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The results of the raw material, technological and typological analyses of the chipped stone industry in Moravia and Lower Austria

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11. THE RESULTS OF THE RAW MATERIAL, TECHNOLOGICAL AND TYPOLOGICAL ANALYSES OF THE CHIPPED STONE INDUSTRY IN MORAVIA AND LOWER AUSTRIA

11.1. List of sites studied

Lower Austria

Municipality	Site	Position	Region	Type of site	Dating (after Tichý)	No. of chipped artefacts (>12 mm)	Chapter
Asparn an der Zaya-Schletz	Asparn-Schletz		Weinviertel	settlement	LBK phase II+III	407	11.2.
Brunn am Gebirge	Brunn I	Wolfholz	Wienerwald	settlement	LBK phase I/II	105	11.3.3.3.
	Brunn IIa	Wolfholz		settlement	LBK phase Ia	2554	11.3.3.2.
	Brunn IIb	Wolfholz		settlement	LBK phase Ia	2575	11.3.3.2.
	Brunn II	Wolfholz		settlement burial	LBK phase I	11	11.3.3.4.
	Brunn IV	Wolfholz		settlement	LBK phase I	31	11.3.3.2.
Kleinhadersdorf		Marchleiten	Weinviertel	cemetery	LBK phase I/II+II	24	11.4.
Mold	Mold I		Waldviertel	settlement	LBK phase I/II	78	11.5.
Rosenburg	Rosenburg I		Waldviertel	settlement	LBK phase Ib	55	11.6.

Moravia

Municipality	Site	Position	Region	Type of site	Dating (after Tichý)	No. of chipped artefacts (>12 mm)	Chapter
Brno-Ivanovice		Globus	South Moravia	settlement	LBK phase Ia	50	11.7.
Brno-Nový Lískovec		Pod Kamenným vrchem	South Moravia	settlement	LBK phase I/II	98	11.8.
Kladníky		Záhumenky	North Moravia	settlement	LBK phase Ia	125	11.9.
Kuřim		Záhoří do klínů and U kopečku	South Moravia	settlement	LBK phase II+III	2418	11.10.
Nové Bránice		V končinách	South Moravia	settlement ?	LBK phase II ?	498	11.11.
Přáslavice-Kocourovec		Na širokém	North Moravia	settlement	LBK phase II	280	11.12.
Těšetice-Kyjovice		Sutny	South Moravia	settlement	LBK phase II	83	11.13.
Vedrovice-Zábrdovice		Za dvorem	South Moravia	settlement	LBK phase Ia	255	11.14.3.2.
		Široká u lesa		settlement	LBK phase I/II+II	3633	11.14.3.3.
		Široká u lesa		cemetery	LBK phase I/II+II	67	11.14.3.4.
Žopy	Žopy I	Cihelna	South Moravia	settlement	LBK phase Ia	76	11.15.3.2.
	Žopy II	Cihelna		settlement	LBK phase II	18	11.15.3.3.

11.2. Asparn an der Zaya – Schletz (Mistelbach district, Weinviertel, Lower Austria)

11.2.1. Background information

Geographic and geomorphological characteristics
The site lies at the cadastral dividing line of Asparn an der Zaya, position "Am Wald" and Schletz, position "Kirchfeld" in the central part of Weinviertel, which covers the north-eastern part of Austria. The site lies on a hillside gently sloping south and east, with an elevation of 225–260 m above sea level. The subsoil consists of a weathered loess cover (Windl 1996).

Research history
Aerial prospection uncovered two ditches – one with an oval ground plan and the other with a trapezoidal one. In 1983, systematic archaeological research began under the direction of H. Windl (Niederösterreichisches Landesmuseum für Urgeschichte, Asparn an der Zaya) and was concluded in 2005. A trapezoidal ditched enclosure about 400 m long, with a 4 m wide and 2 m deep ditch was discovered. In its western and southern parts, the line of the ditch is cut by the oval ditched enclosure. The latter consists of two parallel ditches about 4 m wide and 2 m deep, with an average length of about 330 m. Within the oval ditches, scattered human skeletons were found, bearing traces of fatal injuries, mainly on their heads. The anthropological remains comprised both male and female individuals of various ages with the exception of young women, who are almost absent. This is usually interpreted as a violent attack on the village at the end of the LBK. In southern and inner parts of the enclosure, the ground plans of about nine post-built longhouses were discovered. Two complete ground plans are approximately 20 m long and 6 m wide. The settlement with the houses mentioned above can be assigned stratigraphically neither to the trapezoidal nor to the oval enclosure. In 1993, a timber-lined well of a square ground plan of 120 x 120 cm was uncovered within the oval enclosure (Windl 1996, 10–29; 2002; Lenneis, Stadler & Windl 1996, 99–101; Teschler-Nicola *et al.* 1996).

11.2.2. Dating the site

Absolute chronology
Laboratory ETH in Zürich – a total of two dates from the well (Lenneis, Stadler & Windl 1996, 104, 108)

ETH-13289
Dating BP: 6175 ± 65

68.2 % confidence
cal BC 5220 – 5040 (68.2 %)
95.4 % confidence
cal BC 5300 – 4960 (95.4 %)

ETH-13290
Dating BP: 6215 ± 60

68.2 % confidence
cal BC 5300 – 5260 (10.8 %)
cal BC 5230 – 5190 (11.9 %)
cal BC 5180 – 5060 (45.5 %)
95.4 % confidence
cal BC 5320 – 5010 (95.4 %)

Relative chronology (after Tichý)
Trapezoidal ditched enclosure – transitional phase I/II of the LBK
Longhouses and other features – above all LBK phase II to III, before the construction of the oval ditched enclosure
Oval ditched enclosure– LBK phase III
Well – LBK phase III

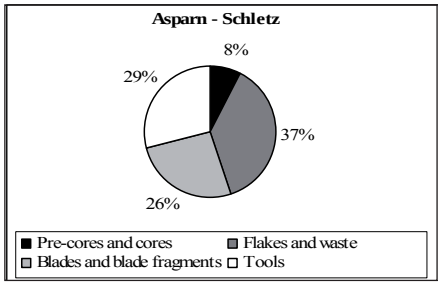
Phase II is probably much more abundant than assumed so far, as documented by the uniform sickle blades as well as the imported pottery of the classical Keszthely phase.

11.2.3. Chipped stone industry

428 pieces of chipped stone were found at the site. 425 chipped stone artefacts pertain to the late phase (phase II/III and phase III). For the sake of comparison with other assemblages, a total of 407 pieces larger than 12 mm was chosen for additional study (**tables 12–14**). Among the 18 pieces which are ≤ 12 mm, there are also three tools that I analysed along with the other implements. In all, a total of three artefacts were found in the settlement features dating to the Early LBK. I studied these three pieces separately and only partially, from the point of view of raw materials (Krakow Jurassic silicite, KL I chert, unidentified).

Blank groups	Total	%	Blanks	Tools	Tools ≤ 12 mm
Pre-cores and cores	40	9.6	31	9	-
Flakes and waste	189	46.5	152	37	-
Blades and blade fragments	178	43.9	106	72	3
Total	407	100	289	118	3

Table 12. Asparn-Schletz, the end of phase II and phase III of the LBK. Chipped stone artefacts divided into basic blank groups.



Basic morphological groups	Total	%
Pre-cores and cores	31	7.6
Flakes and waste	152	37.3
Blades and blade fragments	106	26
Tools	118	29
Total	407	99.9

Table 13. Asparn-Schletz, the end of phase II and phase III of the LBK. Proportion of chipped stone artefacts by basic morphological groups.

Blank groups	No. of pieces	Weight (g)	Avg (g)
Pre-cores and cores	40	2137.4	64.3
Flakes and waste	189	1019.6	8.6
Blades and blade fragments	178	298.4	2.8
Total	407	3455.4	8.5

Table 14. Asparn-Schletz, the end of phase II and phase III of the LBK. Weight of chipped stone artefacts.

11.2.3.1 Nearest outcrops of appropriate raw materials

All outcrops of lithic raw material are relatively far from the settlement. The nearest appear to be the cherts from the Danubian gravels at a distance of 20–30 km. The second nearest raw material are the Krumlovský Les (henceforth KL) cherts, the outcrops of which lie about 50–55 km away from the settlement.

11.2.3.2. Raw material

The chipped stone assemblage from the last phase of the LBK appears very varied in terms of the raw materials used (**tables 15 & 16**). The variety of raw materials indicates that the settlement must have been part of an extensive exchange network, at least for a certain time. The KL chert, imported from a distance of 50–55 km, prevails, but its ratio hardly reaches 40 %. Among the Krumlovský Les cherts, the coarse-grained variety KL I is dominant. The chert breccias of which two artefacts are made are also most likely to come from Krumlovský Les. Similar chert breccias are known from the settlement of Vedrovice "Široká u lesa" (Mateiciucová 1992). The next two artefacts fall under the Moravian Jurassic cherts, which could originate from Krumlovský Les or the Brno Basin territory. In either case, some other as yet unknown outcrops could also exist. In the settlement, there are also some much more distant raw materials alongside the KL chert. The ratio of the Krakow Jurassic silicite imported from a distance of 280–290 km reaches more than 26 %. The ratio of Szentgál radiolarite (approx. 7 %) is noteworthy, too. The other raw materials occur only rarely. They include Baltic erratic silicite, one artefact of Carpathian obsidian and one blade of spotted Świeciechów silicite, the primary outcrops of which lie in the Holy Cross hills (Góry Świetokrzyskie) in Little Poland, at a distance of about 435 km from the settlement. Besides the site of Asparn – Schletz, spotted Świeciechów silicite also occurs in the context of the earliest and late phases of the LBK at Bylany (Přichystal 1985, 483; Lech 1989a). Several artefacts are also known from Mohelnice, where their occurrence is usually connected with the earliest phase (J. K. Kozłowski 1971a, 139).

The presence of obsidian and Szentgál radiolarite at the settlement of Asparn – Schletz indicates some eastern contacts, also documented by pottery imports of the Keszthely, Szakálhát and Želiezovce groups which probably represent the first impulses connected with the later westward expansion of the Lengyel complex (Windl 1996).

Besides the imported raw materials, local resources, which can be found in fluvial gravels, were also utilized. These are the radiolarites with cortex (nine pieces) and quartz (one piece). The origin of 17 radiolarite pieces and five limestone artefacts could not be identified.

Raw material	Artefacts > 12 mm	%	Artefacts ≤ 12 mm	Distance
Krumlovský Les I chert	138	33.9	5	50–55 km
Krumlovský Les II chert	15	3.7	1	50–55 km
Krumlovský Les II chert ?	3	0.7	–	50–55 km
Krumlovský Les chert – burnt	4	1	–	50–55 km
Krakow Jurassic silicite	107	26.3	5	280–290 km
Krakow Jurassic silicite ?	1	0.2	–	
Szentgál radiolarite	29	7.1	6	ca 190 km
Radiolarite – origin undefined	17	4.2	–	
Erratic silicite	9	2.2	–	175–185 km
Erratic silicite ?	6	1.5	–	
Erratic silicite or Krakow Jurassic silicite	13	3.2	–	
Erratic silicite or KL II	3	0.7	–	
Krakow Jurassic silicite or KL II	2	0.5	–	
Radiolarite – "pebble" cortex	9	2.2	–	
Limestone	5	1.2	–	
Green schist ?	4	1	–	ca 60 km
Moravian Jurassic cherts	2	0.5	–	50–76 km
Chert breccia – Krumlovský Les	2	0.5	–	50–55 km
Spotted Świeciechów silicite	1	0.2	–	ca 435 km
Carpathian obsidian	1	0.2	–	ca 345 km
Quartz	1	0.2	–	
Erratic silicite or Abensberg-Arnhofen chert	1	0.2	–	
Olomučany chert ?	1	0.2	–	
Burnt	11	2.7	–	
Undefined	22	5.4	1	
Total	407	99.7	18	

Table 15. Asparn-Schletz, the end of phase II and phase III of the LBK. Proportion of raw materials, including varieties and distance to outcrops.

Raw material	No. of pieces	Cores	Flakes	Blades	Tools
Krumlovský Les chert	160	8	74	44	34
%	100.1	5	46.3	27.5	21.3
Krakow Jurassic silicite	108	7	24	32	45
%	100	6.5	22.2	29.6	41.7
Szentgál radiolarite	29	3	11	7	8
Radiolarite – origin undefined	17	1	6	4	6
Erratic silicite	15	–	8	4	3
Erratic silicite or Krakow Jurassic silicite or KL II	18	–	3	6	9
Radiolarite – "pebble" cortex	9	4	4	–	1
Limestone	5	2	2	–	1
Green schist ?	4	–	3	1	–
Moravian Jurassic cherts	2	–	1	1	–
Chert breccia – Krumlovský Les	2	–	1	–	1
Spotted Świeciechóv silicite	1	–	–	1	–
Carpathian obsidian	1	–	–	1	–
Quartz	1	–	–	–	1
Erratic silicite or Abensberg-Arnhofen chert	1	–	–	–	1
Olomučany chert ?	1	1	–	–	–
Burnt	11	–	6	2	3
Undefined	22	5	9	3	5
Total	407	31	152	106	118

Table 16. Asparn-Schletz, the end of phase II and phase III of the LBK. Proportion of raw materials in the basic morphological groups.

Apart from raw materials usually employed in the production of chipped stone artefacts, residues from polished axes and other polished tools made from green schist were also used. Primary sources of green schist are known near the municipality of Želešice south of Brno. The re-use of the polished tools is probably related to a lack of suitable raw materials during the late phase of the Asparn-Schletz settlement (see below).

11.2.3.3. Pre-cores and cores

A total of 16 pieces of unworked raw material dating to the late LBK phases was found at the settlement, mainly with cortex (**tables 17–19**). Three pieces are of KL I chert, five of a radiolarite with cortex, two of limestone, one of quartz and for five pieces I could not identify the raw material. A total of five pieces had been used as hammerstones. The majority of the unworked raw material, with the exception of the KL chert, seems to be of local origin. Two hammerstones made of a KL-chert nodule were probably brought into the settlement with this intention. However, the occurrence of splintered pieces of the KL chert does not indicate a regular supply (see below).

The raw material without any traces of working need not exclusively be for making chipped stone artefacts. The raw materials intended for any additional processing, are probably mainly those out of which chipped stone artefacts are made at the settlement. These are the radiolarites with cortex and maybe also limestone, as documented by two limestone flakes.

One chert artefact made of KL II material was put aside when its platform and knapping surface had been prepared. Later it was made into an endscraper.

Among the cores, the splintered pieces distinctly prevail. Eight of them are made of Krakow Jurassic silicite (including two tools), four of KL chert (including one tool), three of Szentgál radiolarite and one of Baltic erratic silicite (also classified as a tool). Their height varies between 11 – 41 mm (avg 22.4 mm).

It seems likely that the occurrence of splintered pieces at the settlement of Asparn – Schletz is connected with an insufficient supply of raw material during the terminal phase of the settlement's existence. This insufficient supply probably relates to a collapse of former distribution networks, which led from a gradual isolation of the village to a dramatic crisis connected with the killing of the inhabitants (Teschler-Nicola *et al.* 1996; Windl 1996). Probably due to limited access to the raw material outcrops, the village inhabitants had to gather some low-quality raw materials in the vicinity, as well as to recycle the already rejected cores and flakes. They tried to work the available raw material remains with minimal losses. This is possible thanks to a splintering technique which enables to produce very sharp, albeit tiny, flakes even from a very small piece of raw material.

However, most cores were restricted to the production of blade blanks. This is documented by the rare and mostly considerably exhausted blade and blade/flake cores that occur.

Pre-cores and cores	Blanks	Tools	Total
Unworked raw material	12	4	16
Pre-cores	–	1	1
Cores	3	1	4
Splintered pieces (+ 1 pc ≤ 12 mm)	16	3	19
Core fragments	1	–	1
Total	32	9	41

Table 17. Asparn-Schletz, the end of phase II and phase III of the LBK. Pre-cores and cores.

11.2.3.4. Flakes and waste

A total of 189 artefacts larger than 12 mm falls into this category. Most of them are made from Krumlovský Les chert. A considerable part of the flakes and waste of Krumlovský Les chert consists of cortical artefacts (60.1 % – 51 pieces). On six of them, cortex covered the entire dorsal surface (**table 21**). On the other hand, the cortical artefacts of Krakow Jurassic silicite amount to only 19 %. One of them is fully covered. A total of 12 flakes (7.5 %) is made of Szentgál radiolarite. A partly preserved natural surface occurred on only two of them.

Pre-cores	Raw material	Preparation	Height	Width	Thickness	Weight	Tools
1	undefined	unworked raw material	53	47	26	93	–
2	rad.-pebble	unworked raw material	51	0	0	101	–
3	rad.-pebble	unworked raw material	42	34	16	26.2	–
4	rad.-pebble	unworked raw material	29	28	23	24	–
5	undefined	unworked raw material	38	28	25	36	–
6	undefined	unworked raw material	39	32	27	35	–
7	rad.-pebble	unworked raw material	61	54	35	114	–
8	KL-burnt	unworked raw material	45	0	0	69	–
9	rad.-pebble	unworked raw material	48	41	39	126	hammerstone
10	undefined	unworked raw material	50	45	23	69	–
11	quartz	unworked raw material	53	50	40	130	hammerstone
12	KL I	unworked raw material	69	69	63	378	hammerstone
13	KL I	unworked raw material	65	69	60	361	hammerstone
14	limestone	unworked raw material	55	37	31	82	–
15	limestone	unworked raw material	45	43	28	76	–
16	undefined	unworked raw material	47	40	29	50	–
17	KL II	raw material with prepared striking platform and knapping surface	45	55	49	139	endscraper–denticulates

Table 18. Asparn-Schletz, the end of phase II and phase III of the LBK. Pre-cores.

Besides the common preparation flakes (89 pieces) and debris (61 pieces), various types of technical flakes, as well as those made by a splintering technique (**table 20**), are relatively abundant. Numerous technical flakes show evidence of core rejuvenation, which along with the occurrence of flakes made by splitting indicates the intense processing and utilization of the raw materials available at the settlement. Three flakes detached from polished stone artefacts were also found. We can assume that they were produced intentionally, because of sickle gloss appearing on one of them.

Cores	Raw material	Type of blanks	No. of platforms	Shape	Platform preparation	Dorsal reduction	Platform angle	Height	Width	Thickness	Weight	Tool
1	Krakow Jurassic	blade core	single	conical	rejuv. by several detachments	no	obtuse	46	41	35	71	-
2	Krakow Jurassic	blade-flake core	multiple residual	irregular	–	–	-	38	27	31	41	hammer-stone
3	KL I	blade-flake core	single	prismatic	facetted	–	acute	25	21	15	8.5	-
4	erratic silicite	former blade core		splintered piece	–	–	-	20	21	6	2.5	splintered piece
5	KL I	–	multiple residual	irregular	–	–	-	28	0	0	16	-
6	Krakow Jurassic	–	–	splintered piece	–	–	-	15	6	4	0.1	splintered piece
7	KL I	–	–	splintered piece	–	–	-	38	0	0	16	-
8	KL I	–	–	splintered piece	–	–	-	19	0	0	1	-
9	KL I	–	–	splintered piece	–	–	-	41	23	16	12	-
10	Rad.	–	–	splintered piece	–	–	-	31	20	9	5	-
11	Szentgál	–	–	splintered piece	–	–	-	14	0	0	1.5	-
12	Krakow Jurassic	–	–	splintered piece	–	–	-	18	22	7	1.5	-
13	Krakow Jurassic	–	–	splintered piece	–	–	-	31	30	14	13.5	splintered piece
14	Szentgál	–	–	splintered piece	–	–	-	29	28	11	6	-
15	Krakow Jurassic	–	–	splintered piece	–	–	-	14	12	8	1	-
16	Krakow Jurassic	–	–	splintered piece	–	–	-	21	23	9	4.8	-
17	KL II	–	–	splintered piece	–	–	-	25	18	10	5	-
18	Krakow Jurassic	–	–	splintered piece	–	–	-	22	15	4	1	-
19	Szentgál	–	–	splintered piece	–	–	-	14	11	3	0.1	-
20	Krakow Jurassic	–	–	splintered piece	–	–	-	18	9	8	0.2	-
21	Krakow Jurassic	–	–	splintered piece	–	–	-	11	20	6	1.2	≤ 12 mm
22	KL I	–	–	splintered piece	–	–	-	21	0	0	2	-
23	KL I	–	–	splintered piece	–	–	-	15	0	0	1.5	-
24	Olom. ?	–	–	core fragment	–	–	-	24	0	0	17	-

Table 19. Asparn-Schletz, the end of phase II and phase III of the LBK. Cores.

Type of flake	No. of pieces	%	KL	Krakow Jurassic	Flakes	Tools
Preparation flake	89	47.1	49	21	74	15
Blade-like flake	–	–	–	–	–	–
Splintered flake	9	4.7	1	4	9	–
Crested flakes and secondary crested flakes	4	2.1	–	3	2	2
Rejuvenation flake from a core's knapping surface	8	4.2	1	3	4	4
Rejuvenation flake from a core's striking platform	3	1.6	2	1	2	1
Rejuvenation flake from a core's base	1	0.5	–	1	–	1
Primary flake	3	1.6	2	–	1	2
Other technical flake	–	–	–	–	–	–
From polished tools	3	1.6	–	–	3	–
Waste	61	32.4	25	10	51	10
Natural raw material fragments	6	3.2	1	–	5	1
Undefined	2	1	–	–	1	1
Total	189	100	81	43	152	37

Table 20. Asparn-Schletz, the end of phase II and phase III of the LBK. Flakes and waste.

11.2.3.5. Blades and blade fragments

Of the 178 blades and blade fragments found at the settlement, 40 % are retouched. Blades of KL chert prevail (41.5 %), but the ones made from Krakow Jurassic silicite are also relatively abundant (30.1 %). Considering that obsidian and Świeciechów silicite occur at the settlement only in form of blades, it is probable that this is the form in which they were transported. Among the unretouched blades, the ones with broken off terminal part predominate (**table 25**). Among the retouched blades, mesial blade fragments are prevalent, indicating a frequent shape of blade tools. More than half of the blades with preserved base have the remnant of a primarily facetted platform (**table 30**). Approximately a quarter of the blades showed a plain platform remnant. A higher ratio of blades with plain platform remnant is also

Surface of flakes and flake tools	No. of pieces	%	KL	Krakow Jurassic	Bakony rad.	Other
Cortical	13	6.9	6	1	–	6
Cortical – polished	2	1	–	–	–	2
Partly cortical	74	39.2	45	7	2	20
Partly cortical – polished	1	0.5	–	–	–	1
Without cortex	99	52.4	32	34	10	23
Total	189	100	83	42	12	52

Table 21. Asparn-Schletz, the end of phase II and phase III of the LBK. Degree of preservation of natural surface on flakes including retouched tools.

Length	No. of pieces	Min (mm)	Max (mm)	Avg (mm)	StDev (mm)
Flakes	74	13	54	27.2	8.85
Flake tools	15	18	39	26.3	6.25

Table 22. Asparn-Schletz, the end of phase II and phase III of the LBK. Length of preparation and blade-like flakes (including flake tools).

Width	No. of pieces	Min (mm)	Max (mm)	Avg (mm)	StDev (mm)
Flakes	74	12	51	25	8.28
Flake tools	15	16	33	22.4	5.53

Table 23. Asparn-Schletz, the end of phase II and phase III of the LBK. Width of preparation and blade-like flakes (including flake tools).

Thickness	No. of pieces	Min (mm)	Max (mm)	Avg (mm)	StDev (mm)
Flakes	74	2.5	47	8.3	6.12
Flake tools	15	4	10	7.3	2.16

Table 24. Asparn-Schletz, the end of phase II and phase III of the LBK. Thickness of preparation and blade-like flakes (including flake tools).

documented at the settlement of Kuřim, which belongs partly to the same chronological period. Plain platform remnants begin to appear more frequently in Moravia from stage II of

Type of blade	Blade blanks		Blade tools	
	No. of pieces	%	No. of pieces	%
Whole blade	9	8.5	1	1.4
Blade with broken off terminal part	33	31.2	6	8.3
Blade with broken off basal part	2	1.9	6	8.3
Blade with broken off terminal and basal part	13	12.2	23	31.9
Basal fragment of a blade	11	10.5	4	5.6
Mesial fragment of a blade	23	21.7	30	41.7
Terminal fragment of a blade	10	9.4	1	1.4
Whole crested blade	1	0.9	1	1.4
Fragment of a crested blade	4	3.7	–	–
Whole secondary crested blade	–	–	–	–
Fragment of a secondary crested blade	–	–	–	–
Total	106	100	72	100

Table 25. Asparn-Schletz, the end of phase II and phase III of the LBK. Blades and blade fragments.

the LBK. This tendency continues into the Late Neolithic period, and it probably relates to developments in the regions west of Moravia as well as to the Stroke-Ornamented Ware culture (Kazdová, Peška & Mateiciucová 1999, 145).

Surface of blades and blade tools	No. of pieces	%	KL	Krakow Jurassic	Bakony rad.	Other
Cortical	–	–	–	–	–	–
Partly cortical	22	12.4	6	5	1	10
Partly cortical – polished	1	0.6	–	–	–	1
Without cortex	155	87.1	56	48	13	38
Total	178	100	62	53	14	49

Table 26. Asparn-Schletz, the end of phase II and phase III of the LBK. Degree of preservation of natural surface on blades including retouched tools.

Length	No. of pieces	Min (mm)	Max (mm)	Avg (mm)	StDev (mm)
Blades	9	24	70	36.2	14.06
Blade tools	1	38	38	38	0

Table 27. Asparn-Schletz, the end of phase II and phase III of the LBK. Length of whole finished blades and blade tools.

Width	No. of pieces	Min (mm)	Max (mm)	Avg (mm)	StDev (mm)
Blades	57	6	29	15	4.45
Blade tools	36	10	29	17	3.81

Table 28. Asparn-Schletz, the end of phase II and phase III of the LBK. Width of whole finished blades, blades with broken off terminal part, basal part, terminal and basal parts.

Thickness	No. of pieces	Min (mm)	Max (mm)	Avg (mm)	StDev (mm)
Blades	55	1.5	20	4.9	2.81
Blade tools	11	4	11	5.9	1.87

Table 29. Asparn-Schletz, the end of phase II and phase III of the LBK. Thickness of finished blades with preserved basal part.

Platform remnant	Total	%	KL	Krakow Jurassic	Bakony rad.
Unprepared	1	1.4	–	–	–
Plain	17	24.3	10	1	1
Prepared by several blows	10	14.3	3	4	–
Punctiform	3	4.3	1	1	–
Primary facetted	36	51.4	10	12	4
Dihedral	–	–	–	–	–
Secondary prepared	3	4.3	1	1	–
Total	70	100	25	19	5

Table 30. Asparn-Schletz, the end of phase II and phase III of the LBK. Platform remnants of blades and blade tools.

11.2.3.6. Raw material transport

The Krumlovský Les cherts, the Krakow Jurassic silicite and the Szentgál radiolarites probably reached the settlement in the form of prepared cores. This is suggested by the cores and exhausted cores occurring at the settlement, made from the raw materials mentioned above. The finds of technical blades resulting from core reduction and rejuvenation episodes likewise bear witness to this. The KL cherts could be also partly transported as unworked nodules, as documented by the hammerstones made of KL chert nodules, as well as by a high ratio of artefacts with preserved cortex. With regard to a whole collection of very uniform blades of KL I chert found at the settlement and used as sickle inserts (see below), it cannot be excluded that these regular blades had been transported as already finished products.

11.2.3.7. Tools

The majority of the 121 tools (including three pieces ≤ 12 mm) was manufactured from Krakow Jurassic silicite (38 %; **table 32**). The tools on blade blanks prevail (62 %; **table 31**). Among the tool types, endscrapers predominate (26.5 %; **fig 9: 2, 6**). Truncated blades (**fig 9: 1,8**), retouched blades (**fig. 9: 10**) and combination tools are also frequent. There appears to be a distinctly high ratio of unspecified tool fragments. A high proportion of the tool and combination-tool fragments indicates again a certain isolation of the village when the inhabitants had to reshape the already discarded and damaged implements.

Two short trapezes might be an older intrusion. It cannot be excluded that the perforator with a well-distinguished point made of Szentgál radiolarite also originated in the early LBK, when the settlement was already inhabited.

Type of tools	Total	Cores	Flakes	Blades
Endscrapers	32	–	16	16
Truncated blades	18	–	–	18
Burins	2	–	–	2
Blades with lateral retouch	12	–	–	12
Retouched flakes	3	–	3	–
Borers, perforators and becs	2	–	–	2
Notches and denticulates	9	1	4	4
Sidescrapers	–	–	–	–
Trapezes	2	–	–	2
Other microliths	–	–	–	–
Splintered pieces	8	3	4	1
Combination tools	15	1	4	10
Hammerstones	6	4	2	–
Tool fragments	12	–	4	8
Total	121	9	37	75

Table 31. Asparn-Schletz, the end of phase II and phase III of the LBK. Tool classification by blank types.

11.2.3.8. Artefacts with sickle gloss

At the settlement of Asparn – Schletz, 41 artefacts with sickle gloss were found altogether (**tables 33 & 34**; **fig. 9: 1, 5, 6, 9**), and about half are retouched. A high ratio of sickles made from KL I chert is apparent. The blades used in this way are regular and resemble each other, as if they were standardized. The variety of KL I chert from which they are manufactured bears a considerable resemblance to the KL I chert from the settlement of Nové Bránice, where a specialised production of blades was detected, as well as to the chert found in the mining pits discovered in the Krumlovský Les territory (Mateiciucová 1997b). The exploitation of KL cherts during the LBK is not yet definitely proven (Oliva 1999, 8–10; Oliva, Neruda & Přichystal 1999, 257–258, 269). Four sickle blades of KL I chert, very similar to those from Asparn, were also found at the settlement of Kuřim. In this context, it is interesting that a similar specialised production of blades was detected in Kuřim, but using Olomučany chert. Recently, a site where this chert type had been mined, presumably in the Early Neolithic period, was discovered near Olomučany (Přichystal pers. comm.).

The occurrence of uniform sickle blades and the detection of a certain degree of specialisation at the settlements of Nové Bránice and Kuřim (see chapter 6.2.3.) are probably closely related to each other and bear witness to trends appearing in phase II of the LBK and tending to a standardization in producing blade blanks (Mateiciucová 1997b, 252). An indispensable part of a specialised production was certainly the acquisition of high-quality raw materials, enabled by mining. Specialisation is also connected with a well-organized distribution network through which final products were distributed to further settlements.

Besides artefacts with sickle gloss made of silicite, one flake made of green schist with sickle gloss was found. This flake was chipped from a polished stone tool. Secondary processing and use of polished stone artefacts is probably related to the lack of more suitable raw materials and the isolation of the village.

11.2.3.9. Summary

During phase II and phase II/III of the LBK, the settlement was part of an extensive distribution network. This is indicated first of all by a high ratio of raw materials imported from distant regions (Krakow Jurassic silicite, Szentgál radiolarite), as well as by the occurrence of standardized sickle blades of KL I chert, which had been produced in specialised workshops.

The contacts, mainly social, are documented through the imports of Carpathian obsidian and Spotted Świeciechów silicite from the Holy Cross hills (Góry Świetokrzyskie).

