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The use of erratic stone by the communities of the Linear Pottery culture: a view from the excavations in Kostomłoty, site 27, province of Lower Silesia[1]

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The settlement of the Linear Pottery culture population documented in Kostomłoty, Środa Śląska district, consisted of characteristic longhouses accompanied by various pits forming isolated households. Seven such complexes were observed within the excavated area as well as a complex of spacious dug-out features differing from typical Linear Pottery culture pits. The analysis of the flintworking from this settlement provides new data on the function of this aspect of manufacturing and its context in the first farming communities in Silesia. The unusual character of flintworking in the settlement in Kostomłoty is attributed to being a probable result of the settlement's marginal location in relation to the centre of Linear Pottery culture settlement.

KEY-WORDS: erratic stone, Linear Pottery culture, Lower Silesia

The multicultural site of Kostomłoty (no. 27), Środa Śląska district, is located in south-western Poland at the fork of two small watercourses in a flat upland about 155-160 metres above sea level (see Figure 1). In the north and the west it borders on a denuded, undulating upland 160-170 metres above sea level, while in the east and the south it borders on a denuded, hilly upland about 170-185 metres in elevation. The region is a part of the Sudetic block, which subsided when it was formed by the tectonic processes in the Tertiary made of Old-Palaeozoic phyllite-schist and volcanic complex. During the Tertiary, sedimentation of predominantly argillaceous-sandy-dusty deposits occurred in the crevices, which appeared as a result of tectonic activity. The deposits include Miocene clays of the Poznan series as well as sands and gravel with kaolinite of the Gozdnica series. These are

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covered by Quaternary deposits, which in this case are made of glacial clays, whose thickness reaches 1 metre, accompanied by moraine pavements and fluvio-glacial sands and gravels. The top layer of the deposits is made up of rich dust formations with the admixture of dispersed humus (0.2 – 1.5 m thick), which are loess clays heavily transformed by soil processes, as well as by the humus level of contemporary soil (Szynkiewicz 2003).

The site was discovered during the excavations carried out as part of the Polish Archaeological Record (AZP) project in 1995. In 2002, during archaeological supervision of repairs of the southern road of the A4 motorway, several objects connected with the Linear Pottery culture (LPC) settlement were discovered and explored in the vicinity of the site (Wojciechowski 2003) and, three years later during the repairs of the northern road of the motorway, the team responsible for the archaeological supervision decided to conduct rescue excavations in an area larger than previously anticipated. Ultimately, excavations were completed over an area of 314.45 ares (ca. 7.8 acres; Fig. 1), which yielded 823 unmov-

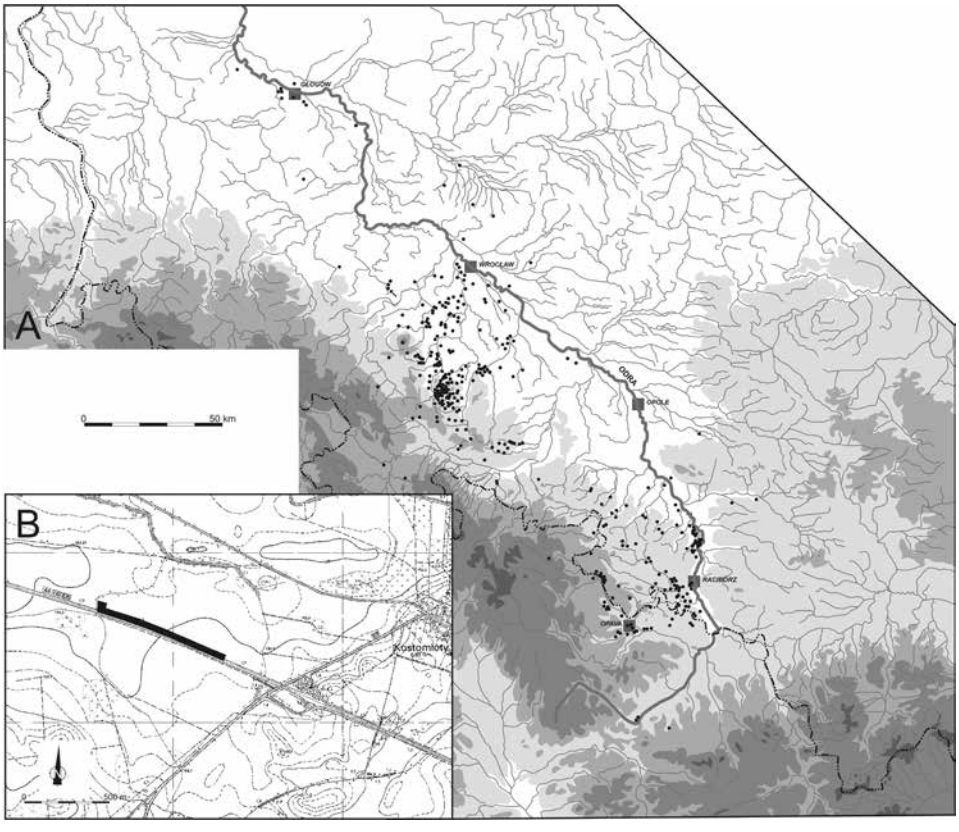

Figure 1. Map of location of LPC sites in south-western Poland (A) – the arrow marks site 27 in Kostomłoty, Środa Śląska district, and location of the trench from 2005 (B).

able objects diagnostic of six stages of the site's settlement – the settlements from Linear Pottery culture, Unětice culture, Lusatian culture, and early Middle Ages. Evidence for settlement from the late Middle ages and the modern period also was discovered (Furmanek and Masojć 2011; Furmanek *et al.*, 2014).

