Lublin).
- Godłowska M.
1976 *Próba rekonstrukcji rozwoju osadnictwa neolitycznego w rejonie Nowej Huty*, Mat. Arch. NH 5, p. 7–180.
1982 *Nowohucki zespół osadniczy na tle wpływów południowych we wczesnym i środkowym neolicie Małopolski*, WA 47, p. 143–160.
- Godłowska M., Kozłowski J. K., Starkel L., Wasylkowa K.
1987 *Neolithic Settlement at Pleszów and Changes in the Natural Environment in the Vistula Valley*, Prz. Arch. 34, p. 133–159.
- Górski J., Grabowska B., Izdebska E., Konieczny B., Wilczyński J., Wojenka M.
2006 *Wyniki archeologicznych badań wykopaliskowych przeprowadzonych w obrębie stanowisk 8–11, 24 i 26 w Targowisku, gm. Kłaj, woj. małopolskie w latach 2003–2004*, Raport 2003–2004, vol. 2, p. 555–584.
- Górski J., Trela E.
2002 *Kontekst kulturowy powierzchniowych znalezisk krzemienia świeciechowskiego na obszarze zachodniomałopolskiej wyżyny lessowej*, [in:] B. Matraszek, S. Sałaciński (ed.), *Krzemień świeciechowski w pradziejach*, Studia nad gospodarką surowcami krzemiennymi w pradziejach 4, Warszawa, p. 209–236.
- Gruszczyńska A.
1991 *Prace wykopaliskowe na osadzie neolitycznej w Łańcucie w latach 1982–1984*, MSROA za lata 1980–1984, p. 149–155.
1992 *Sprawozdanie z badań wykopaliskowych na osadzie neolitycznej w Łańcucie w latach 1985–1990*, MSROA za lata 1985–1990, p. 119–130.
- Grygiel R.
1976 *Osady kultury ceramiki wstęgowej rytej w Brześciu Kujawskim koło Włocławka*, PMMAE 23, Seria Archeologiczna, p. 5–114.
2004 *Neolit i początki epoki brązu w rejonie Brześcia Kujawskiego i Osłonek*, Łódź, vol. I, *Wczesny neolit. Kultura ceramiki wstęgowej rytej*.