Some time during the late phase (phase III), these contacts were interrupted for an unknown reason. The settlement began to suffer from an absence of high-quality lithic raw materials. This absence was countered by gathering mostly low quality raw materials in the vicinity, by reducing the already rejected cores and finally by recycling old tools. In addition, some useless and damaged polished stone implements were recycled as cores for the detachment of flakes. It cannot be definitely proven whether or not the flakes of polished artefacts were detached intentionally or were accidental by-products of working with axes and wedges. In either case, the use wear on the edges of these flakes, even including sickle gloss on one of them, is evidence that the polished stone tools flakes were utilized intentionally.

The absence of high quality raw materials during the late phase can be associated with the settlement's isolation, which probably resulted in a tragic end and the killing of its inhabitants. The effects of similar bloody conflicts are evident in the same period in other regions of the LBK as well (e.g. Talheim; Spatz 2002, 148).

Type of tools	Total	%	KL	Krakow Jurassic	Other
Endscrapers	32	26.5	4	20	8
on a blade	9		2	3	2 (Szentgál) 1 (burnt) 1 (undefined)
on a retouched blade	3		1	2	
on a flake	3		–	3	
fan-shaped	1		–	1	
pointed	4		–	3	1 (undefined)
thumbnail	2		–	2	
circular	1		–	1	
keeled	2		–	2	
high	4		–	2	1 (undefined)
double	3		1	1	2 (undefined)
Truncated blades	19	15.8	5	8	0
oblique straight	2		–	2	
oblique concave	1		–	–	1 (undefined)
transverse straight	5		2	2	1 (undefined)
transverse convex	3		–	2	1 (Szentgál)
oblique on both ends – trapeze shape	4		2	–	1 (burnt) 1 (undefined)
oblique on both ends, alternate ret. – rhomboid shape	1		–	–	1 (Szentgál)
transverse on both ends – rectangular shape	1		–	1	
cornered retouch on both ends – rhomboid shape	2		1	1	
Burins	2	1.6	1	1	0
burin on a break	2		1	1	
Blades with lateral retouch	12	9.9	2	2	8
unilateral continuous	3		–	1	1 (radiolarite) 1 (undefined)
unilateral discontinuous	2		1	1	1 (Szentgál) 2 (undefined)
unilateral partial	4		1	–	1 (Szentgál) 1 (chert breccia)
bilateral discontinuous	3		–	–	1 (undefined)
Retouched flakes	2	1.6	1	1	0
Borers, perforators and becks	2	1.6	0	1	1
slim borer with a weakly distinguished point	1		–	1	
slim perforator with a well distinguished point	1		–	–	1 (Szentgál)
Notches and denticulates	8	7.5	3	1	4
retouched notch	1		–	–	1 (undefined)
multiple notch	1		–	–	1 (radiolarite)
retouch on a break/ notch fragment	1		1	–	1 (erratic silicite)
denticulated blade (flake)	1		1	–	
regularly denticulated blade (flake)	1		1	–	
denticulates	3		1	1	1 (limestone)
Sidescrapers	0		0	0	0
Trapezes	2	1.6	0	2	0
short – dorsal retouch	2		–	2	
Other microliths	0		0	0	0
Splintered pieces	8	6.6	3	3	2
two-sided opposing	7		2	3	1 (erratic silicite) 1 (undefined)
single sided cross	1		1		
Combination tools	15	12.4	7	3	5
endscraper – truncated blade	1		1	–	
endscraper – notch	1		–	1	
endscraper – sidescraper	1		–	–	1 (erratic silicite)
truncated blade – retouched blade	4		2	1	1 (radiolarite)
truncated blade – bec	1		–	1	
truncated blade – notch	5		2	–	2 (radiolarite) 1 (undefined)
sidescraper – denticulates	2		2	–	
Hammerstones	7	5.8	4	1	2
hammerstone – raw material	3		2	–	1 (radiolarite)
hammerstone – from a core	1		–	1	
hammerstone fragment	3		2	–	1 (quartz)
Tool fragments	12	9.9	4	3	5
					1 (undefined) 1 (radiolarite) 1 (Szentgál) 1 (erratic silicite) 1 (burnt)
Total	121	100	34	46	41

Table 32. Asparn-Schletz, the end of phase II and phase III of the LBK. Tool types and their raw materials.

Artefacts with sickle gloss			
Raw material	Blades and blade tools	Flakes and flake tools	Total
Krumlovský Les I chert	17	3	20
Krumlovský Les II chert	2	–	2
Krakow Jurassic silicite	8	2	10
Szentgál radiolarite	4	–	4
Krakow Jurassic silicite or KL II or erratic silicite	3	–	3
Erratic silicite	1	–	1
Green schist ?	–	1	1
Total	35	6	41

Table 33. Asparn-Schletz, the end of phase II and phase III of the LBK. Proportion of artefacts with sickle gloss by raw material.

Blades with sickle gloss	**Blade tools**		**Blades**	**Total**
Type of blade	Type of tools	No. of pieces	No. of pieces	No. of pieces
Whole blade		–	1	1
Blade with broken off terminal part		–	6	6
Blade with broken off basal part	retouch on a break/ notch fragment	1	–	1
Blade with broken off terminal and basal part		10	3	13
	endscraper	1		
	truncated blade	1		
	blade with truncation on both ends	3		
	burin on a break	1		
	blade with lateral retouch	2		
	splintered piece	1		
	truncated blade – retouched blade	1		
Basal fragment of a blade		–	2	2
Mesial fragment of a blade		6	5	11
	endscraper	3		
	truncated blade	1		
	blade with lateral retouch	1		
	truncated blade – retouched blade	1		
Terminal fragment of a blade		–	1	1
Technical blade		–	–	–
Total		17	18	35
Flakes with sickle gloss	**Flake tools**		Flakes	**Total**
Type of flake	Type of tools	No. of pieces	No. of pieces	No. of pieces
Preparation flake		2	3	5
	endscraper	1		
	regularly denticulated flake	1		
From polished tools		–	1	1
Total		2	4	6

Table 34. Asparn-Schletz, the end of phase II and phase III of the LBK. Blanks and tools with sickle gloss by types.

11.3. Brunn am Gebirge, position "Wolfholz" (Mödling district, Wienerwald, Lower Austria)

11.3.1. Background information

Geographic and geomorphological site characteristics
The site of Brunn lies on a terrace of the Danube in the Viennese Basin, on the eastern periphery of the Vienna Woods (Wienerwald). The terrain is flat and has a slight rise to the northeast.

Research history
The settlement was discovered in 1989 during development of the A21 motorway on Vienna's southern periphery. In the same year, a rescue excavation began at the site of Brunn I under the direction of Peter Stadler (Department of Archaeology, Natural History Museum, Vienna) and continued between 1992 and 2005. The excavated area is about 100 000 m^2. 75 longhouses were uncovered by excavation and their ground plans completed by geophysical survey. As not the whole area has been surveyed, a total of 100 houses is estimated for the site.

On the basis of C-14 dating and the orientation of house groups, the remains of the longhouses belong to at least five different, separate groups, which were called sites I-V.

The youngest and smallest site of Brunn I is dated to the end of phase I of the LBK (after R. Tichý). The remains of two longhouses and of a loam pit were discovered here.

Considering the radiocarbon dating and pottery seriation, Brunn II is the oldest site so far. It was divided into two parts – Brunn IIa, which should be a little older, and Brunn IIb. At the site of Brunn II, four burials were discovered within longitudinal pits along the houses. All of these burials are stratigraphically younger than the Brunn II settlement. The radiocarbon date of burial No. 2 confirms that it is contemporary with the younger settlements of Brunn I, III or IV (Lenneis, Stadler & Windl 1996; Stadler *et al.* 2000).

The longhouses at sites I-V are usually oriented south-north, with deviations to the west and east at different sites. The constructions are mostly around 20 m long and about 7–8 m wide, oriented NNW-SSE.

In the oldest parts (Brunn IIa and Brunn IIb), the pottery is very similar to pottery of the late Starčevo culture in Hungary (Stadler 2005).

11.3.2. Dating the site

Absolute chronology
Laboratories ETH in Zürich and VERA in Vienna – a total of 60 dates from the sites Brunn I-V (Stadler 2005)

The range covered by the dates may be too broad, as most samples consisted of oak charcoal. The old wood effect could play a role here, making samples appear older than they are.

Site	Number of samples	1 σ range BC	2 σ range BC
Brunn IIa	12	5540–5210	5750–5050
Brunn IIb	14	5480–5280	5650–5050
Brunn III	24	5450–5200	5700–4950
Brunn IV	5	5390–5300	5480–5200
Brunn I	4	5310–5060	5370–4940
Brunn V	1	5305–5255	5320–5200
Total	60	5480–5060	5700–5000

Dating of the oldest houses from the site of Brunn II (Stadler *et al.* 2000):

House 20:
Laboratory VERA – one date
Dating BP: 6785 ± 75

68.2 % confidence
cal BC 5730 – 5620 (68.2 %)
95.4 % confidence
cal BC 5840 – 5820 (1.4 %)
cal BC 5810 – 5530 (94.0 %)

House 16:
cal BC 5640 – 5510

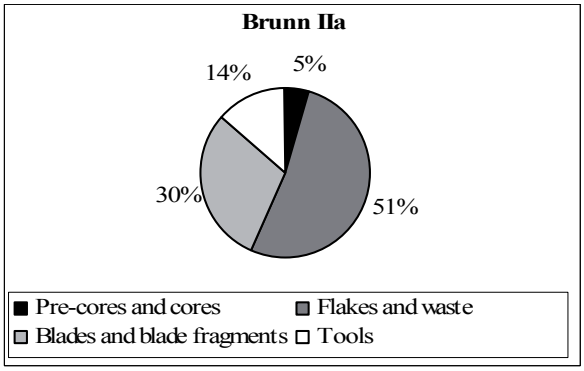
Brunn III
House 33:
Laboratory VERA – three dates
Dating BP: 6333 ± 20

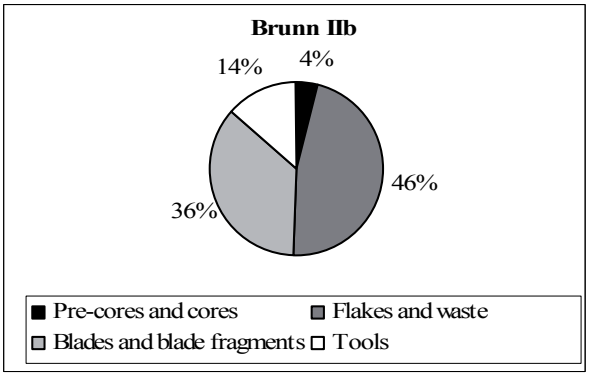
68.2 % confidence
cal BC 5338 – 5332 (7.2 %)
cal BC 5322 – 5298 (61.0 %)
95.4 % confidence
cal BC 5370 – 5250 (95.4 %)

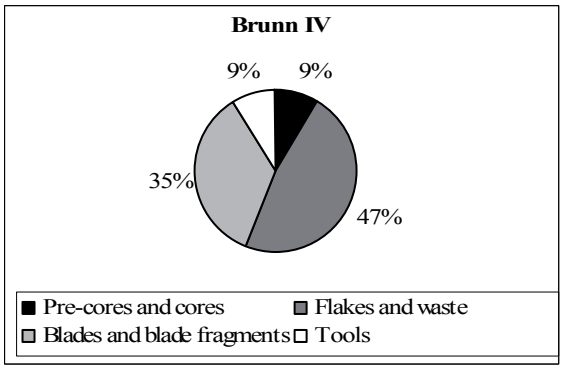
Brunn II (Lenneis & Stadler 1995, Tab. 1; Stadler *et al.* 2000):
Burial 2
Laboratory ETH – one date (sample No. 14825)
Dating BP: 6460 ± 70

Burial 3 (feature 0748)
Laboratory ETH – four dates (samples No. 11146, 11147, 11149 and 11150)
Dating BP: 6344 ± 35

68.2 % confidence
cal BC 5365 – 5295
95.4 % confidence
cal BC 5470 – 5440 (4.9 %)
cal BC 5420 – 5400 (4.9 %)
cal BC 5390 – 5230 (84.5 %)
cal BC 5220 – 5210 (1.1 %)







Brunn IV			
Blank groups	Total	Blanks	Tools
Pre-cores and cores	3	3	–
Flakes and waste	16	16	–
Blades and blade fragments	12	9	3
Total	31	28	3

Table 37. Brunn IV, phase I of the LBK. Chipped stone artefacts divided into basic blank groups.

Brunn IIa		
Basic morphological groups	Total	%
Pre-cores and cores	118	4.6
Flakes and waste	1322	51.8
Blades and blade fragments	764	29.9
Tools	350	13.7
Total	2554	100
Chips	670	

Brunn IIb		
Basic morphological groups	Total	%
Pre-cores and cores	110	4.2
Flakes and waste	1194	46.4
Blades and blade fragments	922	35.8
Tools	349	13.6
Total	2575	100
Chips	978	

Table 35. Brunn IIa, phase I of the LBK. Proportion of chipped stone artefacts by basic morphological groups.
Table 36. Brunn IIb, phase I of the LBK. Proportion of chipped stone artefacts by basic morphological groups.

Relative chronology (after Tichý)
Brunn IIa – LBK phase Ia
Brunn IIb – LBK phase Ia
Brunn III – LBK phase Ib?
Brunn IV – LBK phase Ib?
Brunn V – LBK phase I
Brunn I – LBK phase Ib; LBK phase I/II

11.3.3. Chipped stone industry

In 1996, P. Stadler asked me to identify the raw material used for making the chipped stone artefacts at the site of Brunn. Since then, I was able to examine the raw materials from the settlements of Brunn I, Brunn IIa and Brunn IIb obtained by the archaeological excavations in 1989–1993. The study of the technological and typological aspects of the chipped stone assemblage is in the care of Walpurga Antl-Weiser. In order to obtain some more detailed information on artefact morphology, I studied a minor part of the assemblage from this point of view as well. It was the trapezes, borers and perforators that I focused on more thoroughly. It was also possible to add a small sample from the site of Brunn IV, where I am entrusted with a complete study of the chipped stone industry (i.e. raw material as well as morphological analysis).

As archaeological excavation at this site is still going on alongside post-excavation studies, the present results and conclusions are only preliminary. Due to some incomplete data, a full comparison with other sites is still not possible. Particular sites will be treated as follows: Brunn IIa, Brunn IIb, Brunn IV, Brunn I and the burials of Brunn II.

11.3.3.1 Nearest outcrops of appropriate raw materials

The nearest outcrops of lithic raw materials appropriate for chipped stone industry appear to be the Mauer radiolarites, which lie about 5 km NW of the site. The other nearby outcrops are the Danubian gravels, in which radiolarites and cherts, the raw materials often utilized in the Palaeolithic and Mesolithic periods, are found.

11.3.3.2. Chipped stone industry at the settlements of Brunn IIa, Brunn IIb and Brunn IV

The settlement of Brunn IIa, along with Brunn IIb, is thought to be the oldest of all the settlements detected at the site of Brunn am Gebirge. From the point of view of chipped stone, the assemblages of both settlements can be regarded as the richest so far obtained from the earliest phase of the LBK culture (**tables 35 & 36**).

At the settlement of Brunn IIa, a total of 3224 chipped stone artefacts was found. 670 pieces of this total amount are chips and fragments smaller than 10 mm[100]. Just as the

100 Unlike at the other sites examined, where the artefacts ≤ 12 mm are excluded from a quantitative analysis of the chipped

	Brunn IIa		Brunn IIb		Brunn IV	
Raw material	No. of pieces	%	No. of pieces	%	No. of pieces	Distance
Bakony radiolarites	1445	56.6	1440	55.9	14	160 km
Mauer radiolarite	954	37.3	969	37.6	14	4 – 10 km
Radiolarite – origin undefined	99	3.8	111	4.3	1	
Radiolarite – "pebble" cortex	10	0.4	8	0.3	–	5–15 km
Quartz	10	0.4	23	0.9	–	
Krumlovský Les I chert	–	–	–	–	1	100 – 110 km
Gerecse radiolarite ?	–	–	1	< 0.1	–	
Mecsek radiolarite – burnt?	–	–	1	< 0.1	–	
Hydrosilicit / chalcedon	1	< 0.1	1	< 0.1	1	
Limnosilicite ?	–	–	–	–	–	170 km, 270 – 280 km
Granite	1	< 0.1	2	< 0.1	–	
Silicite – origin undefined	17	0.7	12	0.5	–	
Burnt	17	0.7	7	0.3	–	
Total	2554	100	2575	100	31	

Table 38. Brunn IIa, Brunn IIb and Brunn IV, phase I of the LBK. Proportion of raw materials and distance to outcrops.

	Brunn IIa			Brunn IIb			Brunn IV
Raw material	Artefacts > 10 mm	%	Artefacts ≤10 mm	Artefacts > 10 mm	%	Artefacts ≤10 mm	Artefacts > 10 mm
Szentgál radiolarite	1151	45	482	1097	42.6	596	13
Szentgál radiolarite – burnt	18	0.7	8	2	<0.1	–	1
Úrkút – Eplény radiolarite	39	1.5	7	65	2.5	10	–
Hárskút radiolarite	4	0.2	–	2	<0.1	–	–
Bakony radiolarites	230	9	54	274	10.6	104	–
Bakony radiolarites – burnt	3	0.1	–	–	–	–	–
Mauer radiolarite	933	36.5	90	968	37.5	235	13
Mauer radiolarite ?	19	0.7	–	1	<0.1	–	1
Mauer radiolarite – burnt	2	<0.1	–	–	–	–	–
Gerecse radiolarite ?	–	–	–	1	<0.1	–	–
Mecsek radiolarite – burnt?	–	–	–	1	<0.1	–	–
Radiolarite – "pebble" cortex	10	0.4	–	8	0.3	1	1
Radiolarite – origin undefined	70	2.7	14	44	1.7	5	–
Radiolarite – burnt	29	1.1	7	67	2.6	24	–
Limnosilicite ?	–	–	–	–	–	–	1
Krumlovský Les I chert	–	–	–	–	–	–	1
Silicite/ chalcedony	1	<0.1	1	1	<0.1	–	–
Quartz	10	0.4	–	23	0.9	1	–
Granite	1	<0.1	–	2	<0.1	–	–
Burnt	17	0.7	2	7	0.3	–	–
Undefined	17	0.7	5	12	0.5	2	–
Total	2554	100	670	2575	100	978	31

Table 39. Brunn IIa, Brunn IIb and Brunn IV, phase I of the LBK. Proportion of raw material, including varieties.

chipped stone artefacts larger than 10 mm, they are studied from the point of view of raw material, but excluded from the morphological analysis. The settlement of Brunn IIb yielded 3553 chipped stone artefacts altogether, including 987 chips smaller than 10 mm.

With regard to the ^{14}C dates, the settlement of Brunn IV is a chronological intermediate between the settlements of Brunn IIa and Brunn IIb, which are regarded as the oldest, and the settlement of Brunn I, which dates to the end of LBK phase I. Only a small sample of the chipped stone assemblage from the settlement of Brunn IV was examined for the purpose of this study – 31 pieces in all (**table 37**). The complete analysis of the site is the topic of a separate publication.

11.3.3.2.1. Raw material

In both the settlements of Brunn IIa and Brunn IIb, the highest ratio among the raw materials is provided by the Hungarian radiolarites from the Bakony mountains, imported from a distance of 160 km (**tables 38 & 39**). The chipped stone artefacts made from these radiolarites make up more than half of both assemblages (56.6 % in Brunn IIa and 55.9 % in Brunn IIb). The most intensively imported variety is the Szentgál radiolarite, which also prevails at other sites in Transdanubia, Burgenland and Lower Austria. The Úrkút-Eplény and Hárskút types occur much more rarely. A certain part of the radiolarites from the Bakony mountains could not be definitely assigned to either of the above types.

The second most abundant raw material is the local Mauer radiolarites, which represent 37.3 % at the settlement of Brunn IIa and 37.6 % at Brunn IIb. Primary outcrops of Mauer radiolarite are situated hardly 5 km away from the site.

The other raw materials come mainly from the local Danubian gravels, as indicated by the presence of "pebble" cortex. The provenance of some raw materials could not be definitely determined[101].

At first sight, the local Mauer radiolarites are a little more abundant at the settlement of Brunn IV than at the settlements of Brunn II. However, the total of analysed artefacts from this site is very low, and therefore irrelevant. The presence of an artefact made of KL I chert, the outcrops of which lie at a distance of 100–110 km, in southwest Moravia, can be regarded as interesting.

stone assemblage (see chapter 5.2.1.1.), in Brunn am Gebirge the chips ≤ 10 mm were excluded.

101 Within a settlement feature discovered at the site of Brunn II, yet later assigned neither to Brunn IIa nor to Brunn IIb, two artefacts of KL I chert were found, which indicate contacts with southwest Moravia.

11.3.3.2.2. Pre-cores and cores

At the settlement of Brunn IIa, the pre-cores and cores represent 4.6 % and at Brunn IIb 4.2 % of the whole assemblage. Most cores are single-platform, with a primary facetted striking platform without dorsal reduction. Mainly blade blanks were produced from the cores. In the assemblages made up of Mauer radiolarite, a higher ratio of cores and pre-cores occurs (7.2 % in Brunn IIa and 6.3 % in Brunn IIb), which reflects its local origin (**tables 40 & 41**). Among the Transdanubian radiolarites transported from a long distance, the category of pre-cores and cores is much less abundant (2.7 % in Brunn IIa and 2.4 % in Brunn IIb).

11.3.3.2.3. Flakes and waste

Flakes and waste make up 51.8 % of the assemblage at the settlement of Brunn IIa and 46.4 % at Brunn IIb. In the assemblage of Mauer radiolarite, flakes and waste clearly predominate over the other categories (66.4 % in Brunn IIa and 59.5 % in Brunn IIb; **tables 40 & 41**). Just as with the cores, this predominance is caused by the local availability of the raw material, which made it possible to work the major part of it directly at the settlement. In the assemblages of chipped stone artefacts made of Transdanubian radiolarites, flakes and waste represent a much smaller ratio – 40.9 % in Brunn IIa and 37.2 % in Brunn IIb.

Raw material	No. of pieces	Cores	Flakes	Blades	Tools
Bakony radiolarites	1445	40	592	533	280
%	100	2.7	40.9	36.9	19.5
Mauer radiolarite	954	69	633	205	47
%	100	7.2	66.4	21.5	4.9
Radiolarite – origin undefined	99	7	58	24	10
Radiolarite – "pebble" cortex	10	1	9	–	–
Quartz	10	–	3	–	7
Hydrosilicite/ chalcedony ?	1	–	1	–	–
Granite	1	–	1	–	–
Silicite – origin undefined	17	1	12	–	4
Burnt	17	–	13	2	2
Total	2554	118	1322	764	350
%	100	4.6	51.8	29.9	13.7

Table 40. Brunn IIa, phase I of the LBK. The proportion of raw materials in the basic morphological groups.

Raw material	No. of pieces	Cores	Flakes	Blades	Tools
Bakony radiolarites	1440	34	536	627	243
%	100	2.4	37.2	43.5	16.9
Mauer radiolarite	969	61	577	257	74
%	100	6.3	59.5	26.5	7.7
Radiolarite – origin undefined	111	6	59	36	10
Radiolarite – „pebble" cortex	8	2	6	–	–
Quartz	23	–	4	–	19
Gerecse radiolarite ?	1	1	–	–	–
Mecsek radiolarite – burnt?	1	–	–	1	–
Hydrosilicite/ chalcedony	1	1	–	–	–
Granite	2	–	1	–	1
Silicite – origin undefined	12	2	8	–	2
Burnt	7	3	3	1	–
Total	2575	110	1194	922	349
%	100	4.3	46.4	35.8	13.5

Table 41. Brunn IIb, phase I of the LBK. The proportion of raw materials in the basic morphological groups.

Brunn IIa					
Length	No. of pieces	Min (mm)	Max (mm)	Avg (mm)	StDev (mm)
Flakes	7	14	20	17	2.31
Flake tools	2	16.5	20	18.3	2.47

Table 42. Brunn IIa, phase I of the LBK. Length of preparation and blade-like flakes (including flake tools).

Brunn IIb					
Length	No. of pieces	Min (mm)	Max (mm)	Avg (mm)	StDev (mm)
Flakes	–	–	–	–	–
Flake tools	4	21	80	38.5	28.15
Brunn IV					
Flakes	8	14	36	21.2	6.78
Flake tools	–	–	–	–	–

Table 43. Brunn IIb and Brunn IV, phase I of the LBK. Length of preparation and blade-like flakes (including flake tools).

Brunn IIa					
Width	No. of pieces	Min (mm)	Max (mm)	Avg (mm)	StDev (mm)
Flakes	7	9	27	15	6.43
Flake tools	2	9	22	15.5	9.12
Brunn IIb					
Flakes	–	–	–	–	–
Flake tools	4	11	60	15.5	22.04
Brunn IV					
Flakes	8	7	49	19.9	13.76
Flake tools	–	–	–	–	–

Table 44. Brunn IIa, Brunn IIb and Brunn IV, phase I of the LBK. Width of preparation and blade-like flakes (including flake tools).

Brunn IIa					
Thickness	No. of pieces	Min (mm)	Max (mm)	Avg (mm)	StDev (mm)
Flakes	7	2	6	3.5	.55
Flake tools	2	4	5.5	4.8	1.06
Brunn IIb					
Flakes	-	-	-	-	-
Flake tools	4	2	25	11	9.83
Brunn IV					
Flakes	8	2	16	6.25	4.41
Flake tools	-	-	-	-	-

Table 45. Brunn IIa, Brunn IIb and Brunn IV, phase I of the LBK. Thickness of preparation and blade-like flakes (including flake tools).

11.3.3.2.4. Blades and blade fragments

The proportional representation of blades and blade fragments at the settlements of Brunn II is relatively high (29.9 % at Brunn IIa and 35.8 % at Brunn IIb). In the assemblage of Transdanubian radiolarites, the blades are much more abundant (36.9 % in Brunn IIa and 43.5 % in Brunn IIb) than in the assemblage of Mauer radiolarite (21.5 %

Platform remnant	Total		%		Bakony		Mauer		Other rad.	
Dorsal reduction	yes	no	yes	no	yes	no	yes	no	yes	no
Unprepared	0		0		0		0		0	
Plain	1	1			0	1	1	0		
	2		6.4		1		1		0	
Prepared by several blows	1	2			1	0	0	2		
	3		9.7		1		2		0	
Punctiform	1	2			1	2				
	3		9.7		3		0		0	
Primarily facetted	0	23			0	21	0	1	0	1
	23		74.2		21		1		1	
Dihedral	0		0		0		0		0	
Secondary prepared	0		0		0		0		0	
Total	31		100		26		4		1	

Table 46. Brunn IIa, phase I of the LBK. Platform remnants and dorsal reduction of blades and blade tools.

Platform remnant	Total		%		Bakony		Mauer		Other rad.	
Dorsal reduction	yes	no	yes	no	yes	no	yes	no	yes	no
Unprepared	0		0		0		0		0	
Plain	0	2			0	2				
	2		5.5		2		0		0	
Prepared by several blows	0	1			0	1				
	1		2.8		1		0		0	
Punctiform	0	4			0	3			0	1
	4		11.1		3		0		1	
Primarily facetted	0	26			0	19	0	4	0	3
	26		72.2		19		4		3	
Dihedral	0		0		0		0		0	
Secondary prepared	0	3			0	2	0	1		
	3		8.4		2		1		0	
Total	36		100		27		5		4	

Table 47. Brunn IIb, phase I of the LBK. Platform remnants and dorsal reduction of blades and blade tools.

in Brunn IIa and 26.5 % in Brunn IIb). These differences indicate that the Transdanubian radiolarites reached the settlement in a form enabling blade production without any massive reduction of raw material, i.e. in the form of prepared cores. It cannot be excluded that the raw material was partly transported in form of blade blanks.

The blades are relatively small (**tables 49–52**), their length mostly fluctuates around 30 mm. At all the settlements of Brunn IIa, Brunn IIb and Brunn IV, the blades with primarily facetted platform remnant without dorsal reduction predominate (**tables 46–48**).

11.3.3.2.5. Tools

Among the tools, pieces manufactured on blade blanks prevail (**table 55**). For the purpose of this study, only a minor sample of the chipped stone assemblage was analysed (**tables 53 & 54**). At both settlements, truncated blades predominate, mostly with oblique retouch on one end. End-scrapers are also relatively abundant, mainly the short forms of single and double endscrapers and thumbnail endscrapers. A characteristic feature of the chipped stone assemblage from Brunn IIa and Brunn IIb are the trapezes (**fig. 10 & fig. 11: 1–10**). Long trapezes (AA) and the elongated variants of short trapezes (AZ) appear to be the most typical. For both types, an acute angle between the longer lateral edge and the ends is characteristic. Mostly, a dorsal retouch appears on both ends of the trapezes. These trapezes differ from those found at the other settlements of the earliest phase of the LBK, as well as from those coming from the settlements of Brunn I (**fig. 11: 14–15**), Brunn III (**fig. 11: 12**) and Brunn IV (**fig. 11: 13**; see chapter 6.3.6.).

Besides the trapezes, some less typical trapezoidal points and two wide segments also occurred at the settlements of Brunn IIa and Brunn IIb (**fig. 11: 11**). One segment was also found at the early LBK settlement of Neckenmarkt, Burgenland (Gronenborn 1997, 21–22).

Perforators and borers are also a relatively common feature at the settlements of Brunn IIa and Brunn IIb (**fig. 11: 19–27**). It is mostly the slim forms with a weakly-distinguished point that are present. However, some more profiled pieces also occur, but are not as typical as the borers and perforators with a long, well-distinguished point ("Halsbohrer") known from Mohelnice and Vedrovice (Tichý 1962, 258; Ondruš 1975/76).

Transverse burins, a term which, in this case, apparently refers to a certain technique of snapping blades, i.e. the transverse blow[102] (**fig. 11: 16–18**), are peculiar to Brunn IIa and Brunn IIb. Notched fragments show evidence of a further technique of snapping blanks, the so-called notch-fracture-technique ("Kerb-Bruch-Technik"), which entails breaking the blade at a retouched notch.

11.3.3.2.6. Artefacts with sickle gloss

In the chipped stone sample from the settlement of Brunn IIa, three blade fragments with sickle gloss were detected (two on blades with broken off basal and terminal parts, one on a mesial blade fragment). All pieces are truncated (in one case also in combination with a notch) and made of Szentgál radiolarite. From the settlement of Brunn IIb, there are three artefacts with sickle gloss – a blade with broken off terminal and basal parts, a trapezoidal blade with identical retouch on both ends and a thumbnail endscraper of secondary origin. All these pieces are also made from Szentgál radiolarite.

In the chipped stone sample from the settlement of Brunn IV, sickle gloss appeared on one mesial blade fragment made of Szentgál radiolarite, which is secondarily burnt.

102 However, in some cases it could be the so-called pseudo-burin blow originating from the use of the artefact.

Platform remnant	Total		Szentgál		Mauer	
Dorsal reduction	yes	noo	yes	no	yes	no
Unprepared	0	1			0	1
	1		0		1	
Plain	0		0		0	
Prepared by several blows	0		0		0	
Punctiform	0	2	0	1	0	1
	2		1		1	
Primarily facetted	0	6	0	4	0	2
	6		4		2	
Dihedral	0		0		0	
Secondary prepared	0		0		0	
Total	9		5		4	

Table 48. Brunn IV, phase I of the LBK. Platform remnants and dorsal reduction of blades and blade tools.