The settlement of the Linear Pottery culture is the oldest recorded during the excavations (Fig. 2). Its building development consisted of characteristic longhouses accompanied by various pits representing isolated households. Seven such complexes were recorded within the excavated area, including four which probably survived in a complete form (denoted with symbols KR1-7). No stratigraphic sequences were observed between them and their spatial arrangement has survived. It shows four rows of building developments located along the SW-NE axis, where the distances between individual households are very similar. The excavated portion of the settlement did not function in one period of time, and represents several consecutive construction phases. Individual households differ in many respects, which may prompt conclusions concerning the social organisation of the inhabitants. The houses have not survived in good condition; therefore it is not easy to determine their characteristic features, e.g. the length of some buildings.

Apart from the households a complex of spacious dug-out features differing from typical Linear Pottery culture pits was excavated in the area located between complexes KR1 and KR6. These features are typically irregular in projections and cross-sections, while their fills usually contain very few or are completely devoid of artefacts, although an impressive quantity of flint products was excavated from pit 265 in the southwestern part of the site. The complex's pits form a concentration approximating the shape of a quadrangle, whose orientation is the same as that of the Linear Pottery culture buildings. The concentration's southern boundary is distinctly marked, while the eastern and western are delimited by the farm objects of KR1 and KR6 households; the northern boundary is probably located outside the trench. The occurrence and arrangement of these objects most probably indicates an exploitation zone (denoted as KE), where local flint raw material was acquired and exploited (Fig. 2).

In terms of its technological and stylistic qualities, the pottery found among the Linear Pottery culture objects is considerably homogenous. Its characteristic features indicate that the settlement's chronology may be dated to the Šarka phase of Linear Pottery culture, primarily its younger period. Analogous finds were recorded in a few similar settlements in Lower Silesia, mainly in the late stages of their functioning, e.g. Strachów, site 2, Wrocław district (complexes SR VIII – SR – X; Kulczycka-Leciejewiczowa 1997), Skoroszowice, Strzelin district (Wojciechowski 1981), Strzelin, site 16, Strzelin district (Wojciechowski and Cholewa 1995).

Samples of charcoal and animal bones from 11 pits were subjected to radiocarbon analysis to determine absolute dating of the remains of the Linear Pottery culture settlement (Goslar 2006). Unfortunately, the dating attempted on animal bones was unsuccessful due to a small amount of collagen. As a consequence only the results of two

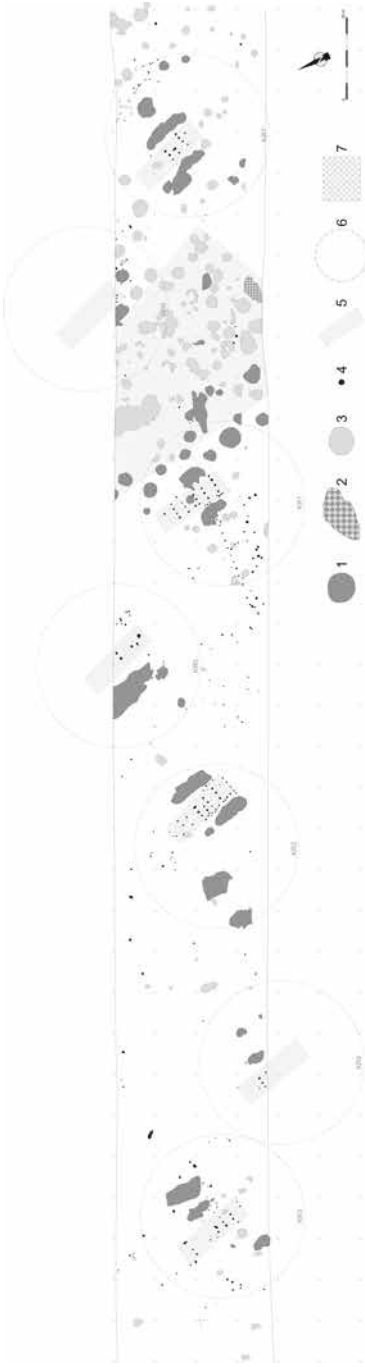

Figure 2. Kostomłoty, site 27, Środa Śląska district, Lower Silesia province. Cross section of the trench with the preserved remains of the Linear Pottery culture settlement: 1 – Pits with the LPC material, 2 – pit 265, 3 – pits from other cultures or undetermined features, 4 – post holes, 5 – LPC houses, 6 – LPC building complexes (KR1-7; homesteads), 7 – exploitation zone (KE).

radiocarbon dates on charcoals from objects 161 and 315 were available, indicating that the settlement functioned in the two last centuries of the 6th millennium BC (Poz-16018: 6110±40 BP; 1σ: 5208-4942 BC; 2σ: 5201-4959 BC; Poz-16022: 6160±40 BP; 1σ: 5217-5000 BC; 2σ: 5207-5055 BC)[2].

Nearly 500 flint artifacts were excavated in 34 features of the Linear Pottery culture settlement (Table 1). Apart from them, outside the area occupied by the individual homesteads, a pit (no. 265) was excavated whose fill provided over 7000 artefacts.