- Hachulska-Ledwoś R.
1963 *Osada kultury ceramiki wstęgowej w Bieńczycach (Kraków–Nowa Huta)*, *Mat. Arch.* 4, p. 75–102.
- Janák V., Přichystal A.
2007 *Distribuce silicitiú krakovsko-čenstochovské jury na Moravě a v Horním Slezsku v neolitu a na počátku eneolitu*, *Pam. Arch.* 98, p. 5–30.
- Kabaciński J.
2010 *Przemiany wytwórczości krzemieniarskiej społeczności kultur wstęgowych strefy wielkodołnej Nizy Polskiego*, Poznań.
- Kaczanowska M.
1976 *Uwagi o kontaktach między terenami Małopolski i Słowacji w neolicie i eneolicie w świetle importów surowców kamiennych*, *Mat. Arch.* 16, p. 37–41.
1985 *Rohstoffe, Technik und Typologie der Neolithischen Feuersteinindustrien im Nordteil des Flussgebietes der Mitteldonau*, Warszawa.
1986 *Kontakte zwischen der Ostslowakei und Kleinpolen angesichts der Importe von Steinrohstoffen*, [in:] B. Chropovský (ed.), *Urzeitliche und Frühhistorische Besiedlung der Ostslowakei in Bezug zu den Nachbargebieten*, Nitra, p. 77–82.
- Kaczanowska M., Godłowska M.
2009 *Contacts between the Eastern and Western Linear Cultures in South-Eastern Poland*, [in:] J.K. Kozłowski (ed.), *Interactions between different Models of Neolithization north of the Central European agro-ecological Barrier*, *Prace Komisji Prehistorii Karpat* 5, Kraków, p. 137–149.
- Kaczanowska M., Kozłowski J. K.
1994 *Zur Problematik der Samborzec-Opatów-Gruppe*, [in:] P. Košťurík (ed.), *Internationales Symposium über die Lengyel-Kultur 1888–1988, Znojmo-Kravsko-Těšetice 3.–7. 10. 1988*, Brno–Łódź, p. 85–103.
1997 *Lithic industries*, [in:] J. K. Kozłowski (ed.), *The Early Linear Pottery Culture in Eastern Slovakia*, *Prace Komisji Prehistorii Karpat* 1, Kraków, p. 177–255.
2002 *Bükk Culture Lithic Assemblage from Humenné, Eastern Slovakia*, *Študijné Zvesti Archeologického Ústavu SAV* 34, p. 65–90.
2005 *L'importance de silex de Świeciechów dans l'Âge de la Pierre: indicateur de changements de relations culturelles autour des Carpates occidentales*, *Praehistoria* 6, p. 71–83.
- Kaczanowska M., Lech J.
1977 *The Flint Industry of Danubian Communities North of the Carpathians*, *AAC* 17, p. 5–28.
- Kadrow S.
1990a *Osada neolityczna na stan. nr 16 w Rzeszowie na Osiedlu Piastów*, *Spraw. Arch.* 41, p. 9–76.
1990b *The Rzeszów Settlement Microregion in Neolithic*, *AAC* 29, p. 33–70.
1992 *Badania sondażowe na osadzie kultury ceramiki wstęgowej rytej na stanowisku nr 38 w Albigowej, woj. Rzeszów*, *MSROA za lata 1985–1990*, p. 131–139.
1997 *Osada kultury ceramiki wstęgowej rytej na stanowisku 3 w Rzeszowie-Staromieście*, *MSROA* 18, p. 5–27.
- Kadrow S., Zakościelna A.
2000 *An Outline of the Evolution of Danubian cultures in Małopolska and western Ukraine*, [in:] A. Koško (ed.), *The Western Border Area of the Tripolye Culture*, *Baltic-Pontic Studies* 9, Poznań, p. 187–255.
- Kamińska J., Kozłowski J. K.
1990 *Entwicklung und Gliederung der Lengyel- und Polar-Kulturgruppen in Polen*, Warszawa–Kraków.
- Kamińska J., Kulczycka-Leciejewiczowa A.
1970 *The Neolithic and Early Bronze Age Settlement at Samborzec in the Sandomierz District*, *Archaeologia Polona* 12, p. 223–246.
- Komorowski P.
1959 *Osada wydmowa kultury ceramiki wstęgowej rytej w miejsc. Krzywosądz, pow. Nieszawa*, *WA* 26, p. 56–59.

Kowalewska-Marszałek H.

- 1993 *Wzgórze Żmigród. Sandomierz-Żmigród*, [in:] S. Tabaczyński (ed.), *Sandomierz: badania 1969–1973*, Warszawa, vol. I, p. 323–361.
- 2002 *Krzemień świeciechowski w neolicie Wyżyny Sandomierskiej. Kilka uwag na temat rozprzestrzenienia inwentarzy*, [in:] B. Matraszek, S. Sałaciński (ed.), *Krzemień świeciechowski w pradziejach*, *Studia nad gospodarką surowcami krzemiennymi w pradziejach* 4, Warszawa, p. 177–207.

Kozłowski J. K.

- 1958 *Przyczynek do znajomości surowców krzemiennych występujących w paleolicie i neolicie Č.S.R.*, *WA* 25, p. 355–360.
- 1960 *Nowe materiały do zagadnienia stosunków między terenem Polski i Węgier w epoce kamiennej*, *APolski* 5, p. 7–20.
- 1970 *Z badań nad wytwórczością krzemieniarską w kulturze ceramiki wstęgowej rytej*, [in:] J. K. Kozłowski (ed.), *Z badań nad kulturą ceramiki wstęgowej rytej*, Kraków, p. 73–94.
- 1985 *The Eastern Areas of the Linear Band Pottery Culture*, [in:] A. Kokowski (ed.), *Memoires Archeologiques*, Lublin, p. 51–70.
- 2004 *Wczesna faza kultury lendzielskiej na Wyżynie Sandomierskiej*, *Mat. Arch. NH* 24, p. 35–48.

Krukowski S.

- 1920 *Pierwociny krzemieniarskie górnictwa, transportu i handlu w holocenie Polski. Wnioski z właściwości surowców i wyrobów*, *WA* 5, p. 185–206.
- 1921 *Sprawozdanie z działalności państwu. Urzędu konserwatorskiego na okręg warszawski — południowy*, *WA* 6, p. 156–167.

Krzak Z.

- 1965 *Tymczasowa charakterystyka kopalni krzemienia w Świeciechowie*, *APolski* 10, p. 217–233.
- 1970 *Wstępna charakterystyka kopalni krzemienia w Ożarowie Opatowskim*, *APolski* 15, p. 291–303.