Brunn IIa					
Length	No. of pieces	Min (mm)	Max (mm)	Avg (mm)	StDev (mm)
Blades	7	21	36	28.4	5.19
Blade tools	2	39.5	65	52.25	18.03
Brunn IIb					
Blades	8	22	48	33.1	8.15
Blade tools	5	24.5	37	31.1	4.71
Brunn IV					
Blades	2	24	35	29.5	7.78
Blade tools	-	-	-	-	-

Table 49. Brunn IIa, Brunn IIb and Brunn IV, phase I of the LBK. Length of whole finished blades and blade tools.

Brunn IIa					
Width	No. of pieces	Min (mm)	Max (mm)	Avg (mm)	StDev (mm)
Blades	19	5.5	18	10.3	2.97
Blade tools	19	7	16	10.8	2.33
Brunn IIb					
Blades	20	6	18	10.4	3.24
Blade tools	26	1	18	9.9	3.03

Table 50. Brunn IIa and Brunn IIb, phase I of the LBK. Width of whole finished blades, blades with broken off terminal part, basal part, terminal and basal parts.

Brunn IV					
Width	No. of pieces	Min (mm)	Max (mm)	Avg (mm)	StDev (mm)
Blades	4	8.5	24	15	6.57
Blade tools	2	8	9	8.5	0.71

Table 51. Brunn IV, phase I of the LBK. Width of whole finished blades, blades with broken off terminal part, basal part, terminal and basal parts.

11.3.3.3. Chipped stone industry from the settlement of Brunn I

The chipped stone assemblage from the settlement of Brunn I is small and consists of just 106 pieces (including one chip). That means it represents only 2 % of the chipped stone artefacts found at the settlements of Brunn IIa, Brunn IIb and Brunn I. Because of W. Antl-Weiser being entrusted with the study of the chipped stone from Brunn I, the following evaluation has to be regarded as preliminary and incomplete.

Brunn IIa					
Thickness	No. of pieces	Min (mm)	Max (mm)	Avg (mm)	StDev (mm)
Blades	20	1	12	3.9	2.31
Blade tools	11	2	17	4.8	4.21
Brunn IIb					
Blades	15	1.5	6	3.2	1.07
Blade tools	22	1.5	5	3.1	1.02
Brunn IV					
Blades	7	2	5.5	3.6	1.46
Blade tools	1	3.5	3.5	3.5	0

Table 52. Brunn IIa, Brunn IIb and Brunn IV, phase I of the LBK. Thickness of finished blades with preserved basal part.

11.3.3.3.1. Raw material

The most abundant raw material appears to be the local Mauer radiolarite (67.6 %). The ratio of the radiolarite from the Bakony mountains decreases to merely 12.4 % (**tables 57 & 58**). Likewise, Szentgál radiolarite is the most frequent variety of Bakony radiolarite found here (nine pieces altogether, one of them burnt). There was one implement made of Krakow Jurassic silicite, imported from a distance of 330–340 km. Unfortunately, it was found on the surface of a settlement feature, which limits the information value of this artefact. However, its presence could well be comparable to the occurrence of radiolarite from the Bakony mountains at sites in south and north Moravia (Mohelnice, Žopy, Kladníky, Vedrovice), where Krakow Jurassic silicite appeared regularly. It also prevails at the cemetery of Kleinhadersdorf, which at least partly belongs to the same chronological period as the settlement of Brunn I.

The origin of radiolarites with "pebble" cortex can be traced to the local Danubian gravels. The provenance of the other radiolarites is uncertain.

The slightly burnt limnosilicite could originate from south Slovakia or north-east Hungary.

11.3.3.3.2. Brief morphological analysis

The ratio of pre-cores and cores at the settlement of Brunn I is three times that of Brunn IIa and Brunn IIb. The majority of this proportion is represented by unworked raw material blocks of local Mauer radiolarite, which show evidence of the raw material having been primarily worked in the settlement area itself. The cores are tiny and mostly single-platform, and they served mainly for the manufacture of blade blanks. For the most part, the striking platform was primary facetted without dorsal reduction.

The total ratio of flakes and waste is higher at the settlement of Brunn I than at Brunn IIa and Brunn IIb, a phenomenon connected to a different raw material preference. While at the settlement of Brunn I it is the local Mauer radiolarites which predominated, at Brunn IIa and

Type of tools	Total	%	Bakony	Mauer	Other
Endscrapers	4	10.5	4		
on a retouched blade	1		1		
thumbnail	2		2		
keeled	1		1		
Truncated blades	9	23.7	8		1
oblique	2		1		1 (rad.)
oblique angled	1		1		
transverse angled	1		1		
oblique on both ends – trapeze shape	4		4		
oblique on both ends – rhomboid shape	1		1		
Burins	0	0			
Blades with lateral retouch	3	7.9	2	1	
unilateral partial	2		2		
bilateral partial	1			1	
Retouched flakes	1	2.6	1		
Borers, perforators and becs	3	7.9	3		
slim perforator with a weakly distinguished point	3		3		
Notches and denticulates	2	5.3	2		
retouched notch	1		1		
denticulated blade (flake)	1		1		
Sidescrapers	0	0			
Trapezes	9	23.7	9		
long – dorsal retouch	7		7		
long – dorsal retouch + dorsal retouch on a break/ notch fragm.	1		1		
long – dorsal retouch + transverse burin	1		1		
Splintered pieces	1	2.6	1		
two-sided cross	1		1		
Combination tools	4	10.5	4		
endscraper – notch	1		1		
truncated blade – notch	2		2		
blade with lateral retouch – notch	1		1		
Hammerstones	2	5.3			2
hammerstone – raw material	1				1 (quartz)
hammerstone fragment	1				2 (quartz)
Tool fragments	0	0			
Total	38		35	1	3

Table 53. Brunn IIa, phase I of the LBK. Tool types and their raw materials (sample).

Type of tools	Total	%	Bakony	Mauer	Other
Endscrapers	13	15.5	11		2
on a blade	3		2		1 (burnt)
on a flake	3		3		
pointed	2		2		
thumbnail	1		1		
thumbnail-double	2		2		
high	1		1		
double	1				1 (rad.)
Truncated blades	24	28.6	21	3	
oblique straight	4		4		
oblique concave	3		3		
oblique angled	1			1	
transverse straight	2		2		
transverse convex	3		2	1	
transverse angled	2		1	1	
oblique on both ends – trapeze shape	8		8		
oblique on both ends, alternate ret. – rhomboid shape	1		1		
Burins	0	0			
Blades with lateral retouch	7	8.3	6	1	
unilateral	4		3	1	
bilateral	3		3		
Retouched flakes	1	1.2	1		
Borers, perforators and becks	5	5.9	5		
slim borer with a weakly distinguished point	1		1		
double borer	1		1		
borer fragment	1		1		
slim perforator with a well distinguished point	1		1		
perforator fragment	1		1		
Notches and denticulates	13	15.5	10		3
retouched notch	1		1		
multiple notch	3		3		
retouch on a break / notch fragment	6		6		
denticulated blade (flake)	2		1		1 (rad.)
denticulates	1				2 (rad.)
Sidescrapers	1	1.2	1		
pointed or angled	1		1		
Trapezes	9	10.7	7	2	
long – dorsal retouch	4		4		
long – dorsal retouch + lateral retouch	1			1	
long – dorsal retouch + ventral retouch	1		1		
long – dorsal retouch + dorsal retouch on a break / notch fragment	3		2	1	
Other microliths	1	1.2	1		
segment – broad	1		1		
Splintered pieces	0	0			
Combination tools	6	7.1	6		
truncated blade – notch	2		2		
blade with lateral retouch – notch	4		4		
Hammerstones	1	1.2			1
Tool fragments	3	3.6	2		1 (rad.)
Total	84		71	6	7

Table 54. Brunn IIb, phase I of the LBK. Tool types and their raw materials (sample).

Brunn IIb it is the radiolarites from the Bakony mountains. The proportional representation of flakes and waste among the Transdanubian radiolarites is nearly identical at all the Brunn settlements (Brunn I – 38.5 %, Brunn IIa – 40.9 % and Brunn IIb – 37.2 %), and much smaller than among the artefacts made of local Mauer radiolarite (Brunn I – 66.2 %, Brunn IIa – 66.4 % and Brunn IIb – 59.5 %). This fact could indicate that the Szentgál radiolarites had been transported in the form of prepared cores.

At the settlement of Brunn I only three blades were found, in no way different from those at the other Brunn settlements. Two broad trapezes of a nearly rectangular shape (transverse arrowheads – AC) were detected among the tools. They are retouched on both ends, one of them dorsally, the other ventrally. Similar broad trapezes and trapezoidal shapes appeared at the cemeteries of Vedrovice "Široká u lesa" and Kleinhadersdorf, which belong to approximately the same chronological period as the settlement of Brunn I.

	Brunn IIa				Brunn IIb			
Type of tools	Total	Cores	Flakes	Blades	Total	Cores	Flakes	Blades
Endscrapers	4	1	2	1	13	1	6	6
Truncated blades	9	–	–	9	24	–	–	24
Burins	–	–	–	–	–	–	–	–
Blades with lateral retouch	3	–	–	3	7	–	–	7
Retouched flakes	1	–	1	–	1	–	1	–
Borers, perforators and becs	3	–	–	3	5	–	–	5
Notches and denticulates	2	–	1	1	13	–	3	10
Sidescrapers	–	–	–	–	1	–	1	–
Trapezes	9	–	–	9	9	–	–	9
Other microliths	–	–	–	–	1	–	–	1
Splintered pieces	1	–	1	–	–	–	–	–
Combination tools	4	–	–	4	6	–	–	6
Hammerstones	2	2	–	–	1	1	–	–
Tool fragments	–	–	–	–	3	–	–	3
Total	38	3	5	30	84	3	5	71

Table 55. Brunn IIa and Brunn IIb, phase I of the LBK. Tool classification by blank types (sample).

Some of them are ventrally retouched, just like those at Brunn I (Mateiciucová 1998, Fig. 2, Fig. 3; 2001a).

11.3.3.4. Chipped stone from settlement burials at Brunn II

At the settlement of Brunn II, four burials with the fragmentarily preserved skeletons of four individuals were discovered in longitudinal pits along the sides of houses. They are regular graves, only a little later than the settlement of Brunn II (Lenneis, Neugebauer-Maresch & Ruttkay 1995, 21). Three of the burials (Burial 1/1990, Burial 2/1990 and Burial 4/1990) included chipped stone artefacts, which can be regarded as grave goods. Chipped stone artefacts also occurred in Burial No. 3; however, they were most probably part of the pit fill.

In Burial No. 1, two whole blades made of a green variety of the local Mauer radiolarite were found. The first blade is 48 mm long and 15 mm wide (**fig. 12: 10**), the second one is 37 mm long and 8.5 mm wide (**fig. 12: 9**). The platform remnants of both the blades are primarily facetted without dorsal reduction and they form an almost right angle with the dorsal surface.

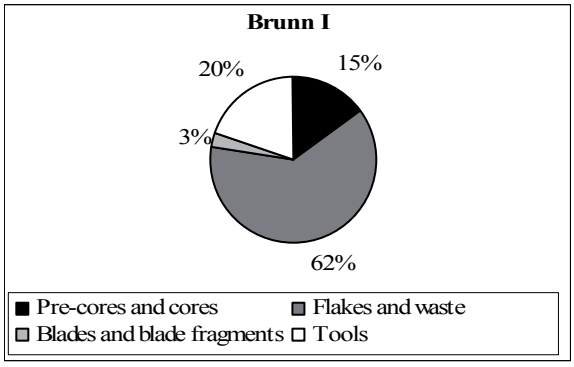
In Burial No. 2, six trapezes (**table 59; fig. 12: 1–6**) and two blades with broken off terminal part (**fig. 12: 7,8**) were discovered. All these artefacts, except one made of Mauer radiolarite, are manufactured from radiolarite from the Bakony mountains. The long trapezes predominate. The short trapezes are also rather elongated. All pieces are dorsally retouched. Two of them are only half-retouched on one end, and they are probably the notch fragments (Inv. No. 142 and 143). On the edges and ends of several trapezes, one can identify some tiny micro-burin negatives (**fig. 12: 7**) which probably originated from using the artefact.

Both blades with broken off terminal part have a primarily facetted platform remnant without dorsal reduction. One blade is made from Szentgál radiolarite and is 29 mm long and 16 mm wide. On its broken off terminal end there are two distinct negatives resulting from burin blows which should, however, rather be taken for pseudo-burin blows.

The other blade is made of Úrkút – Eplény radiolarite and is 32 mm long and 16 mm wide. Burial No. 4 yielded the remains of a child. There was one trapeze of Úrkút – Eplény radiolarite near the skeleton. It is a long trapeze (AA) with dorsal retouch on both ends.

11.3.3.5. Summary

At the settlements of Brunn IIa and Brunn IIb, which date to the earliest phase of the LBK, Transdanubian radiolarites



Basic morphological groups	Total	%
Pre-cores and cores	16	15.2
Flakes and waste	65	61.9
Blades and blade fragments	3	2.9
Tools	21	20
Total	105	100

Table 56. Brunn I, phase I/II of the LBK. Proportion of chipped stone artefacts by basic morphological groups.

Raw material	Artefacts > 12 mm	%	Artefacts ≤ 12 mm	Distance
Mauer radiolarite	71	67.6	1	4 – 10 km
Szentgál radiolarite	8	7.7		160 km
Szentgál radiolarite – burnt	1	0.9		
Bakony radiolarites	4	3.9		
Radiolarite – origin undefined	11	10.6		
Radiolarite – „pebble" cortex	3	2.9		5 – 15 km
Radiolarite – burnt	1	0.9		
Krakow Jurassic silicite	1	0.9		330 – 340 km
Limnosilicite – burnt	1	0.9		170 km, 270 – 280 km
Granite	1	0.9		
Burnt	1	0.9		
Undefined	2	1.9		
Total	105	100	1	

Table 57. Brunn I, phase I/II of the LBK. Proportion of raw materials and distance to outcrops.

Raw material	No. of pieces	Cores	Flakes	Blades	Tools
Mauer radiolarite	71	11	47	1	12
%	100	15.5	66.2	1.4	16.9
Bakony radiolarites	13	3	5	1	4
Radiolarite – origin undefined	11	1	7	–	3
Radiolarite – „pebble" cortex	3	1	2	–	–
Radiolarite – burnt	1	–	1	–	–
Krakow Jurassic silicite	1	–	–	–	1
Limnosilicite – burnt	1	–	1	–	–
Granite	1	–	–	–	1
Burnt	1	–	–	1	–
Undefined – silicite	2	–	2	–	–
Total	105	16	65	3	21
%	100	15.2	61.9	2.9	20

Table 58. Brunn I, phase I/II of the LBK. The proportion of raw materials in the basic morphological groups.

predominate (mainly the Szentgál type; approx. 56 %). Their primary outcrops lie in the Bakony mountains at a distance of about 150–160 km from the site. On the other hand, the local Mauer radiolarites were utilized to just 37–40 %. Mauer radiolarite becomes more important only in later settlement phases; at the settlement of Brunn I it is prevalent. At the sites of Brunn IIa and Brunn IIb, no contacts other than those with south-eastern regions could be detected in relation to the raw materials used. In later phases, on the other hand, communication with some northern (the KL chert at Brunn III) and north-eastern (Krakow Jurassic silicite at Brunn I) regions is also revealed.

At all the settlements of Brunn am Gebirge, the chipped stone industry is microlithic and quite resembles that from the Early Neolithic settlement of Szentgyörgyvölgy-Pityerdomb in Transdanubia[103]. Among the tools, truncated blades prevail. Short endscrapers on flakes, thumbnail endscrapers and above all long trapezes appear to be the typical implements at the settlements of Brunn IIa and Brunn IIb. The ends of several long trapezes are only half-retouched. Similar long trapezes occur at the Late Neolithic sites of Kaposhomok (also trapezes with only half retouch) and Regöly in Transdanubia, as well as at Jásztelek I in north Hungary (Kertész *et al.* 1994, Tab. III.1; Marton pers. comm).[104] Identical long trapezes were also found in the burials dug into the pits flanking the longhouses of Brunn II. The trapezes found at the settlement of Brunn I, on the other hand, are different in form. They are two broad trapezes, the closest analogies of which are known from the cemeteries of Vedrovice "Široká u lesa" and Kleinhadersdorf. Both cemeteries should be at least partly coeval with Brunn I.

Trapezes from burial No. 2			
Find No.	Trapeze	Type of retouch	Raw material
140	short (AZ)	dorsal	Szentgál radiolarite
141	long (AA)	dorsal	Szentgál radiolarite
142	long (AA)	dorsal + dorsal on a break/ notch fragment	Szentgál radiolarite
143	short (AZ)	dorsal + dorsal on a break/ notch fragment	Szentgál radiolarite
144	long (AA)	dorsal	Mauer radiolarite
145	long (AA)	dorsal	Szentgál radiolarite

Table 59. Brunn II – settlement burials, phase I of the LBK. Burial No. 2. Trapezes.

Blank groups	Blanks	Tools	Total
Pebbles and cores	1	-	1
Blades and blade fragments	15	4	19
Flakes	3	1	4
Total	19	5	24
Excluded from further study	1		1

Table 60. Kleinhadersdorf – cemetery, phase I/II and phase II of the LBK. Chipped stone artefacts divided into basic blank groups.

Raw material	No. of pieces	Distance
Krakow Jurassic silicite	8	280–290 km
Krakow Jurassic silicite ?	2	
Szentgál radiolarite	4	190–195 km
Krumlovský Les I chert	3	40–50 km
Krumlovský Les II chert	1	40–50 km
Krakow Jurassic silicite or erratic silicite	1	
Burnt	3	
Undefined	2	
Total	24	

Table 61. Kleinhadersdorf – cemetery, phase I/II and phase II of the LBK. Proportion of raw materials and distance to outcrops.

measurement (mm)	length	width	thickness
small flake	34	19	6
small flake	13	9	2,5
small flake	6	12	1,2
flake fragment	11	14	2,5

Table 62. Kleinhadersdorf – cemetery, phase I/II and phase II of the LBK. Flakes from graves.

103 I thank Eszter Bánffy (Hungarian Academy of Sciences, Budapest) for the possibility of studying the chipped stone industry from this site.

104 At the site of Kaposhomok, alongside the typical Mesolithic points there are also regular blades, short endscrapers and a slim perforator with a weakly-distinguished point, most of them made of Szentgál radiolarite. All the artefacts are very similar to the finds of Brunn II (Marton pers. comm). I thank Tibor Marton for showing me the unpublished material from the Mesolithic site of Regöly in Transdanubia.

11.4. Kleinhadersdorf, position "Marchleiten" (Mistelbach district, Weinviertel, Lower Austria)

11.4.1. Background information

Geographic and geomorphological site characteristics
The municipality of Kleinhadersdorf lies about 4 km west of Poysdorf. The cemetery is situated at the edge of a forest south of Kleinhadersdorf. About 100 m from the cemetery there is a settlement dating to phase II of the LBK. The cemetery lies on west-facing slope at an elevation between 290–300 m above see level.

Research history
In 1931, 19 graves were detected at the position "Marchleiten". A part of them was quite damaged through erosion and the skeletons were also in a poor condition due to aggressive soil conditions. Besides the single burials, there were also a multiple grave of three individuals (Grave No. 1) and a double grave of two infants (Grave No. 17). Graves No. 1–11 had been excavated by J. Bayer. Later in the same year, the excavation was continued by V. Lebzelter, who investigated a further eight graves (Graves No. 12–19) (Lebzelter & Zimmermann 1936, 1–5; Reindl 1937, Nr. 332). The next archaeological campaign at the cemetery followed about 60 years later, in 1987–1991, under the direction of Ch. Neugebauer-Maresch and W. Neugebauer (Federal Office of Historical Monuments). A further 42 graves in various degrees of preservation were found, four of them cremation burials. Thus, a total of 61 graves was discovered. Simple soil stains without skeletons are not included in this count, but the original number of burials presumably reached about a hundred. The deceased were mostly buried in a flexed position on their left side, with head towards the south-east. The grave pit was probably strewn with organic material (e.g. straw), as head and feet lay higher than the rest of body. Several burials were furnished with pottery, shoe-last adzes, stone anvils, pebbles and chipped stone artefacts, as well as jewellery made from Spondylus, Dentalia or snail shells. The pottery and shoe-last adzes sometimes occurred in the upper parts of the grave fill. In addition, a bone awl, antler hook and perforated boar tusks were discovered. On and around some of the skulls traces of red ochre were detected (Lebzelter & Zimmermann 1936, 1–5; Neugebauer-Maresch 1992; Peschel 1992, 157–163; Lenneis, Neugebauer-Maresch & Ruttkay 1995, 36–38).

Definite burials: 36 (Ch.N.)
Empty graves: 39 (Ch.N.)
Graves 1931 – 21 (incl. triple burial)

11.4.2. Dating the site

Absolute chronology
There are no published ^{14}C dates so far.

Relative chronology (after Tichý)
The cemetery was probably in use from phase I of the LBK (Ib phase) up to the late phase III (cremation burials). Most individuals were buried during phase II of the LBK (Lenneis, Neugebauer-Maresch & Ruttkay 1995, 36; Jeunesse 1997, 39–41, 154).

11.4.3. Chipped stone industry

I was allowed to study an assemblage containing 23 chipped stone artefacts. In addition, I also included one pebble found in the triple burial No. 1 discovered in 1931 (**tables 60 & 64**). The chipped artefacts had been recovered during the archaeological excavations in 1987–1991. Among other finds, the triple burial No. 1 yielded a small, transparent reddish-brown flint (L 37 mm and W 14 mm; Lebzelter & Zimmermann 1936, 1–2). It is probably of Krakow Jurassic silicite, which is quite numerous in the assemblage. This artefact was not considered in the study. According to the account of the grave goods, no further chipped stone artefacts were found in the other graves examined in 1931 (Lebzelter & Zimmermann 1936, 1–5; Reindl 1937).

11.2.3.1. Nearest outcrops of appropriate raw materials

All outcrops of lithic raw materials are relatively far from the settlement. The nearest resources appear to be the cherts and radiolarites from the Danubian gravels at a distance of 30–40 km and the Krumlovský Les cherts situated about 42–48 km away from the site.

11.4.3.2. Raw material

Among the raw materials, Krakow Jurassic silicite, imported from a distance of 280 – 290 km, prevails (**table 61**). The other most utilized raw materials are Szentgál radiolarites and Krumlovský Les cherts. A very similar raw material spectrum was also detected at the cemetery of Vedrovice "Široká u lesa" (see chapter 11.14.3.4.1.).

Trapezes and trapezoidal shapes	No. of pieces	No. of grave
Trapezes		
Broad trapeze (transverse arrowheads) – AC	–	
Short trapeze – AZ	–	
Retouched trapezoidal shapes		
Mesial fragment of a blade with transverse truncation	1	79
Fragment of flake with reduced basal part	1	79
Fragment of a blade with retouch on a break/ notch fragment	1	79
Unretouched trapezoidal shapes		
Basal fragment of a blade	8	17, 22, 52, 79
Terminal fragment of a blade	2	40, 79
Small flakes and flake fragments	2	81
Total	15	**in 6 graves**

Table 63. Kleinhadersdorf – cemetery, phase I/II and phase II of the LBK. Total number of chipped stone artefacts with trapezoidal shape.

Grave	Sex	Type of artefact	Retouch	No. of pieces	Raw material	Trapezes/ trapezoidal shapes
1c/1931	male- triple burial	oblong pebble		1	undefined	
17	male	endscraper on a blade with broken off terminal part	dorsal retouch on one end	1	Krakow Jurassic silicite ?	
		blade with retouch on both ends	dorsal retouch concave + dorsal retouch convex	1	Szentgál radiolarite	
		whole blade		1	Krakow Jurassic silicite ?	
		mesial fragment of a blade		1	Krakow Jurassic silicite	AC
22	child	mesial fragment of a blade		1	undefined	AZ
40	undefined	terminal fragment of a blade		1	erratic silicite or Krakow Jurassic	AC
52	undefined	blade with broken off terminal part		1	KL II chert	
		mesial fragment of a blade		1	Krakow Jurassic silicite	AZ
		mesial fragment of a blade		1	burnt	AC
57	undefined	mesial fragment of a blade		1	burnt	AZ
70	undefined	blade with broken off terminal and basal parts		1	burnt	
79	male	blade with broken off terminal part		1	Krakow Jurassic silicite	
		blade with broken off terminal part		1	Krakow Jurassic silicite	
		mesial fragment of a blade with transverse truncation	ventral retouch on one end	1	Szentgál radiolarite	AC
		mesial fragment of a blade		1	Szentgál radiolarite	AC
		fragment of flake with reduced basal part	dorsal retouch	1	Szentgál radiolarite	AC
		mesial fragment of a blade		1	Krakow Jurassic silicite	AC
		mesial fragment of a blade		1	Krakow Jurassic silicite	AC
		terminal fragment of a blade		1	Krakow Jurassic silicite	AC
		mesial fragment of a blade	dorsal retouch on a break/ notch fragment	1	Krakow Jurassic silicite	AC
81	undefined	small flake		1	KL I chert	?
		small flake		1	KL I chert	AC ?
		small flake		1	KL I chert	AC
		total		24		15

Table 64. Kleinhadersdorf – cemetery, phase I/II and phase II of the LBK. Chipped stone artefacts in the individual graves.

11.4.3.3. Pebbles, pre-cores and cores

Only one burial (triple burial 1c/1931) yielded an oblong pebble. Its measurements are: L 119 mm, W 29 mm, and T 26 mm. In size, it resembles an oblong pebble from grave 15/75 at the cemetery of Vedrovice. Unfortunately, I have not myself investigated it.

11.4.3.4. Flakes and waste

In the whole assemblage, there are three tiny flakes and one flake fragment with secondarily retouched platform remnant (**table 62**). All tiny flakes are made of KL I chert and come from grave No. 81. Two of them had been detached successively from the same core. The fragment of the flake with the secondary platform remnant is made of Szentgál radiolarite and comes from grave No. 79. The sizes of the two flakes and the flake fragment resemble the sizes of blade fragments found in other burials and interpreted as arrowheads. The flakes mentioned above have an identical function, perhaps just a symbolic one. The flake fragment (grave No. 79) occurred in association with trapezoidal shapes, several pieces of which are also made of Szentgál radiolarite. Similarly, in a child burial (grave No. 39) at the cemetery of Vedrovice, three tiny flakes of KL chert were recovered together with a trapeze and some trapezoidal shapes made of Krakow Jurassic silicite. The tiny flakes from grave No. 81 probably had a similar function, as did the trapeze and the other trapezoidal shapes found in grave No. 39 (i.e. arrowheads) (Mateiciucová 1998; 2002a, 96–99).

11.4.3.5. Blades and blade fragments

A total of five burials yielded one whole blade (**fig. 12: 13**) and 18 blade fragments, four of them retouched. It was the fragments of mesial parts which occurred most frequent-

ly in the burials – altogether ten times (including two retouched pieces; **fig. 12: 14,15,17,18,20,26–28,31**). In four cases, a blade with broken off terminal part was discovered (including an endscraper; **fig. 12: 12,19,24,25**). Eleven of all the blade fragments are of a trapezoidal form (in two cases modified by retouch) and resemble the trapezes found in the burials at Vedrovice (see chapter 11.14.3.4.7.).

The majority of blades was probably just broken into smaller parts ("fracture technique", "Bruch-Technik"). In one case, a partial truncation was discovered (**fig. 12: 31**), which can indicate either snapping of the blade by breakage with additional partial retouch on the broken end, or preparation of a notch at which the blade was then broken ("notch-fracture-technique", "Kerb-Bruch-Technik"). Both techniques of snapping blades are familiar from the LBK and they also occur at the cemetery of Vedrovice.

The platform remnant was preserved on five pieces. It was always primarily facetted, in two cases in combination with dorsal reduction.

The width of blade fragments varies between 8.5–21 mm (avg 13.4 mm), and the thickness between 1.5–5.5 mm (avg 3.2 mm).

11.4.3.6. Tools

Five out of the total of 24 chipped stone artefacts were modified by retouch – four blades and one flake fragment. Three of the pieces are made of Szentgál radiolarite and two of Krakow Jurassic silicite.

Three of these retouched implements are trapezoidal. This includes two mesial blade fragments, the first with ventral retouch on one end (**fig. 12: 26**), and the second with partial truncation, which could be a notch fragment (**fig. 12: 31**). There is also a trapezoidal flake fragment with dorsally secondarily retouched platform remnant (**fig. 12: 32**).

Besides the trapezoidal shapes, grave No. 17 contained an endscraper on a blade manufactured from Krakow Jurassic silicite (**fig. 12: 12**), and a blade with dorsal retouch on both ends made from Szentgál radiolarite (**fig. 12: 11**). On both these implements one could see a touch of gloss along the edges (see chapter 11.4.3.8.).

11.4.3.7. Appearance and function of trapezoidal shapes

There were altogether 15 chipped stone artefacts of a so-called trapezoidal shape (**table 63**). Similar trapezoidal shapes can also be found at the cemetery of Vedrovice, position "Široká u lesa", where they appear in burials alongside trapezes, indicating a similar function for both types. The trapezes were mounted as arrowheads and that is probably also the way in which the trapezoidal shapes were used. In Kleinhadersdorf, the artefacts of a trapezoidal shape occurred in burials in groups of 1–7 pieces, perhaps originally representing a bundle of arrows. The measurements of most trapezoidal shapes are close to the broad trapezes AC (transverse arrowhead). Exceptionally, some also have dimensions equivalent to the short trapezes AZ. In overall character, size and raw material used, the trapezoidal shapes from Kleinhadersdorf very much resemble the trapezes and trapezoidal shapes from the cemetery of Vedrovice "Široká u lesa" (see chapter 11.14.3.4.7.; chapter 6.3.6.).

11.4.3.8. Artefacts with gloss

Two blades with gloss on the edge appeared in grave No. 17 (Lenneis, Neugebauer-Maresch & Ruttkay 1995, Abb. 16: 1). One blade was made of Krakow Jurassic silicite and shaped into an endscraper on a blade. The gloss is visible along one edge. The other blade was manufactured from Szentgál radiolarite and dorsally retouched on both ends. In this case, the gloss appears along both edges. However, this is not the typical sickle gloss which would indicate that these artefacts had been used as sickle blades. The gloss occurs along the edges only and does not reach the main body of the tool. Therefore, I propose that these are not sickle inserts, but other implements, probably for personal use. The distinct gloss along the edge can originate e.g. from cutting skins (Korobkowa 1999, 120–121).

11.4.3.9. Summary

The chipped stone artefacts from the cemetery at Kleinhadersdorf are mostly made of raw materials imported from considerable distances. Krakow Jurassic silicite prevails, supplemented by Szentgál radiolarites and Krumlovský Les cherts. Distant raw material imports were found in male burials. These differences, however, appear much more obvious at the cemetery of Vedrovice "Široká u lesa" (see below).

Most chipped stone artefacts show a trapezoidal shape and proportions comparable with broad trapezes (transverse arrowheads). The other blade artefacts often have apparent use wear on the edges, and they probably belonged to the personal equipment of the buried individuals.