The collections from individual housholds differ in the number of excavated flint products. The greatest number (n= 238) was excavated in the features of complex KR1 bordering on the exploitation zone in the west. Considerably fewer artifacts (n= 80 and n= 62 respectively) were recorded in complexes KR2 and KR3, and in the remaining households their number does not exceed 25 (Table 1).

Visual analysis suggests that erratic Baltic flint was mainly used in flintworking at Kostomłoty. In some assemblages it is the only type of raw material used by the inhabitants. Imported raw material was found in households KR1 and KR2, where its proportion does not exceed 3%, and in the objects from the exploitation

[2] The results of radiocarbon dating were calibrated with the use of the programme OxCal 4.2.4 based on the calibration curve IntCal13 (Bronk Ramsey 1994, 2009, 2013; Reimer *et al.*, 2013).

Table 1. Kostomłoty, site 27, Środa Śląska district, Lower Silesia province. Quantity of flint products in LPC assemblages (NB – Baltic erratic flint, KJ – Jurassic flint from Cracow area).

Building complex	Total	NB	KJ	NB	KJ
KR1	238	232	6	97,48%	2,52%
KR2	80	79	1	98,75%	1,25%
KR3	62	62	0	100,00%	0,00%
KR4	17	17	0	100,00%	0,00%
KR5	25	25	0	100,00%	0,00%
KR6	2	2	0	100,00%	0,00%
KR7	15	12	3	80,00%	20,00%
KE	58	54	4	93,10%	6,90%
Total	497	483	14	97,18%	2,82%

zone, while its greatest proportion was recorded in a collection from complex KR7 (Table 1).

The composition of collections from individual assemblages differ (Table 2). The most distinct example comes from building complex KR7 with its substantial proportion of both blade and flake blanks (60%), tools – predominantly blades (13.3%) and a small proportion of chunks and undetermined forms. Houshold KR1, the collection of objects from the exploitation zone, and complex KR2 have different structures; the proportion of blanks is smaller (ca. 40%), among which the number of flakes is three times greater than that of blades, the number of tools and cores is small, while the number of chunks and undetermined forms is much greater, constituting half of the assemblage. In building complex KR3 blanks make up ca. 30% of the collection; they are mainly flakes but they do not substantially outnumber the blades. A significant difference also is reflected in the considerable number of tools made from blades and the greatest number of cores. The composition of the remaining assemblages vary, but because they were not subjected to intensive examination, they are not considered in detail here.

The most numerous among the 19 cores excavated in the homesteads (Table 3; Fig. 3: 1-4) are single-platform cores (8 specimens). In the remaining cases the striking platform changed when core reduction continued. No evidence of the use of the splinter technique was recorded, which is understandable considering the abundance of rock raw material available. Technical treatment of cores was limited to the preparation of the striking platform with single chippings. Only occasionally were the sides

Table 2. Kostomłoty, site 27, Środa Śląska district, Lower Silesia province. Composition of LPC tool assemblages: I – quantity of blanks, II – quantity of blades, III – quantity of flakes, IV – quantity of tools from blades, V – quantity of tools from flakes, VI - quantity of burned pieces, VII – quantity of cores, VIII – quantity of chunks and other flakes, IX - quantity of chips, X - quantity of raw material blocks.

Building complex	Total	I	II	III	IV	V	VI	VII	VIII	IX	X
KR1	238	95	24	71	5	5	7	4	122	8	0
	100,0%	39,9%	10,1%	29,8%	2,1%	2,1%	2,9%	1,7%	51,3%	3,4%	0,0%
KR2	80	28	6	22	1	2	4	3	36	7	3
	100,0%	35,0%	7,5%	27,5%	1,3%	2,5%	5,0%	3,8%	45,0%	8,8%	3,8%
KR3	62	18	8	10	2	0	3	9	31	4	0
	100,0%	29,0%	12,9%	16,1%	3,2%	0,0%	4,8%	14,5%	50,0%	6,5%	0,0%
KR4	17	5	1	4	1	0	2	1	5	5	0
	100,0%	29,4%	5,9%	23,5%	5,9%	0,0%	11,8%	5,9%	29,4%	29,4%	0,0%
KR5	25	5	0	5	0	3	0	1	15	1	0
	100,0%	20,0%	0,0%	20,0%	0,0%	12,0%	0,0%	4,0%	60,0%	4,0%	0,0%
KR6	2	0	0	0	0	0	0	0	1	0	1
	100,0%	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	50,0%	0,0%	50,0%
KR7	15	9	3	4	2	1	0	0	2	2	0
	100,0%	60,0%	20,0%	26,7%	13,3%	6,7%	0,0%	0,0%	13,3%	13,3%	0,0%
KE	58	24	7	21	2	0	0	1	27	2	0
	100,0%	41,4%	12,1%	36,2%	3,4%	0,0%	0,0%	1,7%	46,6%	3,4%	0,0%
Total	497	184	49	137	13	11	16	19	239	29	4
	100,0%	37,0%	9,9%	27,6%	2,6%	2,2%	3,2%	3,8%	48,1%	5,8%	0,8%

Table 3. Kostomłoty, site 27, Środa Śląska district, Lower Silesia province. Characteristics of cores. Numbers are individual occurrences.