Kulczycka A., Kozłowski J. K.

- 1960 *Pierwsze materiały kultury bukowogórskiej na północ od Karpat*, *AAC* 2, p. 41–54.

Kulczycka-Leciejewiczowa A.

- 1979 *Pierwsze społeczeństwa rolnicze na ziemiach polskich. Kultury kręgu naddunajskiego*, [in:] W. Hensel, T. Wiślański (eds.), *Prahistoria ziem polskich*, Wrocław–Warszawa–Kraków–Gdańsk, vol. II, *Neolit*, p. 19–164.
- 1983 *The Oldest Linear Pottery Communities and their Contribution to the Neolithization of Polish Territories*, *Archaeologia Polona* 21/22, p. 47–61.
- 1987 *Pierwsze wspólnoty kultury ceramiki wstęgowej rytej na ziemiach polskich*, *APolski* 32, p. 293–348.
- 2008 *Samborzec. Studium przemian kultury ceramiki wstęgowej rytej*, Wrocław.

Lech J.

- 1979 *Krzemieniarstwo w kulturze społeczności ceramiki wstęgowej rytej w Polsce. Próba zarysu*, [in:] W. Wojciechowski, B. Gediga, L. Leciejewicz (eds.), *Początki neolityzacji Polski południowo-zachodniej*, Wrocław, p. 121–136.
- 1980 *Flint Mining among the Early Farming Communities of Central Europe*, *Prz. Arch.* 28, p. 5–55.
- 1981 *Górnictwo krzemienia społeczności wczesnorolniczych na Wyżynie Krakowskiej. Koniec VI tysiąclecia–1 połowa IV tysiąclecia p.n.e.*, Wrocław–Warszawa–Kraków–Łódź.
- 1982 *Flint Mining among the Early Farming Communities of Central Europe. Part II — The Basis of Research into Flint Workshops*, *Prz. Arch.* 30, p. 47–80.
- 1987 *Danubian raw material distribution patterns in eastern central Europe*, [in:] G. de G. Sieveking, M. H. Newcomer (ed.), *The human uses of flint and chert*, Cambridge, p. 241–248.
- 1988 *O rewolucji neolitycznej i krzemieniarstwie. Część I. Wokół metody*, *APolski* 33, p. 273–345.
- 1989a *A Danubian raw material exchange network: a case study from Byłany*, [in:] J. Rulf (ed.), *Byłany seminar 1987. Collected Papers*, Prague, p. 111–120.