The variety of raw materials and the artefact types from the cemetery of Kleinhadersdorf considerably resemble the chipped artefacts from the cemetery of Vedrovice "Široká u lesa", which dates to LBK phases Ib and IIa (Podborský 2002, 316, 336). The Kleinhadersdorf burials probably belong to the same chronological period.

11.5. Mold I (Horn district, Waldviertel, Lower Austria)

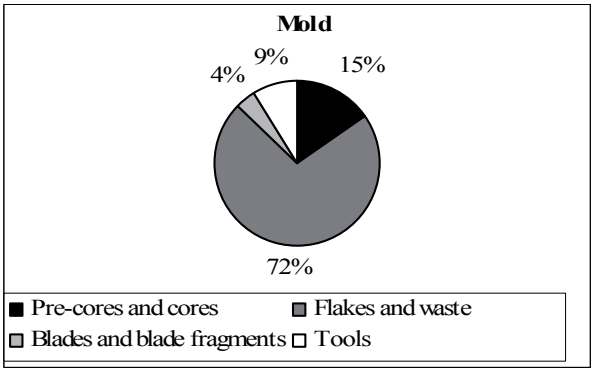
11.5.1. Background information

Geographic and geomorphological site characteristics

The site is situated in the Waldviertel region east of the Taffa stream, about 3 km south-east of the town of Horn. In terms of geology, Waldviertel belongs to the crystalline range at the eastern border of the Bohemian Massif (Demek & Novák *et al.* 1992, 46–47). The site elevation is 290–295 m above sea level and is sloping to the south. The cover of the site consists of loamy loess on a gneiss base. Next to this site lies another Early Neolithic settlement, Rosenburg (see below). For more details on the environmental conditions of the Horn region – see chapter 11.6.1.

Blank groups	Total	%	Blanks	Tools	Tools ≤ 12 mm
Pre-cores and cores	13	16.6	12	1	-
Flakes and waste	59	75.7	56	3	-
Blades and blade fragments	5	7.7	3	3	2
Total	78	100	71	7	2

Table 65. Mold, LBK phase I/II of the LBK. Chipped stone artefacts divided into basic blank groups.



Basic morphological groups	Total	%
Pre-cores and cores	12	15.4
Flakes and waste	56	71.8
Blades and blade fragments	3	3.8
Tools	7	9
Total	78	100

Table 66. Mold, phase I/II of the LBK. Proportion of chipped stone artefacts by basic morphological groups.

Blank groups	No. of pieces	Weight (g)	Avg (g)
Pre-cores and cores	13	511.9	39.4
Flakes and waste	59	312.1	5.3
Blades and blade fragments	6	8	1.3
Total	78	832	10.6

Table 67. Mold, phase I/II of the LBK. Weight of chipped stone artefacts.

Raw material	Artefacts > 12 mm	%	Artefacts ≤ 12 mm	Distance
Krumlovský Les I chert	38	48.7	3	65–75 km
Krumlovský Les II chert	3	3.8	-	65–75 km
Krumlovský Les chert – burnt	1	1.3	-	65–75 km
Krumlovský Les I chert ?	2	2.6	-	
SWPS of Japons type	8	10.2	-	ca 20 km
Siliceous weathering products of serpentinites	7	8.9	1	ca 20, 40–45 km
Siliceous weathering products of serpentinites ?	1	1.3	-	
Quartz	8	10.2	-	
Szentgál radiolarite	2	2.6	-	220–230 km
Krakow Jurassic silicite ?	1	1.3	-	320–330 km
Krakow Jurassic silicite or KL II	1	1.3	-	
Erratic silicite ?	1	1.3	-	200–220 km
Moravian Jurassic chert	1	1.3	-	65–75, 90–100 km
Radiolarite – origin undefined	1	1.3	-	
SWPS or spongolite	1	1.3	-	
SWPS or limnosilicite	1	1.3	-	
Chert – origin undefined	1	1.3	-	
Mauer radiolarite ?	-	-	1	
Burnt	-	-	1	
Total	78	100	6	

Table 68. Mold, phase I/II of the LBK. Proportion of raw materials, including varieties and distance to outcrops.

Research history

The total surface of the site in Mold is about 40 000 m², known by field survey. Since 1995 archaeological excavations under the direction of E. Lenneis (University of Vienna) yielded the remains of 13 longhouses. The most impressive feature of this area was house No. 1 with 37,5 m in length (Großbau, "big building"). Huge houses of that sort seem to be the result of an advanced development of early LBK communities (Lenneis 1996; 1997a, 2004, 152–154).

11.5.2. Dating the site

Absolute chronology

Laboratory VERA – four dates (Stadler *et al.* 2000)

cal BC: 5320 – 5070 (Stadler *et al.* 2000)
68.2 % confidence
cal BC 5320 – 5200 (38.1 %)
cal BC 5180 – 5070 (30.1 %)

95.4 % confidence
cal BC 5470 – 5440 (3.0 %)
cal BC 5430 – 5040 (92.40 %)

Relative chronology (after Tichý)

Mold I dates to the transitional phase Ib/IIa of the LBK (Lenneis 1997a; Kowarik 2006).

Raw material	No. of pieces	Cores	Flakes	Blades	Tools
Krumlovský Les chert	44	9	29	3	3
%	100	20.5	65.9	6.8	6.8
Siliceous weathering products of serpentinites	16	–	15	–	1
Quartz	8	2	6	–	–
Szentgál radiolarite	2	1	–	–	1
Krakow Jurassic silicite ?	1	–	–	–	1
Krakow Jurassic silicite or KL II	1	–	1	–	–
Erratic silicite ?	1	–	–	–	1
Moravian Jurassic chert	1	–	1	–	–
Radiolarite – origin undefined	1	–	1	–	–
SWPS or spongolite	1	–	1	–	–
SWPS or limnosilicite	1	–	1	–	–
Chert – origin undefined	1	–	1	–	–
Total	78	12	56	3	7

Table 69. Mold, phase I/II of the LBK. Proportion of raw materials in the basic morphological groups.

11.5.3. Chipped stone industry

During the excavations at the settlement of Mold I in 1995–1997, an assemblage of 80 chipped stone artefacts was recovered (including two pieces ≤ 12 mm; **tables 65 & 66**). It is the category "flakes and waste" which distinctly dominates (72 %), but the "pre-cores and cores" show a high proportion as well (15 %). The whole chipped stone assemblage from the settlement of Mold seems to be waste products. Most of the chipped artefacts are very tiny, blades are almost absent and the implements are also rather fragmentary (**table 67**). Likewise, the cores are either fragments or exhausted nodules. The entire assemblage makes an impression of the settlement being abandoned intentionally and all the usable material being taken away.

Pre-cores and cores	Blanks	Tools	Total
Unworked raw material	–	1	1
Pre-cores	1	–	1
Cores	10	–	10
Splintered pieces	–	–	–
Core fragments	1	–	1
Total	12	1	13

Table 70. Mold, LBK phase I/II. Pre-cores and cores.

11.5.3.1. Nearest outcrops of appropriate raw material

A raw material of sufficient quality can be found in the siliceous weathering products of serpentinites, the nearest outcrops of which lie next to the municipality of Japons, about 20 km north-west of Mold. Further outcrops of this raw material are known from south-west Moravia around Jevišovice, about 40–45 km away from the site. Rock crystals and quartz occur in pegmatites of the Waldviertel region. Potential sources are the gravels of the Kamp stream and the old arm of the Danube river.

11.5.3.2. Raw material

Unlike the settlement of Rosenburg I, which utilized above all the imported Transdanubian radiolarites, in the period discussed here the same territory shows an increased orientation to local and regional outcrops.

More than half of the chipped stone from Mold is made of Krumlovský Les chert, mainly of the KL I variety (**tables 68 & 69**). The KL cherts had been transported from a distance of 65 – 75 km. Local siliceous weathering products of serpentinites appear much more often here than in Rosenburg; nevertheless, they represent just about fifth of the raw materials used. There were also two artefacts of Szentgál radiolarite, the outcrops of which lie 220 – 230 km away from the site. One, maybe two artefacts could be made of Krakow Jurassic silicite.

11.5.3.3. Pre-cores and cores

This category represents a relatively high ratio – 15 % of the whole assemblage of chipped stone. Unworked raw material appears in just one case (**tables 70 & 71**) – it is a local siliceous weathering product of serpentinites and is used as a hammerstone. Most cores and one intact core (with prepared platform and frontal ridge adjustment) are made of KL I chert. However, quartz also occurred, alongside one considerably exhausted core of Szentgál radiolarite (**table 72**).

The cores are mostly single-platform, of a prismatic or keeled form. They served for producing blades, and in an advanced stage of reduction also for the detachment of flakes. The striking platform was prevailingly adjusted by primary faceting. Except for one case, dorsal reduction is missing. Alongside a right-angled platform, an acute platform angle is also relatively frequent.

11.5.3.4. Flakes and waste

At the settlement of Mold, the category "flakes and waste" obviously predominates over the other categories. Most flakes are made of KL chert, siliceous weathering products of serpentinites, and quartz (**table 69**). Among flakes and flake tools, the artefacts with a partially preserved natural surface predominate (**table 74**), which means that some raw materials had been worked directly at the settlement. These are mainly siliceous weathering products of serpentinites and KL chert, a primary flake of which was found at the settlement (**table 73**).

Pre-cores	Raw material	Preparation	Height	Width	Thickness	Weight	Tool
1	SWPS	unworked raw material	62	54	49	142	hammerstone
2	KL I	pre-core with prepared crest and striking platform	54	39	44.5	79.9	-

Table 71. Mold, phase I/II of the LBK. Pre-cores.

Cores	Raw material	Type of blanks	No. of platforms	Shape	Platform preparation	Dorsal reduction	Platform angle	Height	Width	Thickness	Weight	Tool
1	KL I	flake core	single	prismatic	plain	no	acute	25	26	25	21.8	–
2	KL I	flake core	single	prismatic	facetted	yes	right	32	34	32	30.4	–
3	KL I	undefined	single	prismatic	prepared by several removals	no	acute	47	29.5	19.5	39.6	–
4	KL I	blade core	single	core fragment	facetted	no	right	23	28.5	29	16.2	–
5	KL I	blade core	single	keel	rejuv. by facetting	no	acute	43	27	37	53.3	–
6	Szentgál	blade-flake core	multiple re-sidual.	irregular	facetted	no	right	28	29	25	23.1	–
7	KL I	blade-flake core	single?	irregular	rejuv. by several removals	no	right	33	34	18	19.3	–
8	Quartz	blade-flake core	single		undefined	no	acute	42	26	33	38.3	–
9	KL I	blade-flake core	single	keel	facetted	no	right	20.5	23	32	15.6	–
10	KL I	blade-flake core	double	keel	facetted	no	acute	33	20	31	21.2	–
11	Quartz	blade core	single	burin-like	facetted	no	acute	38	12	22	11.4	–

Table 72. Mold, phase I/II of the LBK. Cores.

Type of flake	No. of pieces	%	KL	SWPS	Flakes	Tools
Preparation flake	36	61.1	21	7	34	2
Blade-like flake	1	1.7	1	–	1	–
Splintered flake	2	3.4	–	2	2	–
Crested flakes and secondary crested flakes	–		–	–	–	–
Rejuvenation flake from a core's knapping surface	1	1.7	1	–	1	–
Rejuvenation flake from a core's striking platform	–		–	–	–	–
Rejuvenation flake from a core's base	–		–	–	–	–
Primary flake	1	1.7	1	–	1	–
Other technical flake	–		–	–	–	–
From polished tools	–		–	–	–	–
Waste	13	22	6	3	12	1
Natural raw material fragments	5	8.4	1	3	5	–
Total	59	100	31	15	56	3

Table 73. Mold, phase I/II of the LBK. Flakes and waste.

Surface of flakes and flake tools	No. of pieces	%	KL	SWPS	Other
Cortical	4	6.7	2	2	-
Partly cortical	32	54.2	18	8	6
Without cortex	23	39.1	11	5	7
Total	59	100	31	15	13

Table 74. Mold, phase I/II of the LBK. Degree of preservation of natural surface on flakes including retouched tools.

Length	No. of pieces	Min (mm)	Max (mm)	Avg (mm)	StDev (mm)
Flakes	35	13	45	22.9	7.46
Flake tools	2	21	52	36.5	21.92

Table 75. Mold, phase I/II of the LBK. Length of preparation and blade-like flakes (including flake tools).

Width	No. of pieces	Min (mm)	Max (mm)	Avg (mm)	StDev (mm)
Flakes	35	9	53	21.5	9.11
Flake tools	2	18	58	38	28.28

Table 76. Mold, phase I/II of the LBK. Width of preparation and blade-like flakes (including flake tools).

Thickness	No. of pieces	Min (mm)	Max (mm)	Avg (mm)	StDev (mm)
Flakes	35	2	20	7.1	3.67
Flake tools	2	5	17	11	8.48

Table 77. Mold, phase I/II of the LBK. Thickness of preparation and blade-like flakes (including flake tools).

11.5.3.5. Blades and blade fragments

In the whole assemblage there are only six blade fragments, three of them retouched (**tables 78 & 79**). Unretouched blades are made of KL I chert. Retouched blades are manufactured from KL I chert and from raw materials of uncertain origin (Krakow Jurassic silicite?, erratic silicite?). Just two blades have a preserved platform remnant, which is primarily facetted without dorsal reduction.

11.5.3.6. Raw material transport

Local siliceous weathering products of serpentinites reached the settlement in form of roughly knapped blocks of raw material or in a natural, unworked state (**tables 69, 71 & 74**). This is documented by cortical flakes and by the unworked raw material used as hammerstones. Additional production was probably carried out directly within the settlement area. The KL cherts could likewise have reached the settlement already in form of roughly prepared raw material, with the additional working carried out within the settlement. This is suggested by a high ratio of flakes, the predominance of flakes with preserved cortex and the occurrence of a primary flake. On the other hand, it is very likely that the majority of the KL cherts reached the settlement in form of cores prepared for the production of blanks, as indicated by a high ratio of cores of this raw material in the assemblage.

11.5.3.7. Tools

Nine artefacts (including two pieces ≤ 12 mm) pertain to the category of implements (**tables 82 & 83**).

Type of blade	Blade blanks	Flake tools
Whole blade	–	–
Blade with broken off terminal part	1	–
Blade with broken off basal part	1	–
Blade with broken off terminal and basal part	1	1
Basal fragment of a blade	–	1
Terminal fragment of a blade	–	1
Whole crested blade	–	–
Fragment of a crested blade	–	–
Whole secondary crested blade	–	–
Fragment of a secondary crested blade	–	–
Total	3	3

Table 78. Mold, phase I/II of the LBK. Blades and blade fragments.

Surface of blades and blade tools	No. of pieces	KL	Krakow Jurassic	erratic silicite
Cortical	–	–	–	–
Partly cortical	1	1	–	–
Without cortex	5	3	1	1
Total	6	4	1	1

Table 79. Mold, phase I/II of the LBK. Degree of preservation of natural surface on blades including retouched tools.

Width	No. of pieces	Min (mm)	Max (mm)	Avg (mm)	StDev (mm)
Blades	3	11	13	12	1
Blade tools	1	18	18	18	0

Table 80. Mold, phase I/II of the LBK. Width of whole finished blades, blades with broken off terminal part, basal part, terminal and basal parts.

Thickness	No. of pieces	Min (mm)	Max (mm)	Avg (mm)	StDev (mm)
Blades	1	6	6	6	0
Blade tools	1	4	4	4	0

Table 81. Mold, phase I/II of the LBK. Thickness of finished blades with preserved basal part.

Type of tools	Total	Cores	Flakes	Blades
Endscrapers	3	–	2	1
Truncated blades	3	–	–	3
Burins	–	–	–	–
Blades with lateral retouch	–	–	–	–
Retouched flakes	–	–	–	–
Borers, perforators and becs	1	–	–	1
Notches and denticulates	–	–	–	–
Sidescrapers	1	–	1	–
Trapezes	–	–	–	–
Other microliths	–	–	–	–
Splintered pieces	–	–	–	–
Combination tools	–	–	–	–
Hammerstones	1	1	–	–
Tool fragments	–	–	–	–
Total	9	1	3	5

Table 82. Mold, phase I/II of the LBK. Tool classification by blank types.

Five of them are manufactured on blades, three on flakes and unworked raw material of siliceous weathering products of serpentinites acted as hammerstones. Endscrapers and truncated blades appear most often. Furthermore, there were a sidescraper and a slim perforator with a weakly distinguished point, which quite resembles the perforators from Rosenburg I also made of KL I chert.

11.5.3.8. Artefacts with sickle gloss

No artefacts with sickle gloss were found at the settlement.

11.5.3.9. Summary

The settlement of Mold dates to the same chronological period as the cemetery of Vedrovice "Široká u lesa" and the settlement of Brunn I. Close by lies the site of Rosenburg, which dates early in LBK phase Ia. A study of the chipped stone assemblage from the settlement of Mold reveals a surprisingly high ratio of flakes, waste and cores at the expense of blades and retouched implements. Most artefacts are preserved in a fragmentary state and they make an impression of waste left behind when the settlement was abandoned, while the usable tools and raw material were taken away.

The chipped stone artefacts are mostly made of KL chert. Local siliceous weathering products of serpentinites appear less frequent. The Transdanubian radiolarite which prevails at the older settlement of Rosenburg occurred in just two cases.

Type of tools		Total	KL	Other
Endscrapers		3	1	2
	on a flake	1	1	
	pointed	2		1 (Szentgál), 1 (Krakow Jur. ?)
Truncated blades		3	1	2
	oblique concave	1		1 (erratic silicite?)
	transverse convex	1		1 (Mauer?)
	transverse angled	1	1	
Burins		0		0
Blades with lateral retouch		0		
Retouched flakes		0		
Borers, perforators and becs		1	1	
	slim perforator with a weakly distinguished point	1	1	
Notches and denticulates		0		
Sidescrapers		1	1	
	straight	1	1	
Trapezes		0		
Other microliths		0		
Splintered pieces		0		
Combination tools		0		
Hammerstones		1	1	1
	hammerstone-raw material	1	1	1(SWPS)
Tool fragments		0		
Total		9	4	5

Table 83. Mold, phase I/II of the LBK. Tool types and their raw materials.

11.6. Rosenburg I (Horn district, Waldviertel, Lower Austria)

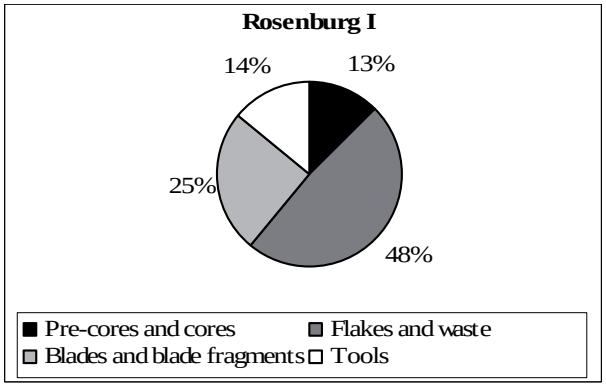
11.6.1. Background information

Geographic and geomorphological site characteristics

The site is situated about 4 km south of the town of Horn in the Waldviertel area in the north-western part of Lower Austria. In terms of geology, Waldviertel belongs to the crystalline range at the eastern border of the Bohemian Massif (Demek & Novák *et al.* 1992, 46–47). With regard to orography, Rosenburg is situated in the so-called Horn Basin. The site lies on a small loess island in the valley of the Kamp stream, which has mainly steep rocky banks. The site lies in a region oknolevel. Unlike the other, more unfavourable parts of Waldviertel, the climatic and soil conditions of this microregion are different, as it approximates the natural conditions of Pannonia. The Horn region with its continental, temperate climate belongs to the warmest parts of Waldviertel. In terms of pedology, it is situated on a boundary between the more humid loess territory of the Alpine foothills and the dryer loess region of Waldviertel and Burgenland (Kreuz 1990, 102–109).

Blank groups	Total	%	Blanks	Tools	Tools ≤ 12 mm
Pre-cores and cores	8	14.5	7	1	–
Flakes and waste	31	56.4	29	2	–
Blades and blade fragments	16	29.1	7	9	2
Total	55	100	43	12	2

Table 84. Rosenburg I, phase I of the LBK. Chipped stone artefacts divided into basic blank groups.



Basic morphological groups	Total	%
Pre-cores and cores	7	12.7
Flakes and waste	29	52.7
Blades and blade fragments	7	12.7
Tools	12	21.8
Total	55	99.9

Table 85. Rosenburg I, phase I of the LBK. Proportion of chipped stone artefacts by basic morphological groups.

Blank groups	No. of pieces	Weight (g)	Avg (g)
Pre-cores and cores	8	197.6	24.7
Flakes and waste	31	103.1	3.3
Blades and blade fragments	16	19.8	1.2
Total	55	320.5	5.8

Table 86. Rosenburg I, phase I of the LBK. Weight of chipped stone artefacts.

Raw material	Artefacts > 12 mm	%	Artefacts ≤ 12 mm	Distance
Szentgál radiolarite	9	16.5	28	230 km
Szentgál radiolarite – burnt	2	3.6	–	231 km
Úrkút-Eplény radiolarite	10	18.2	6	232 km
Hárskút radiolarite	1	1.8	0	233 km
Bakony radiolarite	7	12.8	10	234 km
Krumlovský Les I chert (+1 burnt)	11	20	13	70–80 km
Quartz	6	10.9	10	
Radiolarit – origin undefined	1	1.8	–	10–60 km
SWPS of Japons typ	2	3.6	–	20 km, 45–50 km
Mecsek or Gerecse radiolarite	1	1.8	–	250 km, 325 km
Erratic silicite	1	1.8	–	200 km
Krakow Jurassic silicite	1	1.8	–	330–340 km
Granulite	1	1.8	–	
Rock crystal	–	–	3	
Chert	2	3.6	2	
Total	55	100	72	

Table 87. Rosenburg I, phase I of the LBK. Proportion of raw materials, including varieties and distance to outcrops.

Research history

The LBK settlement at Rosenburg covers an area of about 1 ha and thus belongs to the smallest ones. In 1988–1994, an archaeological excavation took place under the direction of E. Lenneis, with the financial support of the cultural department of the government of Lower Austria.

Raw material	No. of pieces	Cores	Flakes	Blades	Tools
Bakony radiolarite	29	7	14	3	5
Krumlovský Les I chert	11	–	4	1	6
Quartz	6	–	6	–	–
Radiolarite – origin undefined	1	–	1	–	–
Siliceous weathering products of serpentinites	2	–	2	–	–
Mecsek or Gerecse radiolarite	1	–	–	–	1
Erratic silicite	1	–	–	1	–
Krakow Jurassic silicite	1	–	–	1	–
Granulite	1	–	1	–	–
Chert	2	–	1	1	–
Total	55	7	29	7	12

Table 88. Rosenburg I, phase I of the LBK. Proportion of raw materials in the basic morphological groups.

Pre-cores and cores	Blanks	Tools	Total
Unworked raw material	-	-	0
Pre-cores	-	-	0
Cores	3	-	3
Splintered pieces	3	1	4
Core fragments	1	-	1
Total	7	1	8

Table 89. Rosenburg I, phase I of the LBK. Pre-cores and cores.

Cores	Raw material	Type of blanks	No. of platforms	Shape	Platform preparation	Dorsal reduction	Platform angle	Height	Width	Thickness	Weight	Tool
1	Bakony	blade core	1	prismatic	undefined	no	right	32	18	27	12	
2	Bakony	blade core	–	splintered piece	–	–	–	34	27	19	18.6	
3	Bakony	blade core	–	splintered piece	–	–	–	28	51	21	29	
4	Bakony	blade–flake core	1	flat	facetted	no	acute	36	33	17	20	
5	Bakony	blade–flake core	–	splintered piece	–	–	–	36	27	19	15	
6	Bakony	blade core	–	core fragment	–	–	–	46	0	0	31	
7	Bakony	blade–flake core	1	irregular	rejuv. by facetting	no	right	34	35	32	48	
8	Bakony	–	–	splintered piece	–	–	–	47	28	18	24	splintered piece

Table 90. Rosenburg I, phase I of the LBK. Cores.

Type of flake	No. of pieces	Bakony rad.	KL I	Flakes	Tools
Preparation flake	16	7	2	15	1
Blade-like flake	–	–	–	–	–
Splintered flake	1	1	–	1	–
Crested flakes and secondary crested flakes	–	–	–	–	–
Rejuvenation flake from a core's knapping surface	–	–	–	–	–
Rejuvenation flake from a core's striking platform	–	–	–	–	–
Rejuvenation flake from a core's base	–	–	–	–	–
Primary flake	–	–	–	–	–
Other technical flake	–	–	–	–	–
From polished tools	–	–	–	–	–
Waste	12	6	3	12	–
Natural raw material fragments	1	–	–	1	–
Undefined	1	–	–	–	–
Total	31	14	5	29	1

Table 91. Rosenburg I, phase I of the LBK. Flakes and waste.

Surface of flakes and flake tools	No. of pieces	Bakony	KL I	Other
Cortical	–	–	–	–
Partly cortical	9	1	2	6
Without cortex	22	12	4	7
Total	31	13	6	13

Table 92. Rosenburg I, phase I of the LBK. Degree of preservation of natural surface on flakes including retouched implements.

Length	No. of pieces	Min (mm)	Max (mm)	Avg (mm)	StDev (mm)
Flakes	15	13	37	23.4	7.52
Flake tools	1	30	30	30	0

Table 93. Rosenburg I, phase I of the LBK. Length of preparation and blade-like flakes (including flake tools).

Width	No. of pieces	Min (mm)	Max (mm)	Avg (mm)	StDev (mm)
Flakes	15	9	31	20.3	7
Flake tools	1	34	34	34	0

Table 94. Rosenburg I, phase I of the LBK. Width of preparation and blade-like flakes (including flake tools).

Thickness	No. of pieces	Min (mm)	Max (mm)	Avg (mm)	StDev (mm)
Flakes	15	2	13	7.1	3.19
Flake tools	1	19	19	19	0

Table 95. Rosenburg I, phase I of the LBK. Thickness of preparation and blade-like flakes (including flake tools).

The settlement features discovered at the site can be assigned to a minimum of seven house plans.

Other features can be characterized as longitudinal pits, loam pits and indefinable pits. In 1991, a group of three pits was discovered between houses 4 and 7. Pit No. 241 represented the remains of a cooking area, Pit No. 242 an oven and Pit No. 198 contained residues from sweeping a fireplace. Most pottery finds date to the early LBK, phase Ib. Just one house and several pits (including the oven – Pit No. 242) fall into the early middle phase of the LBK (Lenneis & Stadler 1995). I was entrusted with the study of the chipped stone industry from the settlement features dating to phase I of the LBK only.

11.6.2. Dating the site

Absolute chronology

Unfortunately, the absolute dating of the site Rosenburg got verified as late as in 2007 whereby originally it has been dated to the earliest LBK Ia stage, basing on the C-14 data. It was only recently that the original data coming from charcoal of ancient trees were doubted and compared to the data from osteological material, which are corresponding well to the relative chronology (pers. comm. E. Lenneis).

Type of blade	Blade blanks	Blade tools
Whole blade	2	–
Blade with broken off terminal part	2	3
Blade with broken off basal part	1	1
Blade with broken off terminal and basal part	–	1
Basal fragment of a blade	–	–
Mesial fragment of a blade	–	1
Terminal fragment of a blade	1	2
Whole crested blade	–	1
Fragment of a crested blade	1	–
Whole secondary crested blade	–	–
Fragment of a secondary crested blade	–	–
Total	7	9

Table 96. Rosenburg I, phase I of the LBK. Blades and blade fragments.

Surface of blades and blade tools	No. of pieces	Bakony	KL I	Other
Cortical	–	–	–	–
Partly cortical	2	1	–	1
Without cortex	14	7	6	1
Total	16	8	6	2

Table 97. Rosenburg I, phase I of the LBK. Degree of preservation of natural surface on blades including retouched tools.

Platform remnant Dorsal reduction	Total yes no	Bakony yes no	KL I yes no	Other yes no
Unprepared	0 1	0	0	0 1
Plain	0 1	0	0 1	0
Prepared by several blows	0	0	0	0
Punctiform	0 2	0 1	0 1	0
Primarily facetted	0 5	0 2	0 1	0 2
Dihedral	0	0	0	0
Secondary prepared	0	0	0	0
Total	9	3	3	3

Table 98. Rosenburg I, phase I of the LBK. Platform remnants and dorsal reduction of blades and blade tools.

Length	No. of pieces	Min (mm)	Max (mm)	Avg (mm)	StDev (mm)
Blades	2	42	52	47	7.07
Blade tools	–	–	–	–	–

Table 99. Rosenburg I, phase I of the LBK. Length of whole finished blades and blade tools.

Width	No. of pieces	Min (mm)	Max (mm)	Avg (mm)	StDev (mm)
Blades	5	8	19	12.6	4.04
Blade tools	5	5	18	10.2	4.97

Table 100. Rosenburg I, phase I of the LBK. Width of whole finished blades, blades with broken off terminal part, basal part, terminal and basal parts.

Thickness	No. of pieces	Min (mm)	Max (mm)	Avg (mm)	StDev (mm)
Blades	4	2	6	3.4	1.8
Blade tools	3	1.8	10	5.3	4.24

Table 101. Rosenburg I, phase I of the LBK. Thickness of finished blades with preserved basal part.

LBK phase I

Laboratories GrA, GrN in Groningen and VERA – a total of 10 dates (Feature 198)

(Lenneis & Stadler 1995; Lenneis, Stadler & Windl 1996; Stadler *et al.* 2000, Fig. 18)

cal BC: 5480 – 5200
68.2 % confidence
cal BC 5470 – 5440 (5.8 %)
cal BC 5430 – 5210 (59.6 %)
cal BC 5170 – 5140 (2.7 %)
95.4 % confidence
cal BC 5650 – 5050 (95.4 %)

LBK phase II

Laboratories GrA and VERA – a total of four dates (Feature 242) (Stadler *et al.* 2000, 19, Fig. 19)

cal BC: 5250 – 4950
68.2 % confidence
cal BC 5550 – 5450 (6.9 %)
cal BC 5250 – 4950 (61.3 %)
95.4 % confidence
cal BC 5650 – 5350 (22.9 %)
cal BC 5300 – 4850 (72.5 %)

Relative chronology (after Tichý)

early settlement phase – LBK phase Ib
late settlement phase – LBK phase IIa

11.6.3. Chipped stone industry

During the archaeological excavations, 127 pieces of chipped stone were recovered altogether. In order to keep the comparability with other assemblages (see chapter 10.2.1.1.), the pieces ≤ 12 mm were excluded from the quantitative analysis. For an additional study, 55 artefacts larger than 12 mm were chosen from the total of 127 pieces. Alongside other tools, two implements ≤ 12 mm are described (**tables 84 & 85**).

The majority of the chipped stone artefacts larger than 12 mm was found within the settlement features No. 12 (ten pieces) and No. 385 (nine pieces). On the other hand, tiny chips ≤ 12 mm, which originate during manufacturing and refinement of artefacts (including fragments), mostly appeared within the settlement features No. 1 (24 pieces), No. 12 (22 pieces) and No. 61 (11 pieces).