coring				blanks			shape of flaked surface			degree of exploitation		
single-platform	double-platform	multi-platform	technical treatment	blades	bladelets	flakes	circular	rounded	flat	initial	advanced	exhausted
8	0	11	5	4	1	15	1	5	13	3	2	14

or backs of cores modified with a few chippings – the forms resulting from forming crests are rare. No evidence of repair of cores was observed. The cores were used for the acquisition of flake blanks and only occasionally for blade blanks. One excep-

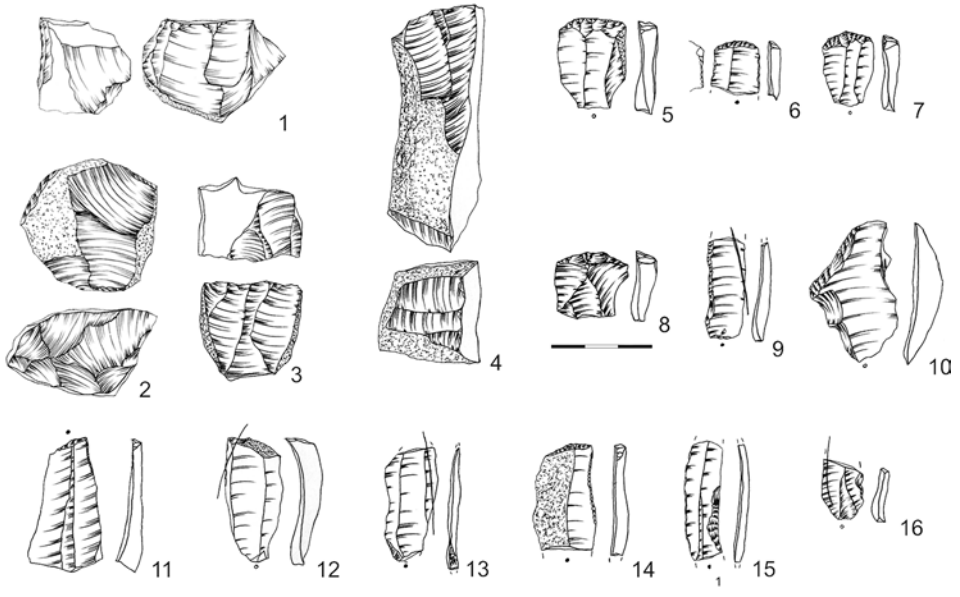

Figure 3. Kostomłoty, site 27, Środa Śląska district, Lower Silesia province. Selection of flint artifacts: 1-3, 13-14 – building complex KR3; 4, 12 – KR4; 5-7, 9-10 – building complex KR 1; 8 – building complex KE; 11 – building complex KR2; 15-16 – building complex KR7. Drawing: M. Masojć.

Table 4. Kostomłoty, site 27, district of Środa Śląska, province of Lower Silesia. Characteristics of blade and flake blanks.

blanks	completeness				coring			presence of cortex			
	whole	proximal part	distal part	middle part	from single-platform core	from double-platform core	from core with changing orientation	non-cortical	cortex < 50%	cortex > 50%	cortex 100%
blades	15	19	7	4	41	1	3	33	10	2	-
flakes	98	29	8	2	59	1	77	62	52	20	3

tion was a specimen made from Jurassic flint from Cracow area displaying distinct evidence of blade – bladelet exploitation. However, most are exhausted forms, hardly ever exceeding of 3 x 3 cm in size.

Half of all 45 excavated blades are proximal forms resulting from intentional breaking. Most are non-cortical. The proportions of blanks correspond to those of cores – their average size never exceeds 3 cm in length and is less than 2 cm in width. However, there are occasional forms exceeding 7 cm in length. Flakes (n= 137) were more numerous and, contrary to blades, they have usually been preserved in a complete form. They display traces of reduction from single-platform cores and more advanced

Table 5. Kostomłoty, site 27, Środa Śląska district, Lower Silesia province. Composition of tool types (quantity of products from Jurassic flint from Cracow area in brackets).

Type of tool	KR1	KR2	KR3	KR4	KR5	KR6	KR7	KE	Total	
									N	%
end-scrapers	3(1)	0	0	0	0	0	0	1(1)	4	16,7%
truncated pieces	0	1	1	1	0	0	0	0	3	12,5%
retouched flakes	4	1	0	0	0	0	1	0	6	25,0%
retouched blades	2(1)	0	1	0	0	0	2(2)	1(1)	6	25,0%
retouched chunks	1	1	0	0	3	0	0	0	5	20,8%
Total	12(2)	3	2	1	3	0	3(2)	2(2)	24	100,0%

flaking after the orientation was changed on the cores. Non-cortical cores of the average size of 3 x 3 cm predominate (Table 4).

Only 24 retouched forms were found within the homesteads, which makes up a mere 5% of the collection. Three groups of tools may be distinguished among the artefacts from Kostomłoty: end-scrapers, truncated pieces and retouched blades (Table 5; Fig. 3: 5-16). The remaining two groups – flakes and retouched chunks – are amorphic forms for very short-term use. The artifacts used as sickle inserts predominate in the assemblage. Truncated pieces and blades with retouched edges were used as harvesting tools, and they carry the traces of characteristic polishing. As many as

Table 6. Kostomłoty, site 27, Środa Śląska district, Lower Silesia province. Pit 265, flint artefact totals.