- 1989b *O rewolucji neolitycznej i krzemieniarstwie. Część II. Wokół neolityzacji dorzeczy Wisły i Odry*, APolski 34, p. 55–125.
- 1990 *The Organization of siliceous rock supplies to the Danubian early farming communities (LBK): central European examples*, [in:] D. Cahen, M. Otte (ed.), *Rubane & Cardial. Actes du Colloque de Liège, novembre 1988*, Etudes et Recherches Archéologiques de l'Université de Liège 39, Liège, p. 51–59.
- 2003 *Mining and siliceous rock supply to the Danubian early farming communities (LBK) in eastern central Europe: a second approach*, [in:] L. Burnez-Lanotte (ed.), *Production and Management of Lithic Materials in the European Linearbandkeramik*, British Archaeological Reports. International Series 1200, Oxford, p. 19–30.
- 2008 *Materiały krzemienne społeczności kultury ceramiki wstęgowej rytej z Samborca, pow. Sandomierz*, [in:] A. Kulczycka-Leciejewiczowa (ed.), *Samborzec. Studium przemian kultury ceramiki wstęgowej rytej*, Wrocław, p. 151–204.
- 2011 *Danubian organization of flint mining in the southern part of the Polish Jura: a study of Sąsław near Cracow*, [in:] M. Capote, S. Consuegra, P. Díaz-del-Río, X. Terradas (eds.), *Proceedings of the 2nd International Conference of the UISPP Commission on Flint Mining in Pre- and Protohistoric Times (Madrid, 14–17 October 2009)*, British Archaeological Reports. International Series 2260, Oxford, p. 117–128.
- Lech J., Małecką-Kukawka J.
- 1987 *Zum Forschungsstand der Verbreitung von Feuersteinen aus Landwirtschaftlichen Gemeinschaften des Nordostteils des Mitteleuropäischen Tieflandes, ca. 4200–1300*, [in:] K. T. Biró (ed.), *Proceedings of the 1st International Conference on Prehistoric Flint Mining and Lithic Raw Material Identification in the Carpathian Basin, Budapest–Sümeğ, 20–22 May, 1986*, Budapest, vol. II, p. 81–89.
- Libera J.
- 2002 *Przedneolityczne osadnictwo wschodniej części północnego Podkarpacia od Böllingu do końca okresu atlantyckiego. Zarys problematyki*, [in:] J. Gancarski (ed.), *Starsza i środkowa epoka kamienia w Karpatach Polskich*, Krosno, p. 189–231.
- 2005 *Osadnictwo schyłkowopaleolityczne w północnej części Kotliny Sandomierskiej*, Rocznik Muzeum Regionalnego w Stalowej Woli 4, [in:] M. Kuraś (ed.), *Archeologia Kotliny Sandomierskiej*, Stalowa Wola, p. 155–185.
- Libera J., Zakościelna A.
- 2002 *Złoże krzemieni turońskich w przelomowym odcinku Wisły*, [in:] B. Matraszek, S. Sałaciński (eds.), *Krzemień świeciechowski w pradziejach*, Studia nad gospodarką surowcami krzemieniami 4, Warszawa, p. 93–109.
- Libera J., Zakościelna A., Superson J.
- 1993 *Wyniki badań powierzchniowych nad środkową Karasiówką w północnej części Kotliny Sandomierskiej*, Annales Universitatis Mariae Curie-Skłodowska. Sectio F, 46–47, p. 17–57.
- Małecką-Kukawka J.
- 1994 *„Gospodarka” surowcami krzemieniami wśród społeczności wczesnorolniczych ziem chełmińskiej z perspektywy teorii wymiany społecznej*, [in:] L. Czerniak (ed.), *Neolit i początki epoki brązu na ziemi chełmińskiej*, Grudziądz, p. 37–50.
- 2008 *O mezolicie, neolicie i krzemieniu czekoladowym*, [in:] W. Borkowski, J. Libera, B. Sałacińska, S. Sałaciński (eds.), *Krzemień czekoladowy w pradziejach*, Studia nad gospodarką surowcami krzemieniami w pradziejach 7, Warszawa–Lublin, p. 185–202.
- Mateiciucová I.
- 2001 *Surovina kamenné štípané industrie v moravském neolitu*, [in:] V. Podborský (ed.), *50 let archeologických výzkumů Masarykovy Univerzity na Znojemsku*, Brno, p. 213–224.
- 2008 *Talking Stones: The Chipped Stone Industry in Lower Austria and Moravia and the Beginnings of the Neolithic in Central Europe (LBK), 5700–4900 BC*, Brno.
- Michalak-Ścibior J.
- 1993 *Z badań nad osadnictwem najstarszej fazy kultury ceramiki wstęgowej rytej na Wyżynie Sandomierskiej*, Spraw. Arch. 45, p. 19–27.