11.6.3.1. Nearest outcrops of appropriate raw materials

The siliceous weathering products of serpentinites are a raw material of sufficient quality. Their nearest outcrops lie next to the municipality of Japons, about 20 km NW of Rosenburg. Further outcrops of this raw material are known from south-west Moravia around Jevišovice, about 40–45 km away from the site. The gravels of the Kamp stream and the old arm of the Danube are further potential sources. Rock crystals and quartz occur in pegmatites of the Waldviertel region.

11.6.3.2. Raw material

More than half of the 55 chipped stone artefacts is made of Transdanubian radiolarites, the primary outcrops of which lie at a distance of about 250 km south-east of the village. In Rosenburg, the Transdanubian radiolarites are represented mainly by the Úrkút-Eplény (ten pieces) and Szentgál (nine pieces) types. One piece was assigned to the Hárskút type[105]. Nine pieces could not be definitely assigned to any type and

105 For the identification of selected items and valua-

Type of tools	Total	Cores	Flakes	Blades
Endscrapers	4	–	2	2
Truncated blades	2	–	–	2
Burins	–	–	–	–
Blades with lateral retouch	–	–	–	–
Retouched flakes	–	–	–	–
Borers, perforators and becs	6	–	–	6
Notches and denticulates	–	–	–	–
Sidescrapers	–	–	–	–
Other microliths	–	–	–	–
Tools with facial retouch	–	–	–	–
Splintered pieces	1	1	–	–
Combination tools	–	–	–	–
Hammerstones	–	–	–	–
Tool fragments	1	–	–	1
Total	14	1	2	11

Table 102. Rosenburg I, phase I of the LBK. Tool classification by blank types. (+ 2 tools ≤ 12 mm).

are thus represented as the radiolarites from the Bakony mountains (**tables 87 & 88**).

Likewise, I believe that another artefact of radiolarite may come from Hungary[106].

The second most abundant raw material found in Rosenburg is Krumlovský Les I chert (ten pieces and one burnt piece). Its occurrence indicates some north-south contacts and, strikingly, it appears here mainly in the form of retouched implements.

There was one implement made of Krakow Jurassic silicite, imported from a distance of 330-340 km. One artefact of erratic silicite was also identified (ca 200 km). Unfortunately, it was found on the surface of a settlement feature, which limits the information value of this artefact.

The other raw materials found at Rosenburg can most probably be described as of local character. These comprise the siliceous weathering products of serpentinites occurring around Rosenburg, quartz and granulite (one piece)[107]. Several rock crystal chips appeared among the chipped stone artefacts ≤ 12 mm. On some of them the cortex is partly preserved, which reveals that they come from gravels.

Type of tools	Total	Bakony	KL I	Other
Endscrapers	4	1	2	1
on a blade	2	1	1	
high – nosed	1			1 (Ger. or Mecsek)
high	1		1	
Truncated blades	2	2		
transverse convex	1	1		
oblique on both ends – trapeze shape	1	1		
Burins	0			
Blades with lateral retouch	0			
Retouched flakes	0			
Borers, perforators and becs	6		6	
slim perforator with a weakly distinguished point	2		2	
robust perforator	2		2	
perforator fragment	1		1	
perforator fragment – Vedrovice type	1		1	
Notches and denticulates	0			
Sidescrapers	0			
Trapezes	0			
Other microliths	0			
Splintered pieces	1	1		
single sided opposing	1	1		
Combination tools	0			
Hammerstones	0			
Tool fragments	1	1		
Total	14	5	8	1

Table 103. Rosenburg I, phase I of the LBK. Tool types and their raw materials.

11.6.3.3. Pre-cores and cores

A total of eight pieces from Rosenburg fall into this category (**tables 89 & 90**). These are three single-platform cores, four splintered pieces (**fig. 13: 14, 15**) and one blade-core fragment. All the cores are of radiolarite from the Bakony mountains. This indicates the form in which the raw material reached the settlement. The nodules are small – their height varies between 28 – 47 mm. All three single-platform cores originally served for producing blade blanks. Blade/flake negatives on two of them (**fig. 14: 1**) indicate a considerable degree of exhaustion. The blade-like character of the chipped stone artefacts produced is also documented by tools mainly manufactured on blade blanks. On two single-platform cores, it can be recognised how the platform was adjusted. One platform was trimmed, or rather rejuvenated, by faceting, while the other was dressed by one single blow.

The cores unable to provide any more blade blanks served for producing flakes, also by use of a splintering technique (**fig. 13: 15**).

11.6.3.4. Flakes and waste

With 31 pieces (56.4 % including tools), flakes and waste predominate in the assemblage.

Of the total of 31 pieces assigned to this category, only two artefacts were classified as tools. Flakes and flake fragments of radiolarite from the Bakony mountains prevail (13 pieces). Neither of them has preserved cortex or was modified by retouch. Among the flakes of other raw materials, a negative surface is also predominant (**table 92**). It relates to their exhaustion and secondary preparation rath-

ble information I thank Katalin T. Biró (National Museum in Budapest).

106 Together with Antonín Přichystal, I assume the origin to be in the Mecsek mountains in south-west Hungary (Mateiciucová 2001a, Tab. VII). After Katalin T. Biró, it is most probably a radiolarite from the Gerecse mountains in north-west Hungary, on the border to Slovakia.

107 For the identification I thank Antonín Přichystal. According to him, granulites can be found in gravels of the Kamp stream at Gars/Kamp (near Horn).

er than to core production. No technologically significant flakes (e.g. a flake rejuvenating a core platform or knapping surface) occur in the assemblage (**table 91**).

11.6.3.5. Blades and blade fragments

In Rosenburg, there are a total of 16 blades and blade fragments > 12 mm. Nine of them are modified by retouch (**table 96**). The blades made of radiolarite from the Bakony mountains (seven pieces, including four retouched) dominate alongside those of KL I chert (six pieces, including five retouched).

Just two final (one of Krakow Jurassic silicite) and one crested blade of Úrkút-Eplény radiolarite (**fig. 13: 10**) are completely preserved. Their length varies between 42 – 52 mm. The blades are regular and almost every one of them has a negative surface (**table 97**). The adjustment of the platform could be traced back for nine blades. It was mostly dressed by primary faceting (**fig. 13: 9,10**). Dorsal reduction on blades is absent (**table 98**).

11.6.3.6. Raw material transport

It is likely that the raw material from the Bakony mountains reached the site in form of cores prepared for the production of blade blanks. This assumption can be supported by the absence of pre-cores of this raw material at the settlement.

Cores of KL I chert are missing in Rosenburg. More than half of the artefacts made from this chert are retouched implements (six pieces); five of them are manufactured on blade blanks[108]. It cannot be excluded that the KL I chert reached the site in form of blanks or final tools[109].

11.6.3.7. Tools

Of the total of 55 chipped stone artefacts > 12 mm, 12 pieces are additionally modified by retouch. Along with the other tools, two implements of a size ≤ 12 mm have also been studied, i.e. 14 tools are examined altogether (**tables 102 & 103**).

It is striking that the most abundant implement in Rosenburg is the perforator (**fig. 13: 4,6–8,12,13**). There are six in all (including fragments), three of them found in the same settlement feature (Fea. No. 1). One perforator fragment (**fig. 13: 13**) could probably be designated as the Vedrovice type (Kaczanowska 1985, 44–45). M. Kaczanowska named it after the settlement of Vedrovice "Široká u lesa", where a whole collection of similar perforators with a well-distinguished point and made of Krakow Jurassic silicite was discovered (Ondruš 1975/76; Lech 1983a). Unfortunately, only a point fragment of this perforator type is preserved at Rosenburg. Even more remarkable is the fact that all the perforators from Rosenburg are made of KL I chert. On three pieces (all from Fea No. 1), I detected some residual limestone on the retouch, which is probably evidence for their use to bore a limestone (maybe marble) raw material or Spondylus, very likely to make beads (see chapter 6.3.4.).

Furthermore, four endscrapers were detected, two of KL I chert (**fig. 14: 2**), one of Szentgál radiolarite (**fig. 13: 2**) and one of Gerecse or Mecsek (?) radiolarite (**fig. 13: 11**). Two truncated blades of radiolarite from the Bakony mountains were also found (**fig. 13: 1**).

One of the cores – a splintered piece (**fig. 13: 14**; see chapter 10.2.3.4.1.) – also falls under tools. Trapezes, which are characteristic of the earliest phase of the LBK, are missing at Rosenburg.

11.6.3.8. Artefacts with sickle gloss

At this settlement, there are no artefacts with sickle gloss.

11.6.3.9. Summary

At the earliest LBK settlement of Rosenburg, the Trasdanubian radiolarites from distant outcrops in north-west Hungary predominate. KL cherts from south-west Moravia were also utilized. On the other hand, any local outcrops of siliceous weathering products of serpentinites were almost completely neglected. In terms of raw materials used, Rosenburg considerably differs from the younger settlement of Mold, where KL cherts predominate, supplemented by siliceous weathering products of serpentinites. The occurrence of Krakow Jurassic silicite in the earliest period cannot be definitely proven, as the site was also settled in the late phase of the LBK.

A specific trait of the chipped assemblage from Rosenburg is formed by the collection of perforator fragments, some of them with traces of limestone or a similar material (marble, Spondylus) on their worn edges. They are all manufactured from KL chert and the whole collection probably represents the remnants of a boring kit, which could be restricted to the production of beads or similar artefacts. No trapezes are found at the settlement, although they occur at other sites of the early phase of the LBK. Artefacts with sickle gloss are also missing in both Rosenburg and Mold.

108 To these six tools can be added two other pieces ≤ 12 mm. They are also made on blade blanks.

109 Tiny chips of this chert in some settlement features can indicate the production or repair of tools.

11.7. Brno-Ivanovice, position "Globus" (district of Brno city, South Moravia, Czech Republic)

11.7.1. Background information

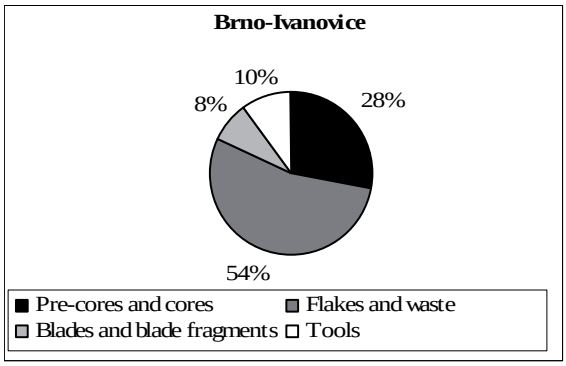
Geographic and geomorphologic site characteristic

The municipality of Brno-Ivanovice is part of the city of Brno and is situated on its north-west periphery at the main road from Brno to Svitavy, in the valley of the Ponávka stream, a left-bank tributary of the Svratka river. In terms of orography, the Ponávka valley is part of the Řečkovice-Kuřim Graben, which represents the north-eastern part of the Bobrava highlands, consisting of abyssal igneous rocks of Brno pluton. The Bobrava highlands pertain to the Brno highlands, creating the heart of Moravia around Brno, and geologically belong to the Bohemian Massif. The average height of the Brno highlands is approximately 412 m above sea level (Demek & Novák *et al.* 1992, 16, 21–23).

The site lies on a SE slope at an elevation of about 280 m above sea level. The subsoil consists of ochre-coloured silty loam interleaved with patches of clay (Geisler 1999).

Blank groups	Total	%	Blanks	Tools
Pre-cores and cores	15	30	14	1
Flakes and waste	30	60	27	3
Blades and blade fragments	5	10	4	1
Total	50	100	45	5

Table 104. Brno-Ivanovice, phase I of the LBK. Chipped stone artefacts divided into basic blank groups.



Basic morphological groups	Total	%
Pre-cores and cores	14	28
Flakes and waste	27	54
Blades and blade fragments	4	8
Tools	5	10
Total	50	100

Table 105. Brno-Ivanovice, phase I of the LBK. Proportion of chipped stone artefacts by basic morphological groups.

Blank groups	No. of pieces	Weight (g)	Avg (g)
Pre-cores and cores	15	767.2	51.2
Flakes and waste	30	365.5	11.9
Blades and blade fragments	5	18	3.6
Total	50	1150.7	23

Table 106. Brno-Ivanovice, phase I of the LBK. Weight of chipped stone artefacts.

Raw material	Artefacts > 12 mm	%	Distance
Olomučany chert	34	68	10 km
Moravian Jurassic chert	5	10	5–15 km
Krumlovský Les II chert	3	6	25–30 km
Krumlovský Les I chert	1	2	25–30 km
Erratic silicite	2	4	100–120 km
Krakow Jurassic silicite	1	2	260 km
Bakony radiolarite	1	2	270 km
Quartz	1	2	
Burnt	1	2	
Undefined	1	2	
Total	50	100	

Table 107. Brno-Ivanovice, phase I of the LBK. Proportion of raw materials, including varieties and distance to outcrops.

Raw material	No. of pieces	Cores	Flakes	Blades	Tools
Olomučany chert	34	11	17	2	4
Moravian Jurassic chert	5	1	3	1	–
Krumlovský Les chert	4	1	3	–	–
Erratic silicite	2	–	1	1	–
Krakow Jurassic silicite	1	–	1	–	–
Bakony radiolarite	1	–	1	–	–
Quartz	1	–	–	–	1
Burnt	1	1	–	–	–
Undefined	1	–	1	–	–
Total	50	14	27	4	5

Table 108. Brno-Ivanovice, phase I of the LBK. Proportion of raw materials in the basic morphological groups.

Pre-cores and cores	Blanks	Tools	Total
Unworked raw material	1	1	2
Pre-cores	4	–	4
Cores	7	–	7
Splintered pieces	–	–	–
Core fragments	2	–	2
Total	14	1	15

Table 109. Brno-Ivanovice, phase I of the LBK. Pre-cores and cores.

Research history

In 1995, the Institute of Archaeological Research and Preservation of Historical Monuments (ÚAPP) in Brno carried out a rescue excavation related to the construction of the Globus shopping centre. The excavation yielded settlement features of the LBK, Moravian Painted Ware and Bell Beaker cultures, as well as a cemetery from the 10–11th centuries.

Pre-cores	Raw material	Preparation	Height	Width	Thickness	Weight	Tool
1	Quartz	unworked raw material	56	43	35	98	hammerstone
2	Olomučany	unworked raw material	75	–	–	160	
3	Olomučany	raw material prepared by several detachments	36	–	–	26.4	
4	Olomučany	raw material prepared by several detachments	37	–	–	23	
5	Olomučany	raw material prepared by several detachments	36	22	41	38	
6	Olomučany	raw material with prepared striking platform and crest	44	28	40	52	

Table 110. Brno-Ivanovice, phase I of the LBK. Pre-cores.

Cores	Raw material	Type of blanks	No. of platforms	Shape	Platform preparation	Dorsal reduction	Platform angle	Height	Width	Thickness	Weight	Tool
1	Olom.	blade–flake core	single	prismatic	facetted	no	acute	32	27	45	56	–
2	Olom.	blade–flake core	single	prismatic	plain	no	right	34	35	34	42	–
3	Olom.	–	–	core fragment	–	–	–	40	–	–	33	–
4	Olom.	blade core	single	semi–conical	facetted	no	right	34	18	17	9,8	–
5	Olom.	blade core	single		rejuv. by facetting	no	obtuse	27	32	22	20	–
6	burnt	–	–	core fragment	–	–	–	40	–	–	38	–
7	Olom.	flake core	–	irregular	–	–	–	50	–	–	59	–
8	MJC	blade–flake core	single	prismatic	facetted	no	right	48	35	40	64	–
9	KL II	flake core	–	irregular	–	–	–	40	–	–	48	–

Table 111. Brno-Ivanovice, phase I of the LBK.Cores.

The settlement features of the LBK are spread within a triangular area of 250 × 215 × 240 m. There are neither house plans nor storage pits.

11.7.2. Dating the site

Absolute chronology
Laboratory VERA – one date (animal bone)[110]

VERA-2596 (Feature 527/1995)
Dating BP: 6345 ± 40
68.2 % confidence
cal BC 5460 – 5450 (1.3 %)
cal BC 5380 – 5290 (57.4 %)
cal BC 5260 – 5220 (9.5 %)
95.4 % confidence
cal BC 5470 – 5400 (12.8 %)
cal BC 5390 – 5220 (82.6 %)

Relative chronology (after Tichý)
Brno-Ivanovice "Globus" – phase Ia of the LBK – (Čižmář 1998, 106–107).

11.7.3. Chipped stone industry

At the site, there is a total of 50 pieces of chipped stone (**tables 104 & 106**). Each of the artefacts is larger than 12 mm. Almost half of them (about 44 %, 22 pieces) come from settlement feature No. 530, eight pieces are from feature No. 504. In the other settlement features, the number of chipped artefacts did not exceed five pieces.

11.7.3.1. Nearest outcrops of appropriate raw materials

The nearest raw material resources appear to be the Olomučany cherts at a distance of about 10 km to the north-east of the site. Another suitable material are the Moravian Jurassic cherts (abbreviated to MJC) from the eastern edge of the Brno Basin (8–16 km away from the settlement). Of these, it is probably the Stránská skála cherts which are of the highest quality. The outcrops of honey-coloured Cretaceous spongolite cherts occur just about 20–30 km north of Brno-Ivanovice, on the territory of the Boskovice Furrow. These spongolites can be also found in the gravels of the Svitava river. Likewise, the outcrops of Krumlovský Les chert (25–30 km) are situated relatively close to the settlement.

11.7.3.2. Raw material

The majority of chipped stone pieces was made of Olomučany chert (34 pieces – 68 %; **tables 107 & 108**). In addition, Krumlovský Les chert (four pieces) and a non-specified Moravian Jurassic chert (five pieces) had been utilized. The only known outcrop of Olomučany chert lies near Olomučany in the central part of the Moravian Karst, about 10 km north-east of the settlement of Brno-Ivanovice (Přichystal 1994, 44). In the LBK, this raw material had above all a local significance and predominated at settlements within a range up to 20 km from the primary outcrops. Only in the earliest LBK phase does it also show a slightly higher proportion at some more distant sites (Vedrovice "Za dvorem").

Type of flake	No. of pieces	Olomučany	MJC + KL	Flakes	Tools
Preparation flake	16	10	5	14	2
Blade-like flake	–	–	–	–	–
Splintered flake	2	2	–	2	–
Crested flakes and secondary crested flakes	–	–	–	–	–
Rejuvenation flake from a core's knapping surface	1	1	–	–	1
Rejuvenation flake from a core's striking platform	–	–	–	–	–
Rejuvenation flake from a core's base	–	–	–	–	–
Primary flake	–	–	–	–	–
Other technical flake	–	–	–	–	–
From polished tools	–	–	–	–	–
Waste	11	7	1	11	–
Natural raw material fragments	–	–	–	–	–
Total	30	20	6	27	3

Table 112. Brno-Ivanovice, phase I of the LBK. Flakes and waste.

Surface of flakes and flake tools	No. of pieces	Olomučany	MJC	KL	Other
Cortical	1	–	1	–	–
Partly cortical	9	3	2	2	2
Without cortex	20	17	–	1	2
Total	30	20	3	3	4

Table 113. Brno-Ivanovice, phase I of the LBK. Degree of preservation of natural surface on flakes including retouched tools.

110 The sample was analysed as part of the Austrian Science Fund Project P12353-PHY (Stadler et al. 2000). The calibration is based on Bronk Ramsey (1995; 2001) and Raimer et al. (2004).

Length	No. of pieces	Min (mm)	Max (mm)	Avg (mm)	StDev (mm)
Flakes	14	20	56	34.1	9.93
Flake tools	2	21	41	31	14.14

Table 114. Brno-Ivanovice, phase I of the LBK. Length of preparation and blade-like flakes (including flake tools).

Width	No. of pieces	Min (mm)	Max (mm)	Avg (mm)	StDev (mm)
Flakes	14	14	63	32.9	13.7
Flake tools	2	30	33	31.5	2.12

Table 115. Brno-Ivanovice, phase I of the LBK. Width of preparation and blade-like flakes (including flake tools).

Thickness	No. of pieces	Min (mm)	Max (mm)	Avg (mm)	StDev (mm)
Flakes	14	4	22	9.5	5.24
Flake tools	2	6	13	9.5	4.95

Table 116. Brno-Ivanovice, phase I of the LBK. Thickness of preparation and blade-like flakes (including flake tools).

The Krumlovský Les chert (25–30 km) appears in the assemblage both in its fine-grained variety KL II (four pieces) and the coarse-grained variety KL I (one piece). Two pieces of Moravian Jurassic cherts could originate either from the eastern periphery of Brno or from the Krumlovský Les territory (Přichystal 1994, 44).

The nearest outcrops of erratic silicite (two pieces) are located in north Moravia at a distance of about 100–120 km.

Krakow Jurassic silicite appeared only once in Brno-Ivanovice. However, its presence is in no way surprising, since it even predominated over other, mainly local raw materials at some early LBK sites (Kladníky, Žopy, Mohelnice). Already during stage I of the LBK, it also occurs at sites situated further south or further from the primary outcrops than Brno-Ivanovice (260 km), e.g. Bylany, the Vedrovice cemetery, Asparn-Schletz (Lech 1989a, 112; Mateiciucová 1997b, Fig. 4).

At Brno-Ivanovice, there was also one artefact made of Szentgál radiolarite from north-west Hungary (270 km).

Type of blade	Blade blanks	Blade tools
Whole blade	1	–
Blade with broken off terminal part	1	–
Blade with broken off basal part	1	–
Blade with broken off terminal and basal part	1	1
Basal fragment of a blade	–	–
Mesial fragment of a blade	–	–
Terminal fragment of a blade	–	–
Whole crested blade	–	–
Fragment of a crested blade	–	–
Whole secondary crested blade	–	–
Fragment of a secondary crested blade	–	–
Total	4	1

Table 117. Brno-Ivanovice, phase I of the LBK. Blades and blade fragments.

11.7.33.3. Pre-cores and cores

The proportional representation of cores and pre-cores, including one tool (15 pieces – 30 %), is high and probably relates to a local production of chipped stone artefacts, whereby the cores damaged at an initial stage of working or during the acquisition of blanks were not rejuvenated because the raw material was easily available and maybe also not first-class, i.e. they were put aside and another nodule was selected for knapping (**table 109**).

Four pieces made of Olomučany chert originate from a core preparation phase. In three cases, these are only roughly dressed nodules; one piece was modified by a frontal crest adjustment and a prepared knapping surface (**table 110**).

Among the cores in the exploitation phase (nine pieces) the blade and flake/blade single-platform cores with striking platform adjusted by primary faceting predominate (**table 111**; **fig. 15: 1,2**). Their form is mostly prismatic, but a keeled example also occurred. On one core, the striking platform was dressed by one single blow (**fig. 15: 3**). Two irregular flake cores could also be detected. Among the exploited nodules, it is again Olomučany chert that appears most frequently.

A hammerstone of quartz and pieces of unworked Olomučany chert also fall in this category.

Surface of blades and blade tools	No. of pieces	Olomučany	MJC	Other
Cortical	–	–	–	–
Partly cortical	1	1	–	–
Without cortex	4	2	1	1
Total	5	3	1	1

Table 118. Brno-Ivanovice, phase I of the LBK. Degree of preservation of natural surface on blades including retouched tools.

Length	No. of pieces	Min (mm)	Max (mm)	Avg (mm)	StDev (mm)
Blades	1	35	35	35	0
Blade tools	–	–	–	–	–

Table 119. Brno-Ivanovice, phase I of the LBK. Length of whole finished blades and blade tools.

Width	No. of pieces	Min (mm)	Max (mm)	Avg (mm)	StDev (mm)
Blades	4	13	20	17	3.54
Blade tools	1	19	19	19	0

Table 120. Brno-Ivanovice, phase I of the LBK. Width of whole finished blades, blades with broken off terminal part, basal part, terminal and basal parts.

Thickness	No. of pieces	Min (mm)	Max (mm)	Avg (mm)	StDev (mm)
Blades	2	5	6	5.5	0.71
Blade tools	–	–	–	–	–

Table 121. Brno-Ivanovice, phase I of the LBK. Thickness of finished blades with preserved basal part.

11.7.3.4. Flakes and waste

Among 30 flakes (including tools), preparation flakes (16 pieces) and waste (11 pieces; **table 112**) predominate. An artefact of Szentgál radiolarite was assigned to the waste products, while another of Krakow Jurassic silicite is a preparation flake. Two flakes were made by a splintering technique and one by rejuvenating the knapping surface of a core.

The natural surface of the raw material is most frequently visible among the Moravian Jurassic cherts and the KL cherts (**table 113**; **fig. 15: 7a,7b**).

11.7.3.5. Blades and blade fragments

In Brno-Ivanovice, there were five blades, one of which was additionally modified by retouch (**fig. 15: 4**). Three blades are

Type of tools	Total	Cores	Flakes	Blades
Endscrapers	–	–	–	–
Truncated blades	–	–	–	–
Burins	–	–	–	–
Blades with lateral retouch	1	–	–	1
Retouched flakes	1	–	1	–
Borers, perforators and becs	–	–	–	–
Notches and denticulates	–	–	–	–
Sidescrapers	–	–	–	–
Trapezes	–	–	–	–
Other microliths	–	–	–	–
Splintered pieces	1	–	1	–
Combination tools	1	–	1	–
Hammerstones	1	1	–	–
Tool fragments	–	–	–	–
Total	5	1	3	1

Table 122. Brno-Ivanovice, phase I of the LBK. Tool classification by blank types.

made of Olomučany chert, two of them have a broken off basal part. In one case there was an entire blade with plain platform remnant without dorsal reduction, the surface is partly cortical (**tables 117 & 118**). One blade of a non-specified Moravian Jurassic chert has a broken off terminal part and a primarily facetted platform remnant, again without dorsal reduction (**fig. 15: 8**). Another blade with broken off terminal and basal parts is made of erratic silicite (**fig. 15: 5**).

11.7.3.6. Raw material transport

The presence of pre-cores and a high ratio of cores and flakes indicate that the chipped stone artefacts must have been produced at the site. However, a low proportional representation of cortical flakes hints at the form of the raw material, which probably occurs in blocks or big nodules with fewer natural cortical surfaces than the raw materials appearing in form of smaller concretions and pebbles. On the other hand, the low ratio of flakes is probably caused by the primary working of the raw material (i.e. rough knapping) being performed outside the settlement.

11.7.3.7. Tools

Only five artefacts were classified as tools (**table 122**). One retouched blade, two retouched flakes (one in combination with a retouched notch) and one splintered piece (also made on a flake blank) are made of Olomučany chert. The fifth tool is a quartzite hammerstone.

11.7.3.8. Artefacts with sickle gloss

No artefacts with sickle gloss were found at the settlement.

11.7.3.9. Summary

The settlement of the oldest phase of the LBK culture in Brno-Ivanovice is situated in the vicinity of primary outcrops of Olomučany chert, which was processed directly at the settlement.

Just as at other Moravian sites of the earliest phase of the LBK culture, Szentgál radiolarites and Krakow Jurassic silicite were also identified at. There are neither trapezes nor borers/perforators.

11.8. Brno-Nový Lískovec, position "Pod Kamenným vrchem" (Brno-city district, South Moravia, Czech Republic)

11.8.1. Background information

Geographic and geomorphological site characteristics

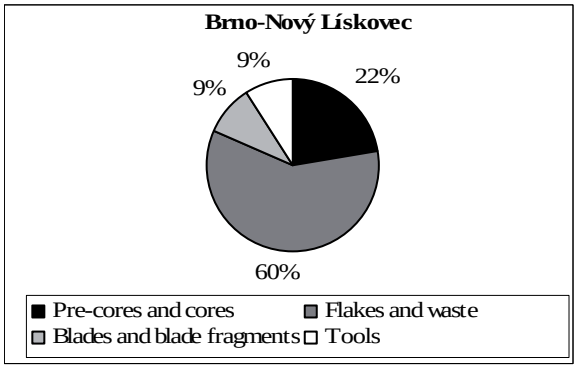
The municipality of Nový Lískovec lies on the south-western periphery of the city of Brno, between the municipalities of Pisárky and Bosonohy. The site is situated at the cadastral dividing line of Starý Lískovec and Nový Lískovec, on the south-east foot of Kamenný vrch (Stony hill). The site itself lies on a moderate north-east facing hillside, the northern part of which slopes steeply down into the deeply incised valley of some nameless creek. Approximately 3 km further on, the creek meets the Svratka river, a left-bank tributary of Dyje (Thaya). The site's elevation is about 280–295 m above sea level (Geislerová 1996, 18). The soil cover consists of chernozem and brown earth over loess. In terms of geology, this region belongs to the Brno Massif, which is part of the Bohemian Massif. The Brno Massif consists of abyssal magmatic rocks with vein intrusions and remnants of the original rock mantle. The rock composition of the massif is very varied. Above all, there is a wide range of granitoids (Demek & Novák *et al.* 1992, 40–42).

Blank groups	Total	%	Blanks	Tools
Pre-cores and cores	27	27.5	22	5
Flakes and waste	60	61	58	2
Blades and blade fragments	11	11.2	9	2
Total	98	100	89	9

Table 123. Brno-Nový Lískovec, phase I/II of the LBK. Chipped stone artefacts divided into basic blank groups.

Research history

During a motorway development on the south-west periphery of Brno, a multi-period prehistoric site was discovered at the cadastral dividing line of Starý Lískovec and Nový Lískovec, on the south-eastern foot of Kamenný vrch (Stony hill). In the course of the construction of a western motorway feeder in 1971, an archaeological rescue excavation carried out by the Institute of Archaeology of the Czechoslovak Academy of Science under the direction of R. Tichý yielded a total of 48 prehistoric features spread over an area of about 8 000 m^2. The settlement activity of the LBK was predominant in the southern part of the investigated area, and also includes a roughly 100 m long ditch running W – E. In 1978, excavation in advance of a road and housing estate development recovered another ten features of the LBK, but only two of them were completely investigated. In 1989, during the construction of the so-called Prague radial road meeting the D1–motorway feeder, many prehistoric features were uncovered. In position II/1989, a total of 47 features datable to the LBK were investigated alongside a 90 m long ditch. The ditch is about 2 m wide in its upper part and about 1 m wide at the bottom; in profile it appears bowl-shaped with gently sloping sides (Geislerová 1996, 18–19, Fig. 10).



Basic morphological groups	Total	%
Pre-cores and cores	22	22.5
Flakes and waste	58	59.2
Blades and blade fragments	9	9.2
Tools	9	9.2
Total	98	100.1

Table 124. Brno-Nový Lískovec, phase I/II of the LBK. Proportion of chipped stone artefacts by basic morphological groups.

Blank groups	No. of pieces	Weight (g)	Avg (g)
Pre-cores and cores	27	3149	116.6
Flakes and waste	60	1852.1	30.8
Blades and blade fragments	11	30.8	2.8
Total	98	5031.9	51.3

Table 125. Brno-Nový Lískovec, phase I/II of the LBK. Weight of chipped stone artefacts.

11.8.2. Dating the site

Absolute chronology

So far, there are no ^{14}C dates available.

Relative chronology (after Tichý)

The site was occupied from the early Ib phase up to the end of the later middle phase, maybe even up to the beginning of phase III of the LBK. The classic Šárka stage does not occur here. According to the finds, the settlement's heyday falls into the end of phase I and the beginning of phase II (Geislerová 1996, 24–26). After T. Berkovec, the ditch was already built during phase Ib of the LBK (Berkovec 2004).

For this study, only the chipped stone industry from un-mixed features was selected.