Category of artefact	Number of artefacts (unburnt)	Number of artefacts (burnt)	Total of artefacts	
			%	Σ
tools	20	4	0,33	24
cores	66	6	0,99	72
other forms	16	2	0,24	18
flakes	2073	837	40,2	2910
blades	96	5	1,39	101
chips	1074	1208	31,52	2282
chunks + raw material	1098	735	25,33	1833
Total:	4443	2797	100	7240

Raw material	Quantity
sandstone	6
quartzite sandstone	15
vein quartz	17
petrified wood	2
granite pebble	2
quartz pebble	1
Total:	43

Table 7. Kostomłoty, site 27, Środa Śląska district, Lower Silesia province. Pit 265, frequency of non-flint rocks.

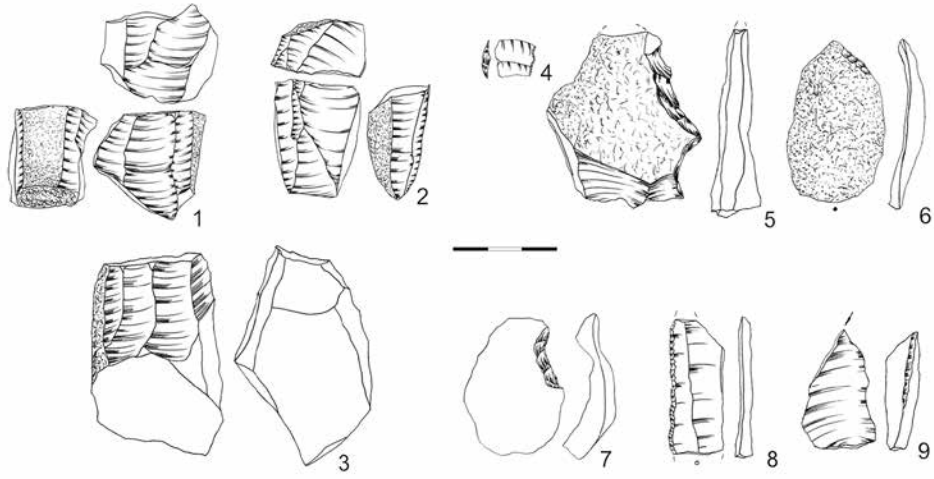

Figure 4. Kostomłoty, site 27, Środa Śląska district, Lower Silesia province. Pit 265, selection of flint artifacts. Drawing: M. Masojć.

25% of the tools were made from imported raw material, which may testify to the special significance of Jurassic flint from Cracow area for the settlement's inhabitants.

As noted above, the most numerous assemblage of flint artifacts was excavated from pit 265, located at the southern edge of the KE exploitation zone. The artefacts come both from primary excavation of the feature and the flotation of its fill, which together yielded a collection of over 2000 flint chips between 0 and 1.5 cm. in size with the majority of chips recovered from flotation of the fill. The assemblage from feature 265 weighed over 46 kg, while the weight of the all the others did not exceed 4 kg.

The feature yielded 7240 flint artefacts (Table 6: Fig. 4-5) and more than 40 fragments of various rocks, mainly sandstone and quartzite, possibly intentionally broken into smaller fragments (Table 7). Some rock fragments can be refitted, indicating that they were broken into pieces within the feature (or in the near vicinity) as part of the activities carried out there.

The flake characteristics of nearly all the cores and a small group of blade blanks suggest that flintworking was devoted to the production of flake blanks. Reduction of cores, usually carried out without any preparation, was limited to knapping massive cortical flakes, or possibly a few other non-cortical forms. At this stage the cores were frequently abandoned. The cores presented in Figure 4 (nos. 1-3) are quite exceptional in the assemblage because they display preliminary preparation of the striking platform and regularly exploited flaked surfaces. Most of the remaining forms are amorphic nodules with occasional flake negatives.

Figure 5. Kostomłoty, site 27, Środa Śląska district, Lower Silesia province. Pit 265, selection of flint products. Photo: M. Jórdeczka.