- Michalak-Ścibior J., Taras H.
1995 *Wczesnoneolityczna osada w Sandomierzu-Krukowie, stan. 20*, Spraw. Arch. 47, p. 69–135.
- Michniak R.
1995 *Geology of the Holy Cross Mountains*, [in:] J. Budziszewski, R. Michniak (eds.), *VIIth International Flint Symposium. Warsaw-Ostrowiec Świętokrzyski. September 1995. Guide-Book of Excursion 2: Northern Foothslopes of Holy Cross Mountains*, Warszawa, p. 7–11.
- Michniak R., Budziszewski J.
1995 *Exposure with Lower Turonian flints in Janików, Tarnobrzeg district*, [in:] J. Budziszewski, R. Michniak (ed.), *VIIth International Flint Symposium. Warsaw-Ostrowiec Świętokrzyski. September 1995. Guide-Book of Excursion 2: Northern Foothslopes of Holy Cross Mountains*, Warszawa, p. 50–51.
- Mikulski P., Włodarczak E., Włodarczak P.
2011 *Badania wykopaliskowe na stanowisku 12 w Stanisławicach, gm. Bochnia*, Raport 2005–2006, Warszawa, p. 379–390.
- Milisauskas S.
1986 *Early Neolithic Settlement and Society at Olszanica*, *Memoirs of the Museum of Anthropology. University of Michigan* 19, Ann Arbor.
- Mitura P.
2003 *Sprawozdanie z ratowniczych badań wykopaliskowych przeprowadzonych w 2000 i 2002 roku na stanowisku 20 w Olchowej, gm. Iwierzycy*, Podkarpacki Biuletyn Konserwatorski 1, vol. 2, p. 11–16.
2006 *Materiały kultury ceramiki wstęgowej rytej i kultury pucharów lejkowatych ze stanowiska 55 w Rzeszowie*, MSROA 27, p. 65–86.
- Mitura P., Zych R.
1999 *Sprawozdanie z badań stanowiska 20 w Olchowej, gm. Iwierzycy, woj. podkarpackie w 1999 roku*, MSROA 20, p. 261–276.
- Nowak M.
2009 *Drugi etap neolityzacji ziem polskich*, Kraków.
- Novotný B.
1982 *Neolithische Siedlung in Poprad-Matejovce*, [in:] B. Chropovský, J. Pavúk (eds.), *Siedlungen der kultur mit Linearkeramik in Europa*, Nitra, p. 185–191.
- Oliva M.
2004 *Flint mining, Rondels, Hillforts... Symbolic works or too much free time?*, AR 56, p. 499–521.
2011 *Chert Mining in the Krumlov Forest (Southern Moravia)*, [in:] M. Capote, S. Consuegra, P. Díaz-del-Río, X. Terradas (eds.), *Proceedings of the 2nd International Conference of the UISPP Commission on Flint Mining in Pre- and Protohistoric Times (Madrid, 14–17 October 2009)*, *British Archaeological Reports. International Series* 2260, Oxford, p. 97–107.
- Pavúk J.
1969 *Chronologie der Želiezovce-Gruppe*, Slov. Arch. 17, p. 269–367.
- Podkowińska Z.
1959 *Osada neolityczna kultury starszej ceramiki wstęgowej (rytej) w Jurkowicach, pow. opatowski (Z zagadnień gospodarki plemion kultury starszej ceramiki wstęgowej w Polsce)*, APolski 3, p. 7–50.
- Pożaryski W.
1948 *Jura i kreda między Radomiem, Zawichostem i Kraśnikiem*, Warszawa.
1997 *Tektonika powaryscyjska obszaru świętokrzysko-lubelskiego na tle struktury podłoża*, *Przegląd Geologiczny* 45, p. 1265–1270.
- Przybyła M.
2002 *Sprawozdanie z sondażowych badań wykopaliskowych przeprowadzonych w 2001 r. na st. 1 w Albigowej, pow. Łańcut*, *Rocznik Przemyski* 38:2 (*Archeologia*), p. 45–52.
2005 *Wyniki ratowniczych badań wykopaliskowych przeprowadzonych w 2004 r. na stan. 1 w Albigowej, pow. Łańcut*, *Rocznik Przemyski* 41:2 (*Archeologia*), p. 29–34.