11.8.3. Chipped stone industry

During the archaeological excavation, about 129 pieces of chipped stone were found in features containing LBK material. The chipped artefacts from features which also contained Moravian painted pottery were not analysed. In total, the assemblage studied consists of 98 chipped stone artefacts, 48 of which come from features dating to the Ib phase. The others were found in features assigned only generally to the LBK (**tables 123 & 125**). The assemblage makes a relatively homogeneous impression. All artefacts are larger than 12 mm. The majority of the chipped stone was found in features No. 4 and No. 40 (nine pieces), and No. 25 (eight pieces). In the other features, the number of chipped artefacts reached between one and four pieces.

Raw material	Artefacts > 12 mm	%	Distance
Krumlovský Les I chert	27	27.5	16–22 km
Krumlovský Les II chert	22	22.5	16–22 km
Krumlovský Les chert	6	6.2	16–22 km
Krumlovský Les chert – burnt	2	2	16–22 km
Krumlovský Les chert ?	1	1	
Moravian Jurassic chert	16	16.4	5–12 km
Moravian Jurassic chert – burnt	1	1	5–12 km
Olomučany chert	4	4.1	ca 20 km
Olomučany chert – burnt	1	1	ca 20 km
Olomučany chert?	1	1	
Krakow Jurassic silicite	3	3.1	260 km
Krakow Jurassic silicite ?	3	3.1	
Quartz	3	3.1	
Erratic silicite	1	1	110–120 km
Erratic silicite or Krakow Jurassic silicite or KL II	2	1	
Erratic silicite or KL II	1	2	
Opal ?	1	1	
Burnt	2	2	
Undefined – local ?	1	1	
Total	98	100	

Table 126. Brno-Nový Lískovec, phase I/II of the LBK. Proportion of raw materials, including varieties and distance to outcrops.

11.8.3.1. Nearest outcrops of appropriate raw materials

The nearest raw material appropriate for making chipped stone artefacts are the so-called Moravian Jurassic cherts occurring on the eastern and north-eastern edges of the Brno Basin at a distance of 5–12 km from the site. The best quality stone are the Stránská skála cherts, the primary outcrops of which are situated about 10 km east of the site. Another high-quality raw material are the Olomučany

Raw material	No. of pieces	Cores	Flakes	Blades	Tools
Krumlovský Les I chert	58	13	36	3	6
%	100	22.4	62.1	5.2	10.3
Moravian Jurassic chert	17	7	10	–	–
Olomučany chert	6	2	2	1	1
Krakow Jurassic silicite	6	–	3	2	1
Quartz	3	–	2	–	1
Erratic silicite	1	–	1	–	–
Erratic silicite or Krakow Jurassic silicite or KL II	2	–	–	2	–
Erratic silicite or KL II	1	–	1	–	–
Opal ?	1	–	1	–	–
Burnt	2	–	1	1	–
Undefined – local ?	1	–	1	–	–
Total	98	22	58	9	9

Table 127. Brno-Nový Lískovec, phase I/II of the LBK. Proportion of raw materials in the basic morphological groups.

cherts, located about 20 km north-east of the settlement, and the Krumlovský Les cherts, with outcrops about 16–22 km to the south-west.

Pre-cores and cores	Blanks	Tools	Total
Unworked raw material	19	5	24
Pre-cores	1	–	1
Cores	1	–	1
Splintered pieces	–	–	–
Core fragments	1	–	1
Total	22	5	27

Table 128. Brno-Nový Lískovec, phase I/II of the LBK. Pre-cores and cores.

Pre-cores	Raw material	Preparation	Height	Width	Thickness	Weight	Tool
1	KL	unworked raw material	68	46	28	90.9	
2	KL	unworked raw material	70	56	36	170	
3	KL	unworked raw material	60	47	45	126	
4	KL	unworked raw material	49	44	42	125	
5	KL	unworked raw material	52	48	25	65.1	
6	KL I	unworked raw material	63	44	38	130	
7	KL I	unworked raw material	65	47	44	116	
8	KL I	unworked raw material	52	42	32	71.6	hammerstone
9	KL I	unworked raw material	81	67	57	262	
10	KL I	unworked raw material	56	54.5	39	86.1	
11	KL I	unworked raw material	84	38	37	116	
12	KL I	unworked raw material	59	34.5	29.5	52.9	
13	KL I	unworked raw material	84	71	65	388	hammerstone
14	KLII	unworked raw material	48	40	38	85.2	hammerstone
15	KLII	unworked raw material	42	39	30	52.1	hammerstone
16	KLII	unworked raw material	72	61	54	248	hammerstone
17	KLII	unworked raw material	65	52	22	95.7	
18	KL II – burnt	unworked raw material	67	41	26.5	78.9	
19	MJC	unworked raw material	70	66	45	170	
20	MJC	unworked raw material	51	51	31.5	90.5	
21	MJC	unworked raw material	53	39	27	50.2	
22	MJC	unworked raw material	68	52	21	82.3	
23	MJC	unworked raw material	75	54	44	212	
24	MJC	raw material prepared by several detachments	50	41.5	32	70.5	
25	Olomučany	unworked raw material	41	36	28	29	

Table 129. Brno-Nový Lískovec, phase I/II of the LBK. Pre-cores.

11.8.3.2. Raw material

At Brno-Nový Lískovec, it is a local raw material which absolutely predominates (**tables 126 & 127**). I designated it typologically as Krumlovský Les chert (27 pieces of KL I, 22 pieces of KL II and nine unspecified pieces). However, it probably comes from the Brno Basin, where the occurrence of similar cherts with black "cortex" is also known (Přichystal 1994, 44). This kind of raw material, found in several features, was also identified in the same way by A. Přichystal (Geislerová 1996, 20). These so-called Krumlovský Les cherts mostly occur at the site in the form of unworked, often slightly heated (thermically modified), rather flattened pebbles or their fragments. Unfortunately, there are so far no explicit criteria on how to distinguish the cherts with black "cortex" coming from the Brno Basin area from those of the Krumlovský Les area. However, there is some difference between the cherts at Nový Lískovec and those from Krumlovský Les. The question is whether these attributes can be accepted as characteristics usable for their differentiation. The pebbles from Nový Lískovec are irregular in shape and their surface is rather smooth or porous, without nail indentations typical for the cherts from the Krumlovský Les area. Also the colour of the cortex is grey to grey-black, rather than black. On the surface, there are many impressions of fossils (Brachiopods?). The silicite substance is often brownish or yellowish, a colour caused by the impregnation with iron oxides and possibly pointing to a fluvial origin (Floss 1994, 94). Likewise, the form in which they occur at the settlement – as entire, unworked raw material cobbles – indicates that they most probably come from the close vicinity of the site. The question is what so many unworked pebbles of low-quality raw material had been intended for. Some of them show a grey-white surface with distinct fissures caused by fire. Are these the so-called cooking stones used for warming up some liquid, most probably water? The assumption that the pebbles could not serve as the initial raw material for making chipped stone artefacts is supported by the fact that they had not been utilized for producing blanks or tools (except for hammerstones). Maybe for only some flakes and blade artefacts, a provenance from Krumlovský Les can also be taken into account, considering the quality of the raw material.

With regard to the structure of the silicite substance, almost half belongs to the KL II variety (maybe rather KL III), utilized only rarely in the LBK. At other LBK sites, it is KL I that

Type of flake	No. of pieces	%	KL	MJC	Flakes	Tools
Preparation flake	9	15	6	–	8	1
Blade-like flake	–		–	–	–	–
Splintered flake	–		–	–	–	–
Crested flakes and secondary crested flakes	–		–	–	–	–
Rejuvenation flake from a core's knapping surface	–		–	–	–	–
Rejuvenation flake from a core's striking platform	–		–	–	–	–
Rejuvenation flake from a core's base	–		–	–	–	–
Primary flake	–		–	–	–	–
Other technical flake	1	1.7	–	–	–	1
From polished tools	–		–	–	–	–
Waste	8	13.3	3	–	8	–
Natural raw material fragments	42	70	28	10	42	–
Total	60	100	37	10	58	2

Table 130. Brno-Nový Lískovec, phase I/II of the LBK. Flakes and waste.

occurs much more frequently, a fact that could suggest an origin other than the Krumlovský Les area[111].

A further 17 pieces, made from cherts of local origin, do not match the Krumlovský Les type. I assigned them to a general category of Moravian Jurassic cherts, which also occurred at the settlement in form of unworked cobbles and their fragments.

The local Olomučany cherts come from a distance of 20 km and appeared only six times among the artefacts. A natural quartz fragment is also taken to be a local raw material.

Krakow Jurassic silicite occurred at least twice. Here, it represents an import at a distance of 260–270 km away from its primary outcrops.

Three artefacts could not be definitely assigned to Krakow Jurassic silicite, erratic silicite or KL II. One piece of opal was also found.

Surface of flakes and flake tools	No. of pieces	%	KL	MJC	Other
Cortical	44	73.3	30	10	4
Partly cortical	10	16.7	6	–	4
Without cortex	6	10	1	–	5
Total	60	100	37	10	13

Table 131. Brno-Nový Lískovec, phase I/II of the LBK. Degree of preservation of natural surface on flakes including retouched tools.

11.8.3.3. Pre-cores and cores

A total of 27 (27.5 %) pieces, including five tools (**table 128**), fall under this category. Although this is a very high proportion in comparison with other assemblages, the greatest part consists of unworked chert cobbles (19 unworked pieces and one partly knapped piece) of local origin (see *Raw material*). Besides KL chert and Moravian Jurassic cherts, Olomučany chert also occurred. Five pebbles had been used as hammerstones (**table 129**).

Only two cores were found. The first is a single-platform flake core made from Olomučany chert with the striking platform rejuvenated by faceting. The other piece is a fragment of a single-platform blade/flake core of KL II chert.

11.8.3.4. Flakes and waste

Of the total of 60 pieces (including two hammerstone fragments), only ten artefacts can be designated as true flakes. The other eight artefacts are waste (**table 130**).

The majority are natural raw material fragments of KL chert, Moravian Jurassic cherts and quartz. If the pebbles were actually restricted to a use in cooking, then the natural fragments could be regarded as remnants of heated pebbles which cracked after being dropped into cold water.

111 This site was also occupied by the Jordanów group. The chipped stone industry from the Jordanów feature is mostly made from KL II chert. This chert, unlike that from the LBK features, has a black "cortex" with nail indentations, and the silicite substance is also typical of the Krumlovský Les area as described by A. Přichystal (1984) and know from my personal experience of this region.

11.8.3.5. Blades and blade fragments

The whole chipped stone assemblage contained only 11 blades (including two blade tools). Two blades are completely preserved (**table 135**). Tools were manufactured on blades with broken off basal part. Three blades are made of KL I chert, another three pieces of Krakow Jurassic silicite, two of Olomučany chert, and for the others the raw material cannot be definitely recognized.

On eight blades there is a preserved platform remnant (**table 137**), mostly adjusted by primary faceting. Dorsal reduction is missing.

Length	No. of pieces	Min (mm)	Max (mm)	Avg (mm)	StDev (mm)
Flakes	8	19	43	33.3	7.9
Flake tools	1	48	48	48	0

Table 132. Brno-Nový Lískovec, LBK phase I/II. Length of preparation and blade-like flakes (including flake tools).

Width	No. of pieces	Min (mm)	Max (mm)	Avg (mm)	StDev (mm)
Flakes	8	17	46	33.9	10.23
Flake tools	1	68	68	68	0

Table 133. Brno-Nový Lískovec, phase I/II of the LBK. Width of preparation and blade-like flakes (including flake tools).

Thickness	No. of pieces	Min (mm)	Max (mm)	Avg (mm)	StDev (mm)
Flakes	8	3	16	10.2	3.99
Flake tools	1	35	35	35	0

Table 134. Brno-Nový Lískovec, phase I/II of the LBK. Thickness of preparation and blade-like flakes (including flake tools).

Type of blade	Blade blanks	Blade tools
Whole blade	2	-
Blade with broken off terminal part	6	-
Blade with broken off basal part	-	2
Blade with broken off terminal and basal part	1	-
Basal fragment of a blade	-	-
Mesial fragment of a blade	-	-
Terminal fragment of a blade	-	-
Whole crested blade	-	-
Fragment of a crested blade	-	-
Whole secondary crested blade	-	-
Fragment of a secondary crested blade	-	-
Total	9	2

Table 135. Brno-Nový Lískovec, phase I/II of the LBK. Blades and blade fragments.

Surface of blades and blade tools	No. of pieces	KL	Olomučany	Other
Cortical	–	–	–	–
Partly cortical	3	1	1	1
Without cortex	8	2	1	5
Total	11	3	2	6

Table 136. Brno-Nový Lískovec, phase I/II of the LBK. Degree of preservation of natural surface on blades including retouched tools.

11.8.3.6. Raw material transport

The presence of pre-cores and a high ratio of cores and flakes indicate that the chipped stone industry must have been produced directly at the site. However, a low propor-

Platform remnant / Dorsal reduction	Total yes	Total no	KL yes	KL no	Olomučany yes	Olomučany no	Other yes	Other no
Unprepared	0		0		0		0	
Plain	0	1	0		0		0	1
Prepared by several blows	0	2	0	1	0	1	0	
Punctiform	0		0	3	0		0	2
Primarily facetted	0	5	0	3	0		0	2
Dihedral	0		0		0		0	
Secondary prepared	0		0		0		0	
Total	8		4		1		3	

Table 137. Brno-Nový Lískovec, phase I/II of the LBK. Platform remnants and dorsal reduction of blades and blade tools.

tional representation of cortical flakes refers to the form of the raw material, which probably occurs in blocks or big nodules that do not have as many natural cortical surfaces as the raw materials appearing in form of smaller concretions and pebbles. On the other hand, the low ratio of flakes is probably caused by the primary working of raw material (i.e. rough knapping) performed outside the settlement.

Length	No. of pieces	Min (mm)	Max (mm)	Avg (mm)	StDev (mm)
Blades	2	38	56	47	12.73
Blade tools	–	–	–	–	–

Table 138. Brno-Nový Lískovec, phase I/II of the LBK. Length of whole finished blades and blade tools.

Width	No. of pieces	Min (mm)	Max (mm)	Avg (mm)	StDev (mm)
Blades	9	13	18	15.3	1.62
Blade tools	2	15	19	17	2.83

Table 139. Brno-Nový Lískovec, phase I/II of the LBK. Width of whole finished blades, blades with broken off terminal part, basal part, terminal and basal parts.

Thickness	No. of pieces	Min (mm)	Max (mm)	Avg (mm)	StDev (mm)
Blades	8	2.5	7.5	4.2	1.62
Blade tools	–	–	–	–	–

Table 140. Brno-Nový Lískovec, phase I/II of the LBK. Thickness of finished blades with preserved basal part.

Type of tools	Total	Cores	Flakes	Blades
Endscrapers	–	–	–	–
Truncated blades	1	–	–	1
Burins	–	–	–	–
Blades with lateral retouch	1	–	–	1
Retouched flakes	–	–	–	–
Borers, perforators and becs	–	–	–	–
Notches and denticulates	–	–	–	–
Sidescrapers	–	–	–	–
Trapezes	–	–	–	–
Other microliths	–	–	–	–
Splintered pieces	–	–	–	–
Combination tools	–	–	–	–
Hammerstones	7	5	2	–
Tool fragments	–	–	–	–
Total	19	5	2	2

Table 141. Brno-Nový Lískovec, phase I/II of the LBK. Tool classification by blank types.

11.8.3.6. Tools

A total of nine pieces comes under the category of tools (**table 144**). Five of them were classified as hammerstones and two as hammerstone fragments. For this purpose, unworked raw material cobbles of KL chert were used.

A further two implements were manufactured on blade blanks. The first is a truncated blade with worn edges made of Krakow Jurassic silicite, the second is a blade with sickle gloss, retouched on one side and made of Olomučany chert.

11.8.3.7. Artefacts with sickle gloss

In Brno-Nový Lískovec, one sickle blade of KL II chert with broken off terminal part was found. There was also one retouched sickle blade with broken off basal and terminal parts made of Olomučany chert (**table 142**). The latter quite resembles the sickle blades of Olomučany chert found in Kuřim[112], where blades had been produced on a large scale and distributed in form of completed artefacts to other settlements, where they were mostly used as sickle blades.

Blades with sickle gloss	Blade tools		Blades
Type of blade	Type of tool	No. of pieces	No. of pieces
Whole blade			
Blade with broken off terminal part			1
Blade with broken off basal part			
Blade with broken off terminal and basal part	retouched blade	1	
Basal fragment of a blade			
Mesial fragment of a blade			
Terminal fragment of a blade			
Total		1	1

Table 142. Brno-Nový Lískovec, phase I/II of the LBK. Blanks and tools with sickle gloss by types.

11.8.3.8. Summary

The composition of the chipped stone industry found at the settlement of Brno-Nový Lískovec differs from other settlements of the LBK. The preferred raw material was local and of low quality. It was not always used for manufacturing chipped artefacts, but also served for other purposes. Among blade artefacts, other kinds of raw material also occur. A sickle blade of Olomučany chert is very much reminiscent of the products of specialised workshops, as identified at the settlements of Kuřim and Nové Bránice.

112 Some of the features at Nový Lískovec could be contemporary with the settlement of Kuřim.

11.9. Kladníky, position "Záhumenky" (Přerov district, North Moravia, Czech Republic)

11.9.1. Background information

Geographic and geomorphological site characteristics
Kladníky lies about 12 km north-east of Přerov. The Hradčanka stream flows through the municipality and later meets the Mostěnka, a left-bank tributary of the Morava river. In terms of orography, Kladníky is situated in the Kelč hills, which represent the western part of the Podbeskydská hills, creating a strip of lower terrain at the foot of the Western Beskyds. The Kelč hills cover a territory of 410 km^2 and have a medium elevation of 312.8 m above sea level. They consist of rounded hills and open wide and narrow valleys. The highest point is Skalka (481 m a.a.O.) near the municipality of Podolí (Demek & Novák *et al.* 1992, 36).
In terms of geology, this region belongs to the Western Carpathians (Chlupáč *et al.* 2002, 19–22).
The site is situated south of the road Kladníky – Lipník n. Bečvou at an elevation of 325–341 m above sea level (Peška & Bém 1999).

Blank groups	Total	%	Blanks	Tools
Pre-cores and cores	3	2.4	3	0
Flakes and waste	66	52.8	60	6
Blades and blade fragments	56	44.8	35	21
Total	125	100	48	27

Table 143. Kladníky, phase I of the LBK. Chipped stone artefacts divided into basic blank groups.

No. of Feature	Year	No. of pieces	%
7	1995	8	6.4
8	1995	9	7.2
11	1995	30	24
12	1995	78	62.4
		125	100

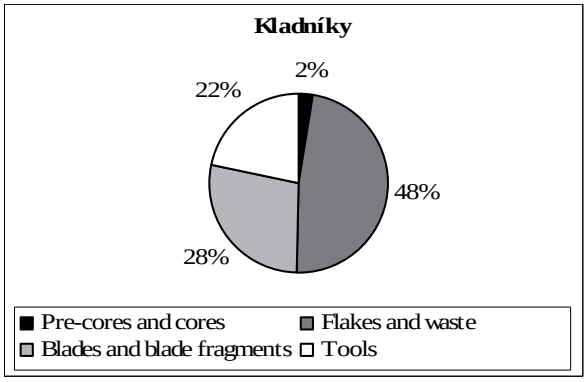
Table 144. Kladníky, phase I of the LBK. Proportion of chipped stone artefacts (> 12 mm) by archaeological feature.

Research history
In connection with the development of the local gas distribution network in 1995, the Institute of Archaeological Research and Preservation of Historical Monuments (ÚAPP) in Olomouc carried out a rescue excavation which yielded a prehistoric multi-period settlement of the LBK, Moravian Painted Pottery and Bell Beaker cultures. A total of seven settlement features of the LBK were investigated. Unfortunately, all features were only half dug.

11.9.2. Dating the site

Absolute chronology
There are no ^{14}C dates available so far.

Relative chronology (after Tichý)
Kladníky "Záhumenky" – phase Ia of the LBK (Čižmář 1998, 106).



Basic morphological groups	Total	%
Pre-cores and cores	3	2.4
Flakes and waste	60	48
Blades and blade fragments	35	28
Tools	27	21.6
Total	125	100

Table 145. Kladníky, phase I of the LBK. Proportion of chipped stone artefacts by basic morphological groups.

Blank groups	No. of pieces	Weight (g)	Avg (g)
Pre-cores and cores	3	134.5	44.8
Flakes and waste	66	638.2	9.7
Blades and blade fragments	56	59.2	1.1
Total	125	831.9	6.7

Table 146. Kladníky, phase I of the LBK. Weight of chipped stone artefacts.

Raw material	No. of pieces	%	Distance
Krakow Jurassic silicite (+ 1 burnt)	82	65.6	180 km
Erratic silicite	28	22.4	5–30 km
Erratic silicite or Krakow Jurassic silicite	11	8.8	
Szentgál radiolarite	1	0.8	290 km
Burnt	1	0.8	
Undefined	2	1.6	
Total	125	100	

Table 147. Kladníky, phase I of the LBK. Proportion of raw materials, including varieties and distance to outcrops.

11.9.3. Chipped stone industry

Chipped stone occurred in four features and the whole assemblage numbers 125 pieces. A total of 123 pieces are > 12 mm. The two remaining artefacts are 12 mm long. As these two artefacts (one of them is a tool) represent a negligible percentage, they have been studied alongside the other chipped pieces (**tables 143 & 145**).

Most chipped stone artefacts were found in features No. 12 (79 pieces) and No. 11 (30 pieces), which are interpreted as classic loam pits; eight pieces come from feature No. 7 and nine pieces from feature No. 8 (**table 144**). The raw material counts by feature appear relatively balanced. Most blade blanks were found in feature No. 12, and tools also mostly occurred in features No. 11 and No. 12.

11.9.3.1. Nearest outcrops of appropriate raw materials

The nearest raw materials appropriate for making chipped stone tools are the Jurassic cherts and Cretaceous spongo-

Raw material	No. of pieces	Cores	Flakes	Blades	Tools
Krakow Jurassic silicite (+ 1 burnt)	82	–	38	25	19
%	100		46.3	30.5	23.2
Erratic silicite	28	3	14	5	6
Erratic silicite or Krakow Jurassic silicite	11	–	5	5	1
Szentgál radiolarite	1	–	1	–	–
Burnt	1	–	1	–	–
Undefined	2	–	1	–	1
Total	125	3	60	35	27

Table 148. Kladníky, phase I of the LBK. Proportion of raw materials in the basic morphological groups.

Pre-cores and cores	Blanks	Tools	Total
Unworked raw material	–	–	–
Pre-cores	–	–	–
Cores	2	–	2
Splintered pieces	1	–	1
Core fragments	–	–	–
Total	3	0	3

Table 149. Kladníky, phase I of the LBK. Pre-cores and cores.

11.9.3.2. Raw material

The most frequently utilized raw material for making chipped stone artefacts at the site of Kladníky was Krakow Jurassic silicite (81 pieces – 65 %), the primary outcrops of which lie in the southern part of the Krakow-Czestochowa highlands, at a distance of about 180 km from the site (**tables 147 & 148**).

The other relatively frequently utilized raw material was erratic silicite (28 pieces – 22 %). For some silicites, it could not definitely be decided whether they are Krakow Jurassic silicite or erratic silicite (11 pieces – 9 %). According to A. Přichystal, Krakow Jurassic silicite can occasionally also occur in morainal sediments. The remnants of the burnished natural surface on some artefacts of Krakow Jurassic silicite show evidence of their origin from gravels.

Krakow Jurassic silicite predominates, or is at least also present, at other Moravian sites dating to phase I of the LBK – e.g. Žopy, Mohelnice, Šišma, Bojanovice (information by J. Lech), Vedrovice (cemetery and settlement) (Mateiciucová 1997b, Fig. 4; 1998, Tab. 3) and Brno-Ivanovice (Mateiciucová 2000, Tab. 6).

Cores	Raw material	Type of blanks	No. of platforms	Shape	Platform preparation	Dorsal reduction	Platform angle	Height	Width	Thickness	Weight	Tool
1	erratic silicite	flake core	single	prismatic	plain	yes	right	34	46	35	55	–
2	erratic silicite	blade core	single	prismatic	facetted	no	right	60	25	31	58	–
3	erratic silicite	former blade core	–	splintered piece	–	–	–	31	29	21	21.5	–

Table 150. Kladníky, phase I of the LBK. Cores.

Type of flake	No. of pieces	%	Krakow Jurassic	Erratic silicite	Flakes	Tools
Preparation flake	38	57.6	25	10	35	3
Blade-like flake	–		–	–	–	–
Splintered flake	2	3	1	1	2	–
Crested flakes and secondary crested flakes	1	1.5	1	–	1	–
Rejuvenation flake from a core's knapping surface	2	3	2	–	1	1
Rejuvenation flake from a core's striking platform	2	3	1	1	2	–
Rejuvenation flake from a core's base	–		–	–	–	–
Primary flake	–		–	–	–	–
Other technical flake	2	3	2	–	2	–
From polished tools	–		–	–	–	–
Waste	14	21.3	8	1	14	–
Natural raw material fragments	5	7.6	1	4	3	2
Total	66	100	41	17	60	6

Table 151. Kladníky, phase I of the LBK. Flakes and waste.

The occurrence of one piece of Szentgál radiolarite from the Bakony mountains in Hungary can be regarded as significant.

11.9.3.3. Pre-cores and cores

The chipped stone assemblage contained only three cores (**tables 149 & 150**) made of erratic silicite. One core was classified as single-platform blade core of prismatic shape with a primarily facetted platform (**fig. 16: 4**). Furthermore, there was a remnant of a single-platform core with plain striking platform and dorsal reduction (**fig. 16: 1**). A splintered piece on which the original utilization as a blade core was still visible was also found (**fig. 16: 2**).

lite cherts. They are the remnants of the Jurassic and Cretaceous limestones which covered the Maleník block of the Lower Carbonian age. The Maleník block is situated north of the Kelčská upland, south of the road Lipník n. Bečvou – Hranice na Moravě, about 4–10 km away from the municipality of Kladníky (information by A. Přichystal; Demek & Novák *et al.* 1992, 36). Another relatively accessible raw material is erratic silicite, the nearest outcrops of which are located about 25–30 km away from the site. Rarely, it can also be found in the gravels of the Bečva river (only 5 km away from the site) (Přichystal 1994, 43).

Surface of flakes and flake tools	No. of pieces	%	Krakow Jurassic	Erratic silicite	Krakow Jurassic or erratic silicites	Other
Cortical	7	10.6	3	4	–	–
Partly cortical	27	40.9	16	10	1	–
Without cortex	32	48.5	22	3	4	3
Total	66	100	41	17	5	3

Table 152. Kladníky, phase I of the LBK. Degree of preservation of natural surface on flakes including retouched tools.

Length	No. of pieces	Min (mm)	Max (mm)	Avg (mm)	StDev (mm)
Flakes	35	12.5	63	26.2	12.98
Flake tools	3	20	35	25.3	8.39

Table 153. Kladníky, phase I of the LBK. Length of preparation and blade-like flakes (including flake tools).

Width	No. of pieces	Min (mm)	Max (mm)	Avg (mm)	StDev (mm)
Flakes	35	10	87	26.8	16,21
Flake tools	3	20	30	24.3	5,13

Table 154. Kladníky, phase I of the LBK. Width of preparation and blade-like flakes (including flake tools).

Thickness	No. of pieces	Min (mm)	Max (mm)	Avg (mm)	StDev (mm)
Flakes	35	2	20	7	5.25
Flake tools	3	7	10	8.7	1.53

Table 155. Kladníky, phase I of the LBK. Thickness of preparation and blade-like flakes (including flake tools).

Type of blade	Blade blanks	Blade tools
Whole blade	4	1
Blade with broken off terminal part	11	4
Blade with broken off basal part	1	–
Blade with broken off terminal and basal part	1	4
Basal fragment of a blade	7	2
Mesial fragment of a blade	4	5
Terminal fragment of a blade	7	5
Whole crested blade	–	–
Fragment of a crested blade	–	–
Whole secondary crested blade	–	–
Fragment of a secondary crested blade	–	–
Total	35	21

Table 156. Kladníky, phase I of the LBK. Blades and blade fragments.

material fragments are represented by three pieces among the flakes and two pieces among the flake tools (**fig. 18: 5**). On a total of 29 pieces (48 %) of flakes and waste and one tool there is a preserved natural surface (**table 152**; **fig. 18: 4**). Among the flakes, two platform preparation flakes, two core rejuvenation flakes (**fig. 16: 5**) and one crested flake also occurred. More than half of the flakes (including tools) are made of Krakow Jurassic silicite (41 pieces – 62 %). An artefact of Szentgál radiolarite was identified as waste.

11.9.3.5. Blades and blade fragments

The chipped stone assemblage from Kladníky contained total a total 35 blades and blade fragments, and together with blade tools they number 56 pieces (**table 156**). Most blades and blade fragments (including blade tools) are made of Krakow Jurassic silicite (41 pieces – 73 %), the others are of erratic silicite (eight pieces – 14 %) or of a raw material which could not be definitely identified as either of the two (four pieces – 7 %). The blades are regular in shape and relatively small (**tables 159–161**).

Of the 56 blades and blade tools, 29 pieces show a preserved platform remnant (**table 158**) mostly adjusted by primary faceting (**fig. 16: 3,6; fig. 17: 1,6,7,10**). Dorsal reduction is absent.

The natural surface (**table 157**) is at least partly preserved on 23 blades and blade tools (14 of them made from Krakow Jurassic silicite), among which the unretouched cortical blades represent almost half (17 pieces – 49 %) of the total of 35 pieces. In contrast, among the blade tools the proportional representation of cortex falls to 29 % (six of 21 pieces). This fact indicates that the blades used for manufacturing tools originate from an advanced phase of core exploitation.

Surface of blades and blade tools	No. of pieces	%	Krakow Jurassic	Erratic silicite	Krakow Jurassic or erratic silicites	Other
Cortical	2	3.6	1	1	–	–
Partly cortical	20	35.7	13	3	4	–
Without cortex	34	60.7	27	4	2	1
Total	56	100	41	8	6	1

Table 157. Kladníky, phase I of the LBK. Degree of preservation of natural surface on blades including retouched tools.

Platform remnant / Dorsal reduction	Total yes	Total no	Krakow Jurassic yes	Krakow Jurassic no	Erratic silicite yes	Erratic silicite no	Krakow Jurassic or erratic silicites yes	Krakow Jurassic or erratic silicites no
Unprepared	0		0		0		0	
Plain	0	6	0	3	0		0	3
Prepared by several blows	0	4	0	4	0		0	
Punctiform	0	2	0	2	0		0	
Primarily facetted	0	16	0	13	0	3	0	
Dihedral	0	1	0	1	0		0	
Secondary prepared	0		0		0		0	
Total	29		23		3		3	

Table 158. Kladníky, phase I of the LBK. Platform remnants and dorsal reduction of blades and blade tools.

11.9.3.4. Flakes and waste

A total of 60 pieces of flakes and waste and six tools made on flake blanks fall into this category (**table 151**). Natural raw

11.9.3.6. Raw material transport

Due to an abundance in cortical flakes and blades made of erratic silicite and Krakow Jurassic silicite, it appears likely that the production of blanks from these raw materials had been carried out at the settlement itself. The question is why there are no cores of Krakow Jurassic silicite at the site. However, we must consider that only a small part of the settlement was investigated. The presence of such cores at the settlement is indicated by the core rejuvenation flakes.