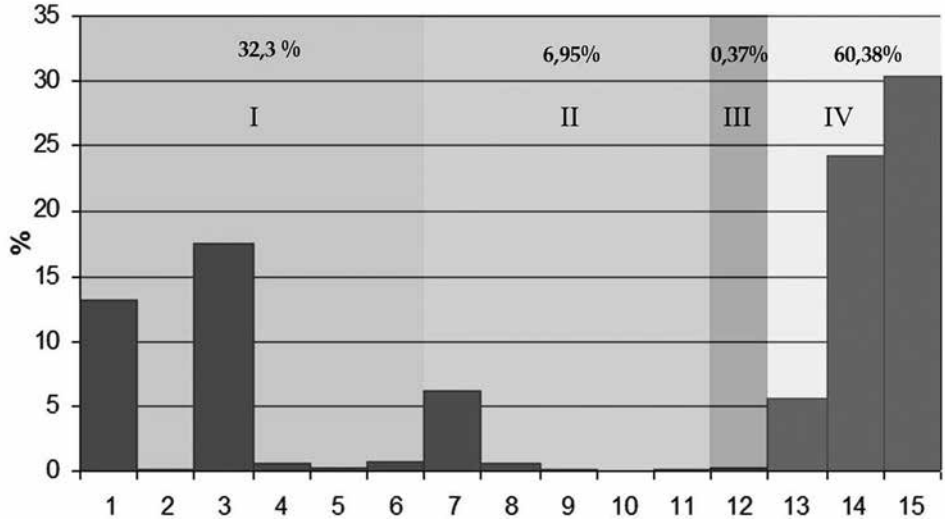

Fig. 6. Kostomłoty, site 27, Środa Śląska district, Lower Silesia province. Pit 265, technological structure of the assemblage: I – group of preparation and early exploitation of cores (32,3%): 1 – cortical flakes (cortical surface up to 50%), 2 – cortical blades (cortical surface up to 50%), 3 – cortical flakes (cortical surface exceeding 50%), 4 – cortical blades (cortical surface exceeding 50%), 5 – blanks with traces of preparation, 6 – initial cores; II – group of core reduction (6,95%): 7 – non-cortical unidirectional flakes, 8 – non-cortical unidirectional blades, 9 – non-cortical multidirectional blades, 10 – blade cores, 11 – flake cores; III – group of tools (0,37%): 12 – flint tools and hammerstones (3?); IV – group of other flakes (60,38%): 13 – undetermined flakes and blades, 14 – chunks and nodules of the raw material, 15 – chips. The vertical axis represent percent of the whole assemblage. The horizontal axis represents number of categories within.

Category of tools	Quantity
trapeze	1
retouched blade	1
burin	3
retouched flake	10
flake with partial retouch	2
bladelet with partial retouch retouch	3
retouched chunks	4
Total:	24

Table 8. Kostomłoty, site 27, Środa Śląska district, Lower Silesia province. Pit 265, frequency of tools.

The artefacts (Fig. 6) are predominated by group (IV) of other flakes (including chips, chunks and nodules of raw material), followed by the group (I) of preparation and early exploitation materials. The products of the stage of advanced exploitation (II) and the tools (III) do not exceed 10% of the features assemblage. Such a technological composition is suggestive of shaping of the flint raw material within the feature. It is quite possible that the infrequently represented products from group II are rare because they were taken away from the settlement.

The group of tools consists of 24 artefacts (Table 8; Fig. 4: 4-9) which defy easy classification. The selection of blanks appears to have been random; they seem to have been made to perform short-lived, very ad hoc functions or they are forms of a functional character, like the microretouched blades. Lack of attention in selecting appropriate blanks is illustrated by the presence of four quite sizeable, amorphic or cortical retouched chunks. The retouched products made on flakes display similar features – they are cortical flakes, of random shape and size with irregular retouch most frequently on a short section of the artifact's edge. Three small bladelets display a functional retouch. Three burins were also carelessly made; one is probably a dihedral burin and the remaining ones were made on a cortical flake and a chunk. High quality of production is evident in a tall, alternately retouched trapeze (Fig. 4: 4) and a fragment of a narrow unifacial retouched blade (Fig. 4: 8). Both artefacts were made from regular blades resulting from advanced stages of a single-platform core reduction (non-cortical blades).

The good condition of the flint raw material, and the ubiquitous cortex with the remains of living organisms (sponges) preserved on external surfaces, suggest that the flint was not randomly collected but excavated from local fluvio-glacial deposits, where it occurred in better condition than the material eroded on the surface (Fig. 5; Szynkiewicz 2003). The feature also yielded occasional artefacts (chunks and blanks) displaying on their natural surfaces the traces of glacial transport (completely worn cortex and polished edges) typical of the erratic raw material.

Considering the number of cracked flint chunks, the majority resulting from breaking flint blocks (possibly to test their usefulness for flintworking), it may be safely assumed that in feature 265 flint was broken into pieces and the blocks unsuitable for further flaking were discarded, which may explain the presence of a very numerous category of flakes predominated by cortical forms. Most of the cores or negative forms discovered in the feature are very rudimentary specimens with just a few negatives; only a few display traces of flaking. The cores suitable for exploitation were quite possibly taken away from the feature or the settlement for further exploitation.

Despite a great amount of flint material, feature 265 did not yield artefacts which would enable unambiguous determination of cultural affiliation. The result of radiocarbon dating of the charcoal sample derived from this feature (Poz-16039: 5055±35 BP; 1σ: 3958-3773 BC; 2σ: 3942-3798 BC) indicates a time around the

beginning of the 4th millennium BC, i.e. the period of functioning of Funnel Beaker culture or late groups of Danubian cultures. However, we can not rule out the possibility that the dated charcoal actually was connected with the subsequent in-filling of the feature and no artefacts were found in the excavated part of the site which could be attributed to Funnel Beaker or Danubian cultures. Contrary to the dating results two lines of evidence, based on spatial relations and the nature of the raw material utilized, suggest that pit 265 is a feature attributable to the Linear Pottery culture.

Feature 265 is situated between three Linear Pottery culture households at the edge of the quite uniform complex of features considered to mark the exploitation zone. Relatively regular and precisely determined boundaries within the zone seem to have prevented any stratigraphic mixing between and among features.

In addition, the presence of flint forms analogous to those recovered from pit 265 occur in practically all Linear Pottery culture households at the site. Apart from occasional low quality artefacts made from Jurassic flint, the most frequent forms are identical sharp-edged chunks with identical natural surface (thick 'pumice-like' cortex) and macroscopic properties (the same shades of grey, presence of numerous once-living organisms in the silica). Less numerous was debitage (made from the same raw material), occasionally used as *ad hoc* tools. We suggest that the flint raw material excavated in the features from the homesteads found its way there after preliminary flaking in feature 265 or in another analogous feature and assume that the source of the raw material, however difficult to determine, was the same as the chunks.