- Rzepecki S.
2013 *Beside the mainstream. Some reflections on the LBK in Kujavia*, Spraw. Arch. 65, p. 79–112.
- Samsonowicz J.
1934a *Objaśnienia arkusza Opatów ogólnej mapy geologicznej Polski w skali 1:100 000*, Warszawa.
1934b *Ogólna mapa geologiczna Polski w skali 1:100 000 ark. Opatów*, Warszawa.
- Schild R., Królik H., Marczak H.
1985 *Kopalnia krzemienia czekoladowego w Tomaszowie*, Wrocław–Warszawa–Kraków–Gdańsk–Łódź.
- Siciński W., Płaza D., Papiernik P.
2012 *Sprawozdanie z badań archeologicznych w miejscowości Kruszyn, stanowisko 10, gm. Włocławek, woj. kujawsko-pomorskie, w 2008 roku*, Raport 2007–2008, vol. 1, Warszawa, p. 65–84.
- Soják M.
1993 *Archeologický prieskum vytypovaných lokalít na Spiši*, AVANS v roku 1992, p. 114–115.
1998 *Výskum neolitického sídliska v Stráňach pod Tatrami*, AVANS v roku 1996, p. 149–151.
1999a *Analýza kamennej siepanej industries zo Strání pod Tatrami z výskumu r. 1996 (severovýchodné Slovensko)*, Pravěk 9, p. 81–106.
1999b *Prieskumy a záchranný výskum na Spiši*, Študijné Zvesti Archeologického Ústavu SAV 33, p. 5–33.
2000a *Nálezy z prieskumov a záchranných exploatacií na Spiši*, AVANS v roku 1999, p. 114–120.
2000b *Neolitické osídlenie Spiša*, Slov. Arch. 48, s. 185–314.
2000c *Prieskum horného a dolného Spiša*, AVANS v roku 1998, p. 149–159.
2001 *Osídlenie Spiša v období stredného neolitu*, [in:] J. Gancarski (ed.), *Neolit i początki epoki brązu w Karpatach polskich*, Krosno, p. 41–55.
2002a *Neolitické sídlisko v Stráňach pod Tatrami, okr. Kežmarok*, [in:] I. Cheben, I. Kuzma (ed.), *Otázky neolitu a eneolitu našich krajín — 2001*, Nitra, p. 313–341.
2002b *Rekognoscácia Spiša*, AVANS v roku 2001, p. 183–196.
2003 *Prieskum a výskum v oblasti Spiša*, AVANS v roku 2002, p. 132–142.
- Szeliga M.
2007 *Der Zufluss und die Bedeutung des Karpatenobsidians in der Rohstoffwirtschaft der postlinearen Donaugemeinschaften auf den polnischen Gebieten*, [in:] J. K. Kozłowski, P. Raczyk (eds.), *Lengyel, Polgar and related cultures in the Middle/Late Neolithic*, Cracow, p. 295–307.
2008 *Kontynuacja badań wykopaliskowych na wielokulturowym stanowisku 6 w Tominach, pow. opatowski, w latach 2006–2007*, Archeologia Polski Środkowowschodniej 10, p. 9–27.
2009 *Znaczenie obsydianu karpackiego w gospodarce surowcowej najstarszych społeczności rolniczych na ziemiach polskich*, [in:] J. Gancarski (ed.), *Surowce naturalne w Karpatach oraz ich wykorzystanie w pradziejach i wczesnym średniowieczu*, Krosno, p. 287–324.
2013 *Turońskie skały krzemionkowe prowincji świętokrzyskiej w gospodarce surowcowej najstarszych społeczności naddunajskich. Technologia obróbki, dystrybucja i cyrkulacja (unpublished doctor thesis stored in Archiv of the Institute of Archaeology, Nicolaus Copernicus University in Toruń)*.
- Szeliga M., Zakościelna A.
2007 *Wstępne sprawozdanie z ratowniczych badań wykopaliskowych na wielokulturowym stanowisku 6 w Tominach, pow. opatowski, w 2006 roku*, Archeologia Polski Środkowowschodniej 9, p. 9–23.
- Ścibior J. M., Taras H.
1995 *Wczesnoneolityczna osada w Sandomierzu–Krukowie, stan. 20*, Spraw. Arch. 47, p. 69–135.
- Talar A.
1971 *Rzeszów. Stanowisko 34*, Informator Archeologiczny. Badania rok 1970, p. 32.
- Wilczyński J.
2008 *Targowisko — a new Late Glacial Site In Southern Poland*, Eurasian Prehistory 6, p. 95–118.

Zakościelna A.

- 1981 *Materiały krzemienne tzw. kultur południowych z Lubelszczyzny*, Annales Universitatis Mariae Curie-Skłodowska. Sectio F 35 / 36, p. 1–23.
- 2002 *Wykorzystanie krzemienia świciechowskiego przez społeczności kultur naddunajskich na Wyżynie Lubelskiej*, [in:] B. Matraszek, S. Sałaciński (eds.), *Krzemień świciechowski w pradziejach*, Studia nad gospodarką surowcami krzemiennymi w pradziejach 4, Warszawa, p. 111–122.
- 2007 *Główne nurty rozwoju młodszych kultur naddunajskich na terenie Małopolski i zachodniej Ukrainy*, [in:] L. Bakalarska (ed.), *Wspólnota dziedzictwa archeologicznego ziem Ukrainy i Polski*, *Materiały z konferencji zorganizowanej przez Ośrodek Ochrony Dziedzictwa Archeologicznego, Łańcut, 26–28 X 2005 r.*, Warszawa, p. 289–314.

Złonkiewicz Z.

- 1994 *Objaśnienia do Szczegółowej Mapy Geologicznej Polski w skali 1:50 000. Arkusz Ożarów (819)*, Warszawa.
- 1998 *Szczegółowa Mapa Geologiczna Polski w skali 1:50 000. Arkusz Ożarów (819)*, Warszawa.

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