11.9.3.7. Tools

Most tools are manufactured on blade blanks (21 pieces). Only six implements are made on flakes (**tables 162 & 163**).

Length	No. of pieces	Min (mm)	Max (mm)	Avg (mm)	StDev (mm)
Blades	4	21	47	36.5	11.47
Blade tools	1	33	33	33	0

Table 159. Kladníky, phase I of the LBK. Length of whole finished blades and blade tools.

Width	No. of pieces	Min (mm)	Max (mm)	Avg (mm)	StDev (mm)
Blades	17	7	18	12.5	3.28
Blade tools	9	9	23	14.7	4.24

Table 160. Kladníky, phase I of the LBK. Width of whole finished blades, blades with broken off terminal part, basal part, terminal and basal parts.

Thickness	No. of pieces	Min (mm)	Max (mm)	Avg (mm)	StDev (mm)
Blades	22	2	7	3.9	1.11
Blade tools	7	3	8	4.6	1.62

Table 161. Kladníky, phase I of the LBK. Thickness of finished blades with preserved basal part.

\	Total	Cores	Flakes	Blades
Endscrapers	4	–	–	4
Truncated blades	8	–	–	8
Burins	–	–	–	–
Blades with lateral retouch	3	–	–	3
Retouched flakes	1	–	1	–
Borers, perforators and becs	3	–	–	3
Notches and denticulates	1	–	1	–
Sidescrapers	3	–	3	–
Trapezes	–	–	–	–
Splintered pieces	–	–	–	–
Combination tools	1	–	–	1
Hammerstones	–	–	–	–
Tool fragments	3	–	1	2
Total	27	0	6	21

Table 162. Kladníky, phase I of the LBK. Tool classification by blank types

Among the tools, blades with transverse or oblique truncation (eight pieces) predominate (**fig. 17: 1–6**). In one case, there are two opposite retouched notches (**fig. 17: 7**). All but one of the pieces, which is of an unidentifiable raw material, were made from Krakow Jurassic silicite. Other typical implements are the endscrapers on blades (four pieces, one of them double) (**fig. 17: 8,10,11**) and retouched blades (**fig. 18: 3**), also made from Krakow Jurassic silicite. There are neither typical trapezes nor perforators with a well-distinguished point, such as those known from other sites dating to phase I of the LBK (e.g. Brunn II, Rosenburg I, Mohelnice, Vedrovice – cemetery and Vedrovice "Za dvorem" – settlement). There is only one trapezoidal tool which resembles trapezes. It has notch remnants on both ends, one of which has been retouched again (Inv. No. 102/95–368; **fig. 17: 9**), and is made of erratic silicite. The notch remnants on both ends show evidence of the so-called "notch-fracture-technique" ("Kerb-Bruch-Technik") being used. This technique of snapping blades is known from the Neolithic period, but absent during the Mesolithic (Taute 1973/74, 80–81). It is based on breaking off the blade in a retouched notch.

Not very typical borer and borer fragment are made of Krakow Jurassic silicite (**fig. 18: 1,2**), a slim perforator is of erratic silicite.

Some indistinct sidescrapers also occurred (three pieces) (**fig. 18: 6**). One sidescraper with two opposite notches is made on a pseudo-flake and it cannot be definitely decided whether or not it is an intended retouch (**fig. 18: 5**).

11.9.3.8. Artefacts with sickle gloss

There are no artefacts with sickle gloss at this settlement.

11.9.3.9. Summary

At the oldest LBK settlement at Kladníky, the main raw material utilized is Krakow Jurassic silicite. Its natural surface indicates it must have been exploited at least partly from gravels. Interestingly, the Krakow Jurassic silicite found at settlements of the early LBK in Little Poland also partly comes from gravels. The local erratic silicite is of only secondary importance for manufacturing chipped stone industry. It remains an open question whether one could find the Krakow Jurassic silicite in glacial gravels close to the site, or whether it comes from fluvial (glaciofluvial) gravels in the vicinity of the primary sources.

Considering the frequent occurrence of cortex on blanks of both erratic silicite and Krakow Jurassic silicite, it appears likely that their production had been performed directly at the settlement.

One artefact of Szentgál radiolarite was also found at Kladníky.

Trapezes did not occur.

Type of tools	Total	Krakow Jurassic	Erratic silicite	Other
Endscrapers	4	4		
on a blade	3	3		
double	1	1		
Truncated blades	8	5	1	2
oblique straight	2	1		1 (Erratic silicite v Krakow Jurassic)
transverse concave	2	2		
transverse convex	2	1		1 (undefined)
transverse convex – ventral	1	1		
oblique on both ends – trapeze shape	1		1	
Blades with lateral retouch	3	3		
unilateral partial	2	2		
bilateral continuous	1	1		
Retouched flakes	1	1		
Borers, perforators and becs	3	2	1	
slim perforator with a weakly distinguished point	1		1	
borer fragment	1	1		
atypical borer	1	1		
Notches and denticulates	1		1	
retouched notch	1		1	
Sidescrapers	3	1	2	
convex	3	1	2	
Trapezes	0		1	
Other microliths	0			
Splintered pieces	0			
Combination tools	1	1		
truncated blades on both ends/retouched notches	1	1		
Hammerstones	0	0		
Tool fragments	3	2	1	
Total	27	19	6	2

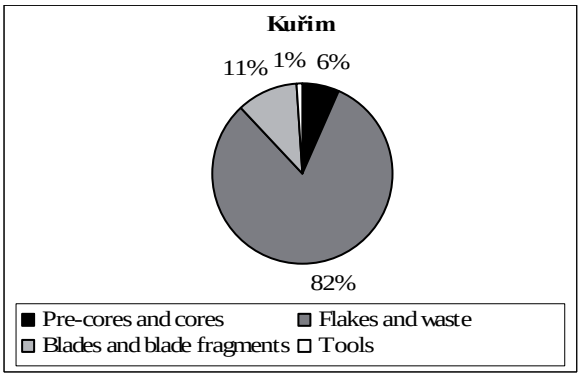
Table 163. Kladníky, phase I of the LBK. Tool types and their raw materials.

11.10. Kuřim, position "Záhoří do klínů" and "U kopečku" (Brno-country district, South Moravia, Czech Republic)

11.10.1. Background information

Geographic and geomorphological site characteristics

The site is located on the northern periphery of the town of Kuřim, which lies about 10 km north-north-west of Brno. The settlement itself is situated only about 4 km north of the early LBK site at Brno-Ivanovice, on one of the numerous stream terraces moderately sloping to the north-west. The northern part of the site lies on a plain adjacent to a small left-bank tributary of the Kuřimka stream, itself a left-bank tributary of the Svratka river. The site's elevation is 315 – 325 m above sea level. It is located in the Kuřim Basin, which forms the north-eastern part of the Bobravská highlands. The Bobravská highlands represent the south-eastern part of the Bohemian Massif, which here consists of abyssal igneous rocks of Brno pluton (Demek & Novák *et al.* 1992, 16, 22; Chlupáč *et al.* 2002). For more details, see chapter 11.7.1. Brno-Ivanovice.



Blank groups	Total	%	Blanks	Tools
Pre-cores and cores	160	6.6	152	8
Flakes and waste	1979	81.8	1974	5
Blades and blade fragments	279	11.6	262	17
Total	2418	100	2388	30

Table 164. Kuřim, phase II and phase III of the LBK. Chipped stone artefacts divided into basic blank groups.

Basic morphological groups	Total	%
Pre-cores and cores	152	6.3
Flakes and waste	1974	81.6
Blades and blade fragments	262	10.8
Tools	30	1.2
Total	2418	100
Chips (≤ 12 mm)	852	

Table 165. Kuřim, phase II and phase III of the LBK. Proportion of chipped stone artefacts by basic morphological groups.

Research history

An archaeological rescue excavation was carried out after the region north of Kuřim was chosen for the development of a large industrial area. The rescue excavation lasted from January to the end of April 1996 and was run by the Institute of Archaeological Research and Preservation of Historical Monuments (ÚAPP) in Brno. The investigated area covered nearly 2 ha. The research was hindered by extreme climatic conditions in the winter. A total of 224 settlement features and 304 post holes was uncovered and partly or fully investigated. Based on these finds, 15 above-ground, post-built houses could be preliminarily identified, and two others were suggested. In 27 cases, ovens or their remnants were detected. In settlement pit No. 243, there was an articulated inhumation of a child covered by pots and grinding slabs (Bálek & Matějíčková 1999).

Most features and the plans of the above-ground houses are dated to the LBK, which is represented by all its phases at the settlement – from Ia to III. Only nine features were assigned to the Moravian Painted Pottery culture, phase

Raw material	Artefacts > 12 mm	%	Artefacts ≤ 12 mm	Distance
Olomučany chert	2292	94.8	845	10 km
Moravian Jurassic chert	91	3.6	6	8–16 km
Krumlovský Les I chert	13	0.5	–	27–33 km
Krumlovský Les II chert	4	0.2	1	27–33 km
KL II or Krakow Jurassic silicite	1	< 0.1	–	
Spongolite	6	0.3	–	8–16 km
Krakow Jurassic silicite	6	0.3	–	260 km
Erratic silicite	2	0.1	–	100–120 km
Erratic silicite or Krakow Jurassic silicite	1	< 0.1	–	
Amphibolite	1	< 0.1	–	
Burnt	1	< 0.1	–	
Total	2418	100	852	

Table 166. Kuřim, phase II and phase III of the LBK. Proportion of raw materials, including varieties and distance to outcrops.

Raw material	No. of pieces	Cores	Flakes	Blades	Tools
Olomučany chert	2292	150	1873	247	22
%	100	6.5	81.7	10.8	1
Moravian Jurassic chert	91	2	87	2	–
%	100	2.2	95.6	2.2	–
Krumlovský Les chert	17	–	3	8	6
Krakow Jurassic silicite	6	–	4	1	1
Spongolite	6	–	5	1	–
Erratic silicite	2	–	1	1	–
Erratic silicite or Krakow Jurassic silicite	1	–	–	–	1
Krakow Jurassic silicite or KL II	1	–	1	–	–
Amphibolite	1	–	–	1	–
Burnt	1	–	–	1	–
Total	2418	152	1974	252	30

Table 167. Kuřim, phase II and phase III of the LBK. Proportion of raw materials in the basic morphological groups.

Pre-cores and cores	Blanks	Tools	Total	%
Unworked raw material	–	2	2	1.25
Pre-cores	23	4	27	16.9
Cores	122	1	123	78.9
Splintered pieces	–	1	1	0.6
Core fragments	7	–	7	4.4
Total	152	8	160	160

Table 168. Kuřim, phase II and phase III of the LBK. Pre-cores and cores.

Ib. The settlement activity of this culture is concentrated at the eastern edge of the investigated and occupied area. The 15 LBK longhouse plans share an identical orientation – NE-SW. Only house D9 is slightly shifted to the EEN-WWS. Pottery fragments of the earliest, Ia phase of the LBK were identified as intrusions in numerous features. Pottery of the Ib phase occurred only rarely. In the later and final periods, settlement density increased. Phase IIa is represented by a number of features which are relatively poor in finds. The following phase IIb can so far not be determined more exactly. In many features, pottery with a so-called 'degenerate' decoration style occurred. In these pits, some decorative elements which can probably already be assigned to the earliest phase of the Želiezovce pottery also appear. Several features also contained ceramics with Šárka decoration.

Besides the pottery and stray finds of animal bones, daub, charcoal and polished stone implements, there is a considerable assemblage of chipped stone from Kuřim. The majority comes from nine features, of which two dates to the Moravian Painted Ware culture, and the others to the LBK. The largest collection (hundreds of pieces) was found in feature No. 291. In the other features, chipped stone was represented by some tens of pieces only (Bálek, Čižmář & Geislerová 2000).

Type of flake	No. of pieces	%	Olomučany	MJC or KL	Flakes	Tools
Preparation flake	1273	64.3	1191	76	1269	4
Blade-like flake	2	0.1	2	–	2	–
Splintered flake	–	–	–	–	–	–
Crested flakes and secondary crested flakes	12	0.6	12	–	12	–
Rejuvenation flake from a core's knapping surface	17	0.9	17	–	17	–
Rejuvenation flake from a core's striking platform	28	1.4	28	–	28	–
Rejuvenation flake from a core's base	3	0.2	3	–	3	–
Primary flake	–	–	–	–	–	–
Other technical flake	1	< 0.1	1	–	1	–
From polished tools	–	–	–	–	–	–
Waste	643	32.4	619	14	642	1
Natural raw material fragments	–	–	–	–	–	–
Total	1979	100	1873	90	1974	5

Table 169. Kuřim, phase II and phase III of the LBK. Flakes and waste.

11.10.2. Dating the site

Absolute chronology

Laboratory VERA – three dates (animal bones)[113]

VERA-2598 (Feature 109/96)
Dating BP: 6090 ± 40

68.2 % confidence
cal BC 5190 – 5180 (1.3 %)
cal BC 5060 – 4940 (66.9 %)
95.4 % confidence
cal BC 5210 – 4890 (93.9 %)
cal BC 4870 – 4850 (1.5 %)

VERA-2599 (Feature 114/96)
Dating BP: 6150 ± 40

68.2 % confidence
cal BC 5210 – 5090 (49.0 %)
cal BC 5080 – 5040 (19.2 %)
95.4 % confidence
cal BC 5220 – 4990 (95.4 %)

VERA-2600 (Feature 117/96)
Dating BP: 6075 ± 35

68.2 % confidence
cal BC 5040 – 4940 (68.2 %)
95.4 % confidence
cal BC 5210 – 5170 (3.3 %)
cal BC 5070 – 4880 (88.8 %)
cal BC 4870 – 4840 (3.3 %)

Relative chronology (after Tichý)
I present only those features for which the chipped stone artefacts have been studied (Čižmář 1998, 1). Their date was established by Z. Čižmář:

Feature No. 110/1996 – phase II of the LBK
Feature No. 114/1996 – phases II and III of the LBK
Feature No. 135/1996 – phase IIb of the LBK
Feature No. 154/1996 – phase III of the LBK
Feature No. 156/1996 – phase IIa of the LBK
Feature No. 158/1996 – phase IIb of the LBK
Feature No. 160/1996 – phase IIa of the LBK
Feature No. 163/1996 – phase IIa of the LBK
Feature No. 179/1996 – phase IIa of the LBK
Feature No. 190/1996 – phase IIa of the LBK
Feature No. 220/1996 – phase IIa of the LBK
Feature No. 234/1996 – phase IIa of the LBK
Feature No. 243/1996 – phase IIa of the LBK
Feature No. 258/1996 – phases II and III of the LBK
Feature No. 259/1996 – phase IIa of the LBK
Feature No. 268/1996 – phase IIb of the LBK
Feature No. 290/1996 – phase II of the LBK
Feature No. 291/1996 – phases II and III of the LBK

113 See note 109 in chapter 11.7.2.

Type of blade	Blade blanks		Blade tools
	No. of pieces	%	No. of pieces
Whole blade	20	7.6	2
Blade with broken off terminal part	47	17.9	4
Blade with broken off basal part	10	3.8	2
Blade with broken off terminal and basal part	10	3.8	3
Basal fragment of a blade	91	34.7	1
Mesial fragment of a blade	34	13	4
Terminal fragment of a blade	37	14.2	–
Whole crested blade	3	1.1	–
Fragment of a crested blade	7	2.7	–
Whole secondary crested blade	2	0.8	–
Fragment of a secondary crested blade	–	–	1
Burin blade	1	0.4	–
Total	262	100	17

Table 170. Kuřim, phase II and phase III of the LBK. Blades and blade fragments.

Surface of blades and blade tools	No. of pieces	%	Olomučany	MJC + KL	Other
Cortical	–	–	–	–	–
Cortical – polished	1	0.4	–	–	1
Partly cortical	28	10	26	2	–
Without cortex	250	89.6	231	13	6
Total	279	100	257	15	7

Table 171. Kuřim, phase II and phase III of the LBK. Degree of preservation of natural surface on blades including retouched tools.

Platform remnant Dorsal reduction	Total yes	Total no	% yes	% no	Olomučany yes	Olomučany no	MJC or KL yes	MJC or KL no	Other	
Unprepared	1	3	25	75	1	3				
	4		2.2		4		0		0	
Plain	18	25	41.9	58.1	17	24	0	1	1	0
	43		24.6		41		1		1	
Prepared by several blows	2	10	16.7	83.3	2	10				
	12		6.8		12		0		0	
Punctiform	2	7	22.2	77.8	2	7				
	9		5		9		0		0	
Primarily facetted	6	99	5.7	94.3	6	92	0	5	0	2
	105		59.3		98		5		2	
Dihedral	1	0	100	0			1	0		
	1		0.6		0		1		0	
Secondary prepared	0	3	0	100	0	2	0	1		
	3		1.5		2		1		0	
Total	177		100		166		8		3	

Table 172. Kuřim, phase II and phase III of the LBK. Platform remnants and dorsal reduction of blades and blade tools.

Feature No. 295/1996 – phase II of the LBK
Feature No. 308/1996 – phase IIb of the LBK
Feature No. 309/1996 – phase Ib of the LBK
Feature No. 313/1996 – phase IIa of the LBK

11.10.3. Chipped stone industry

The archaeological excavation in Kuřim yielded an assemblage of 2418 chipped stone artefacts > 12 mm and 852 chips ≤ 12 mm (**tables 164 & 165**). The chips were excluded from further study. The assemblage is distinctly dominated by flakes and waste. In contrast, tools represent just one percent. An obviously higher ratio of flakes and waste indicates that the production of chipped stone industry had been performed at the settlement directly.

Length	No. of pieces	Min (mm)	Max (mm)	Avg (mm)	StDev (mm)
Blades	20	13	57	39.1	10.76
Blade tools	2	41	44	42.5	2.12

Table 173. Kuřim, phase II and phase III of the LBK. Length of whole finished blades and blade tools.

Width	No. of pieces	Min (mm)	Max (mm)	Avg (mm)	StDev (mm)
Blades	87	4	17	16	5.07
Blade tools	11	9	20	20.1	5.1

Table 174. Kuřim, phase II and phase III of the LBK. Width of whole finished blades, blades with broken off terminal part, basal part, terminal and basal parts.

11.10.3.1. Nearest outcrops of appropriate raw materials

The nearest raw material resources appear to be the Olomučany cherts, about 10 km east of the site. A little further, there are the Moravian Jurassic cherts from the eastern edge of the Brno Basin (10–18 km away from the site), among which the Stránská skála cherts are the highest quality material. The outcrops of honey-coloured Cretaceous spongolite cherts are situated only 16–26 km north of Kuřim on the territory of the Boskovice Furrow. These spongolites can also be found in the gravels of the Svitava river. Relatively close by (28–33 km), there are also outcrops of Krumlovský Les cherts.

11.10.3.2. Raw material

In the assemblage one can see a distinct prevalence of Olomučany cherts, the raw material from which 95 % of all chipped artefacts are made (**tables 166 & 167**). Their outcrops lie about 10 km away from the site. It was only the excavation in Kuřim that proved an intensive use of this chert, which retained its local character throughout the whole existence of the LBK. Olomučany chert appears to have been the essential raw material at the settlements of Brno-Ivanovice, Bořitov "Býkovky" and Bořitov "Písky" (Čižmář 1995). All these sites are situated within a radius of up to 15 km from its primary outcrops. At other, more distant locations it was found only rarely.

Among the other raw materials, Moravian Jurassic cherts account for only 4 %. Some pieces made of KL I chert were also found. As a rarity we can regard six artefacts of spongolite (**fig. 19: 10**), which is almost absent in the LBK but, on the contrary, regularly present in the Mesolithic. It is much more likely to come from the gravels of the Svitava river than from the primary outcrops.

As to distant imports, there are only six artefacts of Krakow Jurassic silicite (**fig. 19: 8**) and two of erratic silicite.

Type of tools	Total	Cores	Flakes	Blades
Endscrapers	5	–	2	3
Truncated blades	4	–	–	4
Burins	–	–	–	–
Blades with lateral retouch	4	–	–	4
Retouched flakes	1	–	1	–
Borers, perforators and becs	2	–	–	2
Notches and denticulates	3	–	1	2
Sidescrapers	–	–	–	–
Trapezes	1	–	–	1
Other microliths	–	–	–	–
Splintered pieces	2	1	1	–
Combination tools	1	–	–	1
Hammerstones	7	7	–	–
Tool fragments	–	–	–	–
Total	30	8	5	17

Table 175. Kuřim, phase II and phase III of the LBK. Tool classification by blank types.

11.10.3.3. Pre-cores and cores

The producers of chipped stone artefacts in Kuřim specialised in working Olomučany chert. The majority of this raw material is represented by exploited cores, although the ratio of pre-cores (17 %) also appears relatively high (**table 168**). The raw material probably reached the settlement as roughly prepared pieces. Additional working and production of blanks was then carried out at the site itself. The reduced cores are single-platform, mostly of a prismatic shape. They served for producing relatively large and wide blade blanks, which is testified by a number of rather big cores (in comparison to cores from other sites) at the exploitation stage. The cores were put aside after blade blanks of a certain size had been detached, because further blanks would no longer reach the expected standard. This fact is also evidenced by smaller entire blades left behind at the place of production, while larger pieces or parts thereof were taken away (see below). The core platforms had mostly been adjusted by primary faceting, but also by a single blow. The latter technique appeared much more frequently here than at other sites. Dorsal reduction is not very rare. The platform usually forms nearly a right platform angle.

11.10.3.4. Flakes and waste

Besides tiny preparation flakes, there are also a number of robust flakes. Various technical flakes appear relatively often (**table 169**). The presence of cortical flakes is not so distinct, a fact which probably relates to the natural form of the raw material as rather large concretions and blocks. From the character of the flakes, we can assume that the raw material was brought into the settlement in form of roughly knapped blocks, which were further shaped into prepared cores. This phase was then followed by the exploitation of blade blanks.

11.10.3.5. Blades and blade fragments

Blade negatives on the cores show that relatively thick/large and wide blades were produced here (**fig. 19: 1,2,6,9**). However, the existence of such blades is documented only by their fragments or by negative scars on blade cores. It is the small blade fragments which predominate at the settlement, particularly the basal ones (**table 170**). The whole blades that occur are rather small and less regular and probably represent production waste. It is likely that the terminal and basal

Type of tools	Total	Olomučany	KL I	Other
Endscrapers	5	3	2	
on a flake		2		
high – nosed			1	
high		1		
indistinct			1	
Truncated blades	4	2	1	
oblique straigth		1	1	
oblique concave – ventral			1	
transverse concave		1		
Burins	–	–		
Blades with lateral retouch	4	3		1
unilateral continuous		1		
unilateral partial		2		
bilateral partial				1 (erratic silicite or Krakow Jurassic)
Retouched flakes	1	1		
Borers, perforators and becs	2		1	1
slim borer with a weakly distinguished point				1 (Krakow Jurassic)
slim perforator – point fragment			1	
Notches and denticulates	3	3		
basal notched blade		1		
denticulated blade		1		
denticulates		1		
Sidescrapers	–			
Trapezes	1	1		
short/atypical – dorsal retouch	1	1		
Other microliths	–			
Splintered pieces	2	2		
two-sided opposing	1	1		
two-sided cross	1	1		
Combination tools	1	1		
endscraper – denticulates	1	1		
Hammerstones	7	6	1	
hammerstone – raw material	2	1	1	
hammerstone – from a core	1	1		
hammerstone	4	4		
Tool fragments	–			
Total	30	22	6	2

Table 176. Kuřim, phase II and phase III of the LBK. Tool types and their raw materials.

Blades with sickle gloss	Blade tools		Blades
Type of blade	Type of tools	No. of pieces	No. of pieces
Whole blade		2	–
	basal notched blade endscraper – denticulates	1 1	
Blade with broken off terminal part		2	2
	truncated blade denticulated blade	1 1	
Blade with broken off basal part	endscraper	1	–
Blade with broken off terminal and basal part		2	–
	truncated blade retouched blade	1 1	
Basal fragment of a blade		–	–
Mesial fragment of a blade		–	1
Terminal fragment of a blade		–	
Total		7	3

Table 177. Kuřim, phase II and phase III of the LBK. Blanks and tools with sickle gloss by types.

parts of blades, quite numerous at the site, were broken off intentionally. The absence of completed blades and blade tools at the settlement indicates that the blades were taken away from the place of production after being finished. The blade platform remnants were mostly adjusted by primary faceting (60 %; **fig. 19: 9**) without dorsal reduction (**table 172**). Unlike in the chipped stone assemblage from the early phase of the LBK, blades with a plain platform remnant are relatively frequent (25 %; **fig. 19: 1,2**), often even showing dorsal reduction (42 %; **fig. 19: 10**). The form of the platform remnant and a right angle between the platform remnant and the dorsal surface indicate that the blades were made using a punch (see chapter 6.2.3.).

11.10.3.6. Raw material transport

A high ratio of flakes and waste is evidence that for the most part, raw material processing was carried out in the settlement itself. Among the cores, reduced pieces prevail, but pre-cores are also relatively abundant. The Olomučany cherts probably reached the settlement as roughly knapped nodules, which were later shaped into prepared cores directly at the site, where the following production of blanks was also carried out. Likewise, the local Moravian Jurassic cherts were most likely brought into the settlement in a roughly worked state only. Krumlovský Les chert was mainly used for blades and tools, which could have reached the site as already finished blade blanks and tools.

Blades and flakes with gloss		
Raw material	Blades and blade tools	Flakes and flake tools
Krumlovský Les I chert	4	–
Krumlovský Les II chert	–	–
Olomučany chert	6	–
Total	10	

Table 178. Kuřim, phase II and phase III of the LBK. Proportion of artefacts with sickle gloss by raw material.

11.10.3.7. Tools

In the whole assemblage there are only 30 implements, more than half of them made on blade blanks (**table 175**).

Among the tools, the ratio of Olomučany cherts appears lower than in other categories. Besides Olomučany cherts, KL I cherts were also utilized (**table 176**). The hammerstones (seven pieces) are predominant, which is probably related to chipped stone working and the production of blanks. All pieces but one are made of Olomučany chert. Furthermore, there are five endscrapers, including two high endscrapers. Truncated blades (**fig. 17: 5**), retouched blades and a denticulated blade also occurred. There is also an atypical, short, relatively robust trapeze of Olomučany chert, probably made secondarily through the transformation of another blade tool (**fig. 17: 4**). Two splintered pieces of Olomučany chert are likewise classified as tools.

11.10.3.8. Artefacts with sickle gloss

In Kuřim, there are three blade fragments and seven blade tools with sickle gloss (**tables 177 & 178**). Four of them are made of Krumlovský Les I chert (**fig. 19: 5**) and the others of Olomučany chert (**fig. 19: 6**). All the artefacts are regular and make a uniform impression. It cannot be excluded that there was a specialised production of blade blanks for sickle blades at Kuřim.

The sickle blades of Krumlovský Les I chert are very similar to those from the settlement of Asparn-Schletz. These blades could have been made at a settlement like Nové Bránice (see below) which, just like Kuřim, specialised in the mass production of blades.

11.10.3.9. Summary

The inhabitants of the settlement at Kuřim were engaged in working Olomučany chert, which they apparently acquired by exploiting nearby primary sources. The processing is of a high technological standard. The prevailing blade cores, numerous technical flakes originating from a core's reduction phase and tiny fragments of blade blanks testify that the production of chipped stone industry at Kuřim was oriented towards the manufacture of blade blanks, which were then exported to other sites. Blade blanks were probably used for manufacturing sickles, as indicated by the finds of uniform sickle blades of Olomučany chert, both at the settlement of Kuřim itself and at other settlements of the LBK (Brno-Nový Lískovec). Similar specialised blade production using Krumlovský Les I chert was identified at the site of Nové Bránice "V končinách". Uniform sickle blades of KL I chert were found at the settlements of Kuřim, Těšetice-Kyjovice and Asparn-Schletz.

In contrast to the settlements of the older phase of the LBK, the number of blades with plain platform remnant increased, which could be evidence for some new technological approaches, or the mixing of different traditions (plain platform remnants on blades prevail in the western part of the LBK's distribution).

11.11. Nové Bránice, position "V končinách" (Brno-country district, South Moravia, Czech Republic)

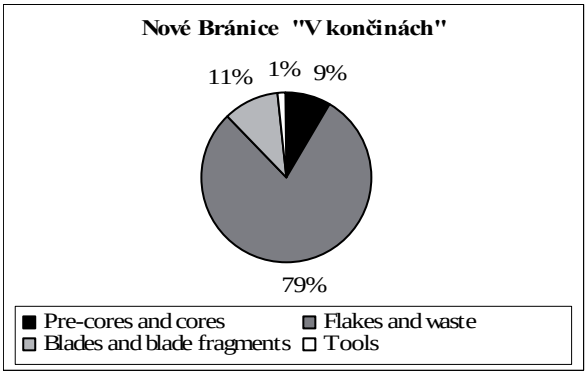
11.11.1 Background information

Geographic and geomorphological site characteristics
The municipality of Nové Bránice lies about 6 km south-east of the town of Ivančice, on the right side of the Jihlava river which is a right-bank tributary of the Svratka river. The site is situated south-west of the village at the cadastral dividing line of Nové Bránice and Trboušany. It lies on the eastern edge of the Krumlovský Les upland, on a moderate east-facing slope at an elevation of 260–270 m above sea level. The Krumlovský Les upland, which is part of the Bobrava Highlands, creates the eastern part of the Czech-Moravian Highlands. In terms of geology, the Krumlovský Les upland lies at the eastern edge of the Bohemian Massif, touching the Carpathian Foredeep (Demek & Novák *et al.* 1992, 15–16; Mateiciucová 1992). For more details, see chapter 11.14.1.

Blank groups	Total	%	Blanks	Tools
Pre-cores and cores	46	9.2	44	2
Flakes and waste	395	79.3	393	2
Blades and blade fragments	57	11.5	54	3
Total	498	100	491	7

Table 179. Nové Bránice „V končinách", phase II of the LBK. Chipped stone artefacts divided into basic blank groups.

Research history
The position "V končinách" is characterized by an extraordinary concentration of chipped stone assemblages, which have been systematically collected by O. Svoboda, teacher in Dolní Kounice (now in the collection of the Moravian Museum in Brno) and his disciple A. Otto (private collection). My attention was drawn to this location in 1987 through M. Oliva.



Basic morphological groups	Total	%
Pre-cores and cores	44	8.8
Flakes and waste	393	78.9
Blades and blade fragments	54	10.8
Tools	7	1.4
Total	498	100

Table 180. Nové Bránice "V končinách", phase II of the LBK. Proportion of chipped stone artefacts by basic morphological groups.

Raw material	Artefacts > 12 mm	%	Distance
Krumlovský Les I chert	444	89.2	0 – 5 km
Krumlovský Les II chert	30	6	0 – 5 km
Krumlovský Les chert – burnt	11	2.2	0 – 5 km
Burnt	13	2.6	
Total	498	100	

Table 181. Nové Bránice "V končinách", phase II of the LBK. Proportion of raw materials, including varieties and distance to outcrops.