In view of the above, we take the view that the contents of pit 265 constitute evidence of the functioning of a flintworking workshop situated outside the existing Linear Pottery culture buildings, at the edge of several households of this culture, providing them with raw material and blanks. The raw material acquired from exposed fluvial-glacial deposits (deep objects) underwent preliminary flaking there and then it was transported to feature 265. The households received selected flakes, less frequently blades, as well as bigger and more massive broken flint nodules, frequently in the form of cortical chunks. They functioned there as mass material, used *ad hoc* next to good quality selected flint tools made from Jurassic flint from Cracow area.

The analysis of the flintworking from the Linear Pottery culture settlement in Kostomłoty provided important new data concerning the functioning of this area of manufacturing and its context in the first farming communities in Silesia. The composition of the raw material excavated here is distinct from the pattern characteristic of other sites from Lower Silesia. The contribution of the raw material imported from Polish Jura is very small, reaching barely 3% of the whole assemblage, not taking into consideration the material from feature 265 (in the latter case its contribution would decrease to less than 1%). It is thus of marginal significance compared with the universally used local erratic raw material.

However, the extent of use of erratic raw material in south-western Poland during the time of the Linear Pottery culture changed in time and through space (Table 9 and 10). Baltic erratic flint occurs almost exclusively in the oldest assemblages dated to the Gniechowice phase (e.g. Stary Zamek, Wrocław district, Gniechowice, Wrocław district, Strzelin, site 16; Lech 1985; Wojciechowski and Cholewa 1995). The significance of Jurassic flint from the Cracow area increases significantly at the beginning of the middle phase of Linear Pottery culture (in the assemblage from Strzelin, site 19, its contribution amounts to over 60%). On average, the proportion of this raw material is slightly greater than 60% and its contributions are different in different sites. The proportion of imported flint increases in the older period of Šarka phase and this tendency is also reflected in the consecutive construction phases observed within the sites. Spatial diversification of the collections is also clearly visible. The sites with the greatest contribution of Jurassic flint from the Cracow area are located in the Niemcza-Strzelin Hills: Niemcza, Dzierżoniów district, Skoroszowice, Strachów. The role of local erratic raw material increases with the increasing distance from the settlement complex mentioned above, reaching its extreme in the collections from Kostomłoty.

The structure of the Kostomłoty collections also differs from most LPC sites. For example, in Skoroszowice the proportion of retouched products is 32.5 %, in Strachów – 25.2 and in Strzelin 16 (Šarka phase) – 26,8 % (Wojciechowski 1981; Wojciechowski and Cholewa 1995; Lech 1997). Such a structure of the group of tools as distinct to the remaining morphological groups is hardly ever encountered in Lower Silesia. It is typical of the settlements processing siliceous rocks on a massive scale, such as Olszanica, Kraków district (Milisauskas 1976) or Vedrovice – Zábrdovice, Znojmo district (Mateiciucová 1997; Lech 1982). In Olszanica the contribution of tools in the collection is 4.63%, while in Vedrovice it is 8.6%. The composition of flint material within individual morphological groups from both sites mentioned above is very similar to that from the homesteads in Kostomłoty (Lech 2008: Fig. 26: B, H). In Olszanica flintworking took place on a massive scale, processing the locally occurring Jurassic flint from the Cracow area, while chert of the Krumlowský Les type was processed in Vedrovice. In one of the workshops from that site (object 098) a single trapeze occurred among the retouched products, similar to the artifact recovered from pit 265 in Kostomłoty (Lech 1982: 51-52).

The Verlaine site, Liège district, in Belgium provides an interesting analogy for pit 265 from Kostomłoty. In this site consisting of 6 – 10 houses a dozen concentrations of flint blanks (workshops) were excavated. In one, specialising in the production of blade blanks, ca. 30 thousand artefacts were recovered. The scale of flintworking in Verlaine clearly exceeded the needs of the settlement's inhabitants and the artifacts manufactured at the site – blanks – were distributed to other local settlements (Burnez-Lanotte and Allard 2003), similar to the case at Darion, Luik district, and Longchamps, Namur district (Keeley and Cahen 1989). The observations made in these sites suggest that the changes taking place in the late phase of the development

Table 9. Structure of raw material on the most important LPC assemblages in south-western Poland (NB – Baltic erratic flint, JP – Jurassic flint from Cracow area, CZ – chocolate flint, OB – obsi-dian, ? – undetermined), after Kulczycka-Leciejewiczowa and Romanow 1985; Lech 1981, 1985, 1997; Wojciechowski 1975, 1981, 1987; Wojciechowski and Cholewa 1995, 2000; Bednarek and Wojciechowski 2008.

Site	Building complex	Phase	NB	JP	CZ	OB	?	TOTAL
Gniechowice 8	GNI	IA	21	0	0	0	0	21
			100,00%	0,00%	0,00%	0,00%	0,00%	100,00%
Strzelin 16	ST16 I	IA	2	0	0	0	0	2
			100,00%	0,00%	0,00%	0,00%	0,00%	100,00%
Strzelin 16	ST16 II	IA	3	0	0	0	0	3
			100,00%	0,00%	0,00%	0,00%	0,00%	100,00%
Stary Zamek 5	SZI	IA	6	0	0	0	0	6
			100,00%	0,00%	0,00%	0,00%	0,00%	100,00%
Stary Zamek 5	SZII	IA	23	1	0	0	0	24
			95,83%	4,17%	0,00%	0,00%	0,00%	100,00%
Mochów A	MR	II	5	21	0	0	1	27
			18,52%	77,78%	0,00%	0,00%	3,70%	100,00%
Strzelin 19	ST19 I	IIA	6	14	1	1	0	22
			27,27%	63,64%	4,55%	4,55%	0,00%	100,00%
Muszkowice 9	MU	IIB	0	22	0	0	0	22
			0,00%	100,00%	0,00%	0,00%	0,00%	100,00%
Strzelin 16	ST16 III	IIB	1	0	0	0	0	1
			100,00%	0,00%	0,00%	0,00%	0,00%	100,00%

Strzelin 16	ST16 IV	IIB	17	12	0	0	0	29
			58,62%	41,38%	0,00%	0,00%	0,00%	100,00%
Strzelin 16	ST16 V	IIB	11	19	0	0	0	30
			36,67%	63,33%	0,00%	0,00%	0,00%	100,00%
Niemcza 4	NR I-IV	IIB-C	8	49	3	0	6	66
			12,12%	74,24%	4,55%	0,00%	9,09%	100,00%
Skoroszowice 1	SK I-VI	IIC-IIIB	77	242	0	1	37	357
			21,57%	67,79%	0,00%	0,28%	10,36%	100,00%
Strachów 2	SR I-II	IIIA	8	32	0	0	3	43
			18,60%	74,42%	0,00%	0,00%	6,98%	100,00%
Strachów 2	SR IV	IIIA	30	140	0	0	29	199
			15,08%	70,35%	0,00%	0,00%	14,57%	100,00%
Strachów 2	SR V-VI	IIIA	13	37	0	0	2	52
			25,00%	71,15%	0,00%	0,00%	3,85%	100,00%
Strzelin 16	ST16 VI	IIIA	22	29	0	0	5	56
			39,29%	51,79%	0,00%	0,00%	8,93%	100,00%
Smolec 14	SM	IIIA	19	17	0	0	0	36
			52,78%	47,22%	0,00%	0,00%	0,00%	100,00%
Strachów 2	SR VII-X	IIIB	17	56	0	0	14	87
			19,54%	64,37%	0,00%	0,00%	16,09%	100,00%
Strzelin 19	ST19 II	IIIB	8	5	1	0	0	14
			57,14%	35,71%	7,14%	0,00%	0,00%	100,00%

Table 10. Diversification of the raw material in consecutive phases of LPC in south-western Poland (NB – Baltic erratic flint, JP – Jurassic flint from Cracow area, CZ – chocolate flint, OB – obsidian, P – undetermined).

Phase	NB	JP	CZ	OB	P
LPC I	99,20%	0,80%	0%	0%	0%
LPC II	36,20%	60,10%	1,30%	0,60%	1,80%
LPC III	31,10%	60,40%	0,90%	0%	7,60%
LPC IIIA	30,10%	63%	0%	0%	6,90%
LPC IIIB	38,40%	50%	3,60%	0%	8%

of Linear Pottery culture resulted from social and economic transformation rather than from changes in the accessibility of the raw material. They may be attributed to the emerging specialisation in flintworking and appearance of production surplus, which was later distributed. In the case of Kostomłoty, the character of feature 265 is different, resulting from the need to satisfy local demand.

As Wojciechowski (2003) observed, the different character of flintworking in the settlement in Kostomłoty may have resulted from the settlement's marginal location in relation to the centre of Linear Pottery culture settlement. The conclusions concerning the changes in occurrence of imported raw material in Lower Silesian sites suggest the existence of a hierarchical system for the distribution of goods (raw material) between the local communities, which in the Šarka phase probably consisted in their redistribution, wherein the groups from the area of the Niemcza-Strzelin Hills (e.g. Skoroszowice, Strachów) played the leading role. However, the reasons for the specific character of the site in Kostomłoty are probably rooted in the wider context of the changes taking place at the end of the Linear Pottery culture. The extensive network of exchange and distribution of goods existing at that time included not only flint raw material but other commodities as well (e.g. products from metabasite of the Jizera Mountains type, Spondylus shells, etc.). Quite frequently, the tools used by these groups were made from imported raw material, despite the fact that local artifact-quality raw materials were easily accessible in the vicinity (cf. e.g. Ramminger 2009; Mateiciucová 2008). With time the system was reorganised, evident in the discontinuity in circulation of various categories of goods and the increased use of local raw material in flint and stoneworking. This may reflect the processes of 'atomisation' of local communities, isolation of settlement centres and disintegration of the long-lasting ties based on kinship, which intensified considerably at that time. The processes, observable in post-LPC groups (e.g. the older phase of Stroke Ornamented Pottery culture; cf. e.g. Wojciechowski 1988),

actually began at the end of functioning of Linear Pottery culture. The settlement in Kostomłoty may mirror the effect of those changes and be a local reflection of that crisis. If so, the restrictions resulting from changes in the exchange system may have made it necessary to satisfy the demand for raw material at the local community level; hence the dramatic attempts at finding suitable raw material locally. That these attempts were not entirely successful is attested by overall poor character of flintworking in individual Kostomłoty households.

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