Raw material	No. of pieces	Cores	Flakes	Blades	Tools
Krumlovský Les chert	485	44	380	54	7
%	100	9.1	78.4	11.1	1.4
Burnt	13	-	13	-	-
Total	498	44	393	54	7

Table 182. Nové Bránice "V končinách", phase II of the LBK. Proportion of raw materials in the basic morphological groups.

In November, 1989 in order to find out the cultural affiliation of the site, I opened two small trenches joining each other at a right angle:
Trench A – 1 × 2,5 m
Trench B – 1 × 2 m.
The trenches were situated at an elevation of 260–264 m above sea level, about 20 m north of the edge of a forest. On the south-east side (trench A), the following stratigraphy was revealed:
Beneath a 33 cm thick layer of topsoil rested a reddish-brown cultural layer of 27–29 cm thickness. Loess without any traces of cut features occurred at a depth of 60–62 cm below the trench edge.

Numerous chipped stone artefacts and several pottery sherds already came to light in the topsoil. The cultural deposit contained some sherds of a fine, muddy grey clay with note-like decoration. From a study of the not very representative ceramic material, we can hypothesise that the site was settled at the time of the LBK, probably in its phase II (Mateiciucová 1992).

Pre-cores and cores	Blanks	Tools	Total
Unworked raw material	1	–	1
Pre-cores	9	–	9
Cores	29	2	31
Splintered pieces	1	–	1
Core fragments	4	–	4
Total	44	2	46

Table 183. Nové Bránice "V končinách", phase II of the LBK. Pre-cores and cores.

11.11.2. Dating the site

Absolute chronology
There are no ^{14}C dates available so far.

Relative chronology (after Tichý)
Several tiny pottery fragments with note-like decoration indicate that the site can be dated to phase II of the LBK. However, occupation in the other chronological stages cannot be excluded.

Pre-cores	Raw material	Preparation	Height	Width	Thickness	Tools
1	KL I	unworked raw material	69	40	41	–
2	KL I	raw material prepared by several detachments	75	47	39	–
3	KL I	raw material prepared by several detachments	78	60	45	–
4	KL I	raw material prepared by several detachments	69.5	58	50	–
5	KL I	raw material prepared by several detachments	74	56	50	–
6	KL I	raw material prepared by several detachments	81	47	56	–
7	KL II	raw material with prepared striking platform	74	47	48	–
8	KL I	pre-core with prepared crest and striking platform	66	40	48	–
9	KL II	pre-core with prepared crest and striking platform	56	42	54	–
10	KL I	pre-core with prepared crest and striking platform	62	46	47	–

Table 184. Nové Bránice "V končinách", phase II of the LBK. Pre-cores.

11.11.3. Chipped stone industry

The cultural layer yielded 211 and the topsoil 287 chipped stone artefacts, which were studied as one assemblage of 498 pieces (**tables 179 & 180**). As at Kuřim, Nové Bránice also shows a very high ratio of flakes and waste (79.3 %) compared to the other categories. Equally, tools merely represent 1 % of all the artefacts here.

Cores	Raw material	Type of blanks	No. of platforms	Shape	Platform preparation	Dorsal reduction	Platform angle	Height	Width	Thickness	Tools
1	KL I	flake core	–	splintered piece	–	–	–	41	35	30.5	splintered piece
2	KL I	flake core	–	irregular	–	–	–	50.5	45	32	–
3	KL I	former blade core	–	core fragment	–	–	–	66	55	51	–
4	KL I	blade core	single	keel	rejuv. by several removals	–	acute	48.5	40.5	61	–
5	KL I	blade core	single	prismatic	rejuv. by faceting	–	acute	52.5	47	41	–
6	KL I	blade core	single	prismatic	rejuv. by faceting	–	right	63	39.5	42	–
7	KL I	blade core	single	prismatic	rejuv. by several removals	–	acute	54	47	32	–
8	KL I	blade core	single	prismatic	facetted	–	right	63	45	48	–
9	KL I	blade core	single	prismatic	prepared by several removals	yes	right	62	46	51	–
10	KL I	blade core	single	prismatic	facetted	–	right	59	44	44.5	–
11	KL I	blade core	single	prismatic	facetted	–	right	55	45	41	–
12	KL I	blade core	single	prismatic	facetted ?	–	acute	63	46.5	50	–
13	KL I	blade core	single	semi–conical	plain	–	acute	64	55	51	–
14	KL I	blade core	single	semi–conical	rejuv. by several removals	–	?	64	66	41	–
15	KL I	blade core	single	semi–conical	facetted	yes	acute	42.5	44.5	38.5	–
16	KL I	blade core	double	prismatic	facetted	–	right	43	39	40	–
17	KL II	blade core	double	prismatic	plain + facetted	–	acute	65	35	35	–
18	KL I	blade core	–	irregular	–	–	–	39	50	43	–
19	KL I	blade core	–	irregular	–	–	–	49	41	42	–
20	Přep. KL	blade core	–	exhausted	–	–	–	54	48	33	–
21	KL I	blade core	–	exhausted	–	–	–	49	37	32	–
22	KL I	blade core	–	core fragment	–	–	–	50	34	36	–
23	KL I	blade-flake core	single	prismatic	facetted	–	right	50	40	30	–
24	KL I	blade-flake core	single	prismatic	facetted	–	right	48	50	50	–
25	KL I	blade-flake core	single	prismatic	rejuv. by several removals	yes	right	34.5	35.5	21	–
26	KL I	blade-flake core	single	prismatic	prepared by several removals	–	right	62	43	40	–
27	KL I	blade-flake core	single	prismatic	prepared by several removals	–	–	54	41.5	31	–
28	KL I	blade-flake core	single	irregular	rejuv. by faceting	–	obtuse	44	45	45	hammerstone
29	KL I	blade-flake core	single	exhausted	facetted	–	neurč.	48.5	41	30	–
30	KL I	blade-flake core	–	exhausted	–	–	–	62	42	32	–
31	KL I	blade-flake core	–	exhausted	–	–	–	58	45.5	39	–
32	KL I	blade-flake core	–	irregular	–	–	–	45	44	41	–
33	KL I	blade-flake core	–	exhausted	–	–	–	49	43	35	–
34	KL I	blade-flake core	–	core fragment	–	–	–	53	43	36	–
35	KL I	blade-flake core	–	exhausted	–	–	–	55	33	39	–
36	KL II	blade-flake core	–	core fragment	–	–	–	48	40	32	–

Table 185. Nové Bránice "V končinách", phase II of the LBK. Cores.

Type of flake	No. of pieces	%	KL	Burnt	Flakes	Tools
Preparation flake	228	58	227	1	226	2
Blade-like flake	–	–	–	–	–	–
Splintered flake	–	–	–	–	–	–
Crested flakes and secondary crested flakes	6	1.5	6	–	6	–
Rejuvenation flake from a core's knapping surface	4	1	4	–	4	–
Rejuvenation flake from a core's striking platform	3	0.8	3	–	3	–
Rejuvenation flake from a core's base	2	0.5	2	–	2	–
Primary flake	2	0.5	2	–	2	–
Other technical flake	–	–	–	–	–	–
From polished tools	–	–	–	–	–	–
Waste	119	30.3	113	6	119	–
Natural raw material fragments	29	7.4	23	6	29	–
Total	393	100	380	13	391	2

Table 186. Nové Bránice "V končinách", phase II of the LBK. Flakes and waste.

Surface of flakes and flake tools	No. of pieces	%	KL	Burnt
Cortical	41	10.4	35	6
Partly cortical	104	26.5	101	3
Without cortex	248	63.1	244	4
Total	393	100	380	13

Table 187. Nové Bránice "V končinách", phase II of the LBK. Degree of preservation of natural surface on flakes including retouched tools.

11.11.3.1. Nearest outcrops of appropriate lithic raw materials

The site of Nové Bránice is situated directly on the edge of the Krumlovský Les exploitation area with its rich outcrops of Krumlovský Les chert. Another not very distant resource is provided by the outcrops of siliceous weathering products of serpentinites in south-west Moravia, 30–38 km away from the site. Finally, at a distance of 25–35 km north of Nové Bránice, on the northern and eastern edge of the Brno Basin, deposits of other Moravian Jurassic cherts occur.

Type of blade	Blade blanks		Blade tools
	No. of pieces	%	No. of pieces
Whole blade	2	3.7	–
Blade with broken off terminal part	14	25.9	–
Blade with broken off basal part	2	3.7	–
Blade with broken off terminal and basal part	2	3.7	–
Basal fragment of a blade	24	44.4	–
Mesial fragment of a blade	6	11.1	2
Terminal fragment of a blade	3	5.6	–
Whole crested blade	–	–	–
Fragment of a crested blade	–	–	–
Whole secondary crested blade	1	1.54	–
Fragment of a secondary crested blade	–	–	1
Total	54	100	3

Table 188. Nové Bránice "V končinách", phase II of the LBK. Blades and blade fragments.

Surface of blades and blade tools	No. of pieces	%	KL
Cortical	1	1.8	1
Partly cortical	13	22.8	13
Without cortex	43	75.4	43
Total	57	100	57

Table 189. Nové Bránice "V končinách", phase II of the LBK. Degree of preservation of natural surface on blades including retouched tools.

11.11.3.2. Raw material

The whole chipped stone assemblage is made of Krumlovský Les cherts, among which the KL I variety is absolutely predominant. Only for a few burnt artefacts was it impossible to identify the raw material, but it is probably one of the local cherts (**tables 181 & 182**). The KL cherts from Nové Bránice differ macroscopically from the ones used at the settlements of Vedrovice "Široká u lesa" and "Za dvorem". In the cherts from Nové Bránice, the silicite substance is created by more and less transparent thin layers. The natural raw material occurred in form of rather flattened pebbles or as larger, more angular lumps. Generally, it seems that the Krumlovský Les variety from Nové Bránice is of higher quality and more appropriate for making blade blanks than the grey-blue variety from Vedrovice. According to A. Přichystal, in the case of Nové Bránice the cherts are of Cretaceous rather than Jurassic age (A. Přichystal pers. comm.; Mateiciucová 1992).

Platform remnant Dorsal reduction	Total yes	Total no	% yes	% no	KL yes	KL no
Unprepared	0	2	0	100	0	2
	2		5.6		2	
Plain	0	3	0	100	0	3
	3		8.3		3	
Prepared by several blows	1	3	25	75	1	3
	4		11.1		4	
Punctiform	0		0		0	
Primarily facetted	1	26	3.7	96.3	1	26
	27		75		27	
Dihedral	0		0		0	
Secondary prepared	0		0		0	
Total	36		100		36	

Table 190. Nové Bránice "V končinách", phase II of the LBK. Platform remnants and dorsal reduction of blades and blade tools.

11.11.3.3. Pre-cores and cores

A total of 46 pieces (9.2 %), including two implements, belong to the category of pre-cores and cores (**table 183**). As at Kuřim, it is the exploited cores which are most represented at Nové Bránice. However, pre-cores and unworked raw material are also present (**tables 184 & 185**). The cores are single-platform, mostly of a prismatic, sometimes also of a half-conical shape. They were used for manufacturing blade blanks and in an advanced stage of reduction also for the detachment of flakes. However, most cores were discarded after the exploitation of blade blanks (**fig. 19: 11; fig. 20: 4,5**)

The core platform is usually adjusted by faceting or by applying several blows. Dorsal reduction occurred only rarely. The platform angle is mostly 90°. The reduced cores are nearly identical in size and create a uniform impression. Blade negatives indicate that the created blades are relatively large and wide, and the production as a whole resembles blade manufacturing at Kuřim.

One core was classified as a splintered piece and also assigned to the implements. Another piece was secondarily used as a hammerstone.

Length	No. of pieces	Min (mm)	Max (mm)	Avg (mm)	StDev (mm)
Blades	2	33	45	39	8.48
Blade tools	–	–	–	–	–

Table 191. Nové Bránice "V končinách", phase II of the LBK. Length of whole finished blades and blade tools.

Width	No. of pieces	Min (mm)	Max (mm)	Avg (mm)	StDev (mm)
Blades	20	10	24	16.7	14.15
Blade tools	–	–	–	–	–

Table 192. Nové Bránice "V končinách", phase II of the LBK. Width of whole finished blades, blades with broken off terminal part, basal part, terminal and basal parts.

Thickness	No. of pieces	Min (mm)	Max (mm)	Avg (mm)	StDev (mm)
Blades	40	3	7	5.3	1.08
Blade tools	–	–	–	–	–

Table 193. Nové Bránice "V končinách", phase II of the LBK. Thickness of finished blades with preserved basal part.

Blade negatives	No. of pieces	Min (mm)	Max (mm)	Avg (mm)	StDev (mm)
Length	10	42.5	62.5	53.4	5.91
Wight	10	14	24	17.6	2.83

Table 194. Nové Bránice "V končinách", phase II of the LBK. Length and wight of whole blade negatives on the cores.

Type of tools	Total	Cores	Flakes	Blades
Endscrapers	1	–	–	1
Truncated blades	2	–	–	2
Burins	–	–	–	–
Blades with lateral retouch	–	–	–	–
Retouched flakes	–	–	–	–
Borers, perforators and becs	–	–	–	–
Notches and denticulates	1	–	1	–
Sidescrapers	1	–	1	–
Trapezes	–	–	–	–
Other microliths	–	–	–	–
Splintered pieces	1	1	–	–
Combination tools	–	–	–	–
Hammerstones	1	1	–	–
Tool fragments	–	–	–	–
Total	7	2	2	3

Table 195. Nové Bránice "V končinách", phase II of the LBK. Tool classification by blank types.

11.11.3.4. Flakes and waste

This category is the most abundant. Flakes make up 62 %, the rest consists of waste and natural raw material fragments (**table 186**). On more than 37 % of flakes, the dorsal surface is completely or partly covered by natural surface (**table 187**). Besides common preparation flakes, some technical flakes also occurred. Only two flakes were additionally retouched.

Type of tools	Total	KL
Endscrapers	1	1
on a blade	1	1
Truncated blades	2	2
transverse convex	2	2
Burins	0	
Blades with lateral retouch	0	
Retouched flakes	0	
Borers, perforators and becs	0	
Notches and denticulates	1	1
denticulates	1	1
Sidescrapers	1	1
concave	1	1
Trapezes	0	
Other microliths	0	
Splintered pieces	1	1
Combination tools	0	
Hammerstones	1	1
hammerstone-raw material	1	1
Tool fragments	0	
Total	7	7

Table 196. Nové Bránice " V končinách", phase II of the LBK. Tool types and their raw materials.

11.11.3.5. Blades and blade fragments

Altogether, 57 (11.5 %) blades and blade fragments fall into this category (**table 188**). Three blades are retouched. Blades without cortex prevail, but cortical blades are also abundant (**table 189**; **fig. 19: 3,7 & fig. 20: 1–3,6**). At Nové Bránice, as at Kuřim, there are also numerous basal fragments of blades. It seems that in this case, too, the finished blade products were taken away and only rejects and broken off blade fragments remained in place. Most blades with preserved basal part had a primarily facetted platform remnant without dorsal reduction (**table 190**). By contrast, in Kuřim it is the blades with plain platform remnant which make up about a quarter of the total ratio.

11.11.3.6. Raw material transport

Because of the settlement's proximity to the outcrops of Krumlovský Les cherts, we can assume that most of the raw material had been directly worked at the site. As indicated by a high ratio of cortical flakes, primary flakes and various stages of pre-cores, the raw material reached the settlement in the form of roughly knapped blocks additionally worked at the village.

11.11.3.7. Tools

In the whole assemblage there were only seven implements (**tables 195 & 196**). They include two truncated blades, an endscraper on blade, notches, denticulates, a splintered piece and a hammerstone made of a core. The low ratio of tools again resembles the assemblage from Kuřim. The chipped stone implements of both collections come from those parts of the settlement which acted as some kind of specialised workshop area for the manufacture of blade blanks.

11.11.3.8. Artefacts with sickle gloss

No artefacts with sickle gloss were found.

11.11.3.9. Summary

The inhabitants of the settlement in Nové Bránice concentrated on working Krumlovský Les chert. Uniform blade cores and blade fragments document a specialised production of blade blanks, which like at Kuřim had been produced not only for local use, but also to be distributed to surrounding settlements. Uniform blades, often with sickle gloss, which are manufactured of the the variety of Krumlovský Les I chert that is macroscopically identical to thatt processed in Nové Bránice, occur at the middle and late LBK settlements of Kuřim, Těšetice-Kyjovice and Asparn-Schletz.

11.12. Přáslavice-Kocourovec, position "Na širokém" (Olomouc district, North Moravia, Czech Republic)

11.12.1. Background information

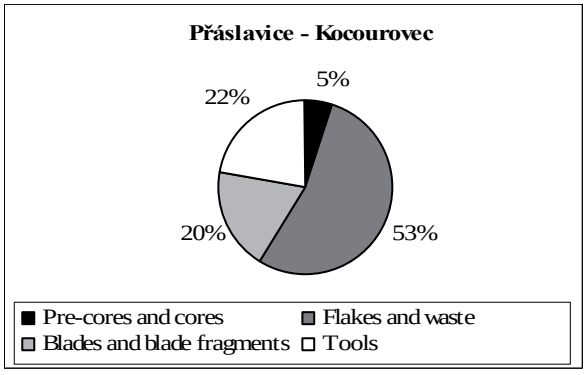
Geographic and geomorphological site characteristics

The site of Přáslavice-Kocourovec lies about 10 km east of Olomouc at the position "Na širokém" at an elevation of 303–313 m above sea level. The settlement is spread out in a shallow valley around an already dried-up water course and also covers the greatest part of a hillside sloping west and north-west above the Vrtůvka stream. The Vrtůvka meets the Bystřice stream, which is a left-bank tributary of the Morava river. In terms of orography, the site is situated in the Tršice upland, the southernmost part of the Lower Jeseník mountains. It is characterised by rather flat watersheds and shallow valleys. A distinct slope separates it from the higher Odra/Oder Highlands. The Jeseník mountains are part of the Bohemian Massif.

Blank groups	Total	%	Blanks	Tools
Pre-cores and cores	19	2.4	15	4
Flakes and waste	173	52.8	148	25
Blades and blade fragments	88	44.8	55	33
Total	280	100	218	62

Table 197. Přáslavice-Kocourovec, phase II of the LBK. Chipped stone artefacts divided into basic blank groups.

The geological subsoil is made up of Lower Carboniferous greywackes and slates of the Culmian facies. The upper cover consists of denudation relics of Neogene loams and sands covered with Quaternary sediments represented mainly by loess soils (Demek & Novák *et al.* 1992, 16, 29; Horáková *et al.* 1997, 7). In the Middle Holocene, the Tršice upland was covered by Atlantic oak woodland, which was found on all loess areas (Opravil 1997, 125).



Basic morphological groups	Total	%
Pre-cores and cores	15	5.4
Flakes and waste	148	52.9
Blades and blade fragments	55	19.6
Tools	62	22.1
Total	280	100
Chips (< 12 mm)	7	

Table 198. Přáslavice-Kocourovec, phase II of the LBK. Proportion of chipped stone artefacts by basic morphological groups.

Blank groups	No. of pieces	Weight (g)	Avg (g)
Pre-cores and cores	19	1348.1	70.9
Flakes and waste	173	1154.8	6.7
Blades and blade fragments	88	292.3	3.3
Total	280	2795.2	10

Table 199. Přáslavice-Kocourovec, phase II of the LBK. Weight of chipped stone artefacts.

Raw material	Artefacts > 12 mm	%	Artefacts ≤ 12 mm	Distance
Krakow Jurassic silicite	205	73.2	3	180 km
Krakow Jurassic silicite – burnt	10	3.6		
Erratic silicite	27	9.6		20–40 km
Krumlovský Les II chert	2	0.7		90–100 km
Szentgál radiolarite	1	0.4		270–280 km
Radiolarite – "pebble" cortex	1	0.4		
Burnt	28	10	4	
Undefined	6	2.1		
Total	280	100	7	

Table 200. Přáslavice-Kocourovec, phase II of the LBK. Proportion of raw materials and distance to outcrops.

Raw material	No. of pieces	Cores	Flakes	Blades	Tools
Krakow Jurassic silicite (+burnt Krakow Jurassic)	215	10	38	25	19
%	100	4.7	47	25.1	23.2
Erratic silicite	27	1	19	3	4
Krumlovský Les II chert	2	–	–	1	1
Szentgál radiolarite	1	1	–	–	–
Radiolarite – "pebble" cortex	1	–	1	–	–
Burnt	28	2	18	3	5
Undefined	6	1	2	1	2
Total	280	15	141	62	62

Table 201. Přáslavice-Kocourovec, phase II of the LBK. Proportion of raw materials in the basic morphological groups.

Pre-cores and cores	Blanks	Tools	Total
Unworked raw material	–	1	1
Pre-cores	–	1	1
Cores	12	1	13
Splintered pieces	2	1	3
Core fragments	1	–	1
Total	15	4	19

Table 202. Přáslavice-Kocourovec, phase II of the LBK. Pre-cores and cores.

Research history

Prior to the construction of the R35 speedway, a surface prospection was carried out along its route in 1992. It identified a settlement of the LBK culture between Lipník nad Bečvou and Olomouc, about 300 m north-west of the municipality of Kocourovec. In 1994 and 1995, the Institute of Archaeological Research and Preservation of Historical Monuments (ÚAPP) in Olomouc carried out a rescue excavation under the direction of J. Peška. The site was located in the area of the future slip road and uncovered a small part of the extensive LBK settlement identified by the survey. An area of about 2 ha was investigated, representing approximately only 1/5 – 1/6 of the area originally occupied. Twelve ground plans of longhouses were recognized and altogether 517 cut features were excavated (clay pits, remnants of about 20 ovens and unspecifiable post holes). Within the excavated part of the site, the overall spatial arrangement of the settlement shows two distinct areas. The houses and construction pits concentrated in the northern half (the so-called residential district), while features more associated with an economic function clustered in the southern half. The east and south-east edges of the settlement could be identified with certainty. The occupation probably expanded from the east towards the south-west (Horáková *et al.* 1997, 7–9).

11.12.2. Dating the site

Absolute chronology

There are no ^{14}C dates available so far.

Relative chronology (after Tichý)

Ceramic material from several features dates the settlement to between the very end of the early phase Ib and the late phase III of the LBK culture, with influences from the area of the Želiezovce Group (Horáková *et al.* 1997, 9; Čižmář 1998, 122, 124).

11.12.3. Chipped stone industry

Chipped stone material was found in 92 of the 517 features and in one post hole of house No. 13. Altogether, an assemblage of 287 pieces was obtained, of which seven chipped artefacts are ≤ 12 mm (**tables 197 & 198**). In most features, the amount of artefacts > 12 mm was six pieces at the most. The majority of the chipped stone artefacts were found in features No. 501 – 16 pieces, No. 190 – 13 pieces and No. 4 – nine pieces.

11.12.3.1. Nearest outcrops of appropriate lithic raw materials

The nearest source of raw material is the Maleník block south of the flowline Lipník nad Bečvou – Hranice na Moravě, about 18–25 km away from the municipality of Přáslavice-Kocourovec (information by A. Přichystal; Demek & Novák *et al.* 1992, 36). Jurassic cherts and Cretaceous spongolite cherts, which represent the remnants of the weathered Jurassic and Cretaceous limestones that covered the Maleník block, are found there. Another relatively easily accessible raw material are the erratic silicites occur-

Pre-cores	Raw material	Preparation	Height	Width	Thickness	Weight	Tool
1	Krakow Jurassic	unworked raw material	53	–	–	111	hammerstone
2	Krakow Jurassic	pre-core with prepared crest and striking platform	69	61	35	125	hammerstone

Table 203. Přáslavice-Kocourovec, phase II of the LBK. Pre-cores.

Cores	Raw material	Type of blanks	No. of platforms	Shape	Platform preparation	Dorsal reduction	Platform angle	Height	Width	Thickness	Weight	Tool
1	?	blade–flake core	single	prismatic	plain	no	right	39	33	29	38	–
2	Krakow Jurassic	blade–flake core	single	prismatic	several removals	no	obtuse	36	29	40	38	–
3	Szentgál	–	–	irregular	–	–	–	29	29	13	11.5	–
4	erratic silicite	blade core	double	burin–like	–	no	acute	64	39	44	103	–
5	Krakow Jurassic	–	multiple–platform core	exhausted	facetted	–	–	40	–	–	30	–
6	Krakow Jurassic	blade core	multiple–platform core	keel	rejuvenated by facetting	no	obtuse	57	40	96	265	–
7	Krakow Jurassic	flake core	single	keel	unprepared	–	obtuse	24	35	49	45.2	–
8	Krakow Jurassic	–	–	splintered piece	–	–	–	44	16	3	3.8	splintered piece
9	Krakow Jurassic	blade–flake core	–	irregular	–	–	–	46	35	28	45	hammerstone
10	Krakow Jurassic	former blade core	–	splintered piece	–	–	–	47	33	44	70	–
11	Krakow Jurassic	blade core	single	prismatic	prepared by several removals	no	obtuse	39	36	41	48.5	–
12	Krakow Jurassic	flake core	multiple–platform core	irregular	–	–	–	29	–	–	26	–
13	Krakow Jurassic	–	–	exhausted	–	–	–	59	–	–	79	–
14	Krakow Jurassic	–	–	splintered piece –fragment	–	–	–	33	–	–	5.8	–
15	Krakow Jurassic	blade–flake core	single	keel	plain	yes	obtuse	52	79	52	250	–
16	burnt	–	–	core fragment	–	–	–	41	–	–	27.5	–
17	burnt	blade core	single	–	–	–	–	44	–	–	25.8	–

Table 204. Přáslavice-Kocourovec, phase II of the LBK. Cores.

ring in glacial sediments 20–40 km away from the settlement (Přichystal 1994, 43).

11.12.3.2. Raw material

The most frequently utilized raw material was Krakow Jurassic silicite (215 pieces – 77 %; 180 km; **tables 200 & 201**). In contrast, the erratic silicite that could be gathered just 20 km away had been utilized only very rarely (10 %).

Contacts with the south Moravian region are documented by two pieces of Krumlovský Les chert, namely the fine-grained dun variety Krumlovský Les II (Přichystal 1984, 207).

The find of a core remnant made of Szentgál radiolarite from north-west Hungary is surprising. These radiolarites mostly occur at sites associated with the earliest phase of the LBK culture. In the middle phase of that culture, their influx was discontinued, and they occur again only at the end of the LBK culture (Asparn-Schletz) and in the Lengyel culture. At Přáslavice-Kocourovec, Szentgál radiolarite appeared in feature 26a, assigned to phase IIb of the LBK culture on the basis of associated ceramic material (I thank Z. Čižmář for the specification). The occurrence of Szentgál radiolarite could be related to finds of Želiezovce ceramics in the settlement (Čižmář 1998, 122, 124).

Type of flake	No. of pieces	%	Krakow Jurassic	Erratic silicite	Flakes	Tools
Preparation flake	103	59.5	80	14	88	15
Blade-like flake	–	–	–	–	–	–
Splintered flake	1	0.6	1	–	1	–
Crested flakes and secondary crested flakes	8	4.6	7	1	8	–
Rejuvenation flake from a core's knapping surface	5	2.8	5	–	3	2
Rejuvenation flake from a core's striking platform	5	2.8	5	–	4	1
Rejuvenation flake from a core's base	2	1.2	1	–	2	–
Primary flake	–	–	–	–	–	–
Other technical flake	4	2.4	3	1	4	–
From polished tools	–	–	–	–	–	–
Waste	39	22.5	22	4	37	2
Natural raw material fragments	2	1.2	–	–	1	1
Undefined	4	2.4	4	–	–	4
Total	173	100	128	10	148	25

Table 205. Přáslavice-Kocourovec, phase II of the LBK. Flakes and waste.

Surface of flakes and flake tools	No. of pieces	%	Krakow Jurassic	Erratic silicite	Other
Cortical	5	2.9	4	-	1
Partly cortical	54	31.2	39	8	7
Without cortex	114	65.9	85	12	17
Total	173	100	128	20	25

Table 206. Přáslavice-Kocourovec, phase II of the LBK. Degree of preservation of natural surface on flakes including retouched tools.

Length	No. of pieces	Min (mm)	Max (mm)	Avg (mm)	StDev (mm)
Flakes	86	13	57	27	8.7
Flake tools	15	14	55	30.5	12.06

Table 207. Přáslavice-Kocourovec, phase II of the LBK. Length of preparation and blade-like flakes (including flake tools).

Width	No. of pieces	Min (mm)	Max (mm)	Avg (mm)	StDev (mm)
Flakes	86	12	71	27.5	10.64
Flake tools	15	17	46	28.5	9.51

Table 208. Přáslavice-Kocourovec, phase II of the LBK. Width of preparation and blade-like flakes (including flake tools).

Thickness	No. of pieces	Min (mm)	Max (mm)	Avg (mm)	StDev (mm)
Flakes	86	2	24	7.4	3.81
Flake tools	15	5	19	8.8	4.35

Table 209. Přáslavice-Kocourovec, phase II of the LBK. Thickness of preparation and blade-like flakes (including flake tools).

One radiolarite artefact with pebble surface probably comes from fluvial or glacial gravels.

11.12.3.3. Pre-cores and cores

In total, 19 artefacts (including four tools manufactured on cores) were assigned to the group of pre-cores and cores (**table 202**).

Most cores are made of Krakow Jurassic silicite (14 pieces, including four tools). This raw material was also found in the form of an unworked nodule and a pre-core with prepared platform and frontal crest adjustment. Both were used as hammerstones (**tables 203 & 204**; **fig. 22: 5; fig. 23: 6**). Of the 17 reduced cores, one was made of erratic silicite (**fig. 24: 3**), one of Szentgál radiolarite (**fig. 25: 5**) and two cores were burnt. One piece could not be identified with certainty as either Krakow Jurassic or erratic silicite.

Most were originally used for manufacturing blade blanks. Thereafter, some of them were also used for producing flake blanks. Six cores are single-platform, two double-platform and two are multiple-platform cores. The cores are mostly prismatic, but there are also burin-like cores, flat, keeled (**fig. 21: 1; fig. 22: 1**) or irregular cores and three splintered pieces (**fig. 21: 5; fig. 24: 1; fig. 25: 8**). At Přáslavice-Kocourovec, one core was originally used for detaching blades on its narrower side and only secondarily became a splintered piece.

Multiple-platform cores with altered orientation, flake negatives on cores, irregular shapes and the occurrence of splintered pieces all testify to an effort towards the best possible utilization of raw material.

The striking platform was adjusted by primary faceting (four pieces), by detaching a single flake (three pieces) and in one case by retention of the natural surface. Dorsal reduction was not identified.

11.12.3.4. Flakes and waste

Altogether, 148 unretouched artefacts and 25 tools manufactured on flake blanks belong to this group (**table 205**).
The majority of flakes and waste (including tools) is made of Krakow Jurassic silicite (74 %).
Waste, natural fragments of raw material and undefineable artefacts make up 26 % (45 artefacts, including seven tools) in total.
Cortical flakes are represented by 59 artefacts (34 %). On five of them cortex covers the entire dorsal surface (**table 206**).
Primary and secondary crested flakes (eight pieces), together with primary and secondary crested blades, show evidence of crest preparation of cores and probably also of the form in which the raw material (mainly Krakow Jurassic silicite) reached the site (**fig. 26: 1,3**).
The effort towards the best core exhaustion and preparation possible is documented through rejuvenation flakes from the striking platform (five pieces), rejuvenation flakes from the core's knapping surface (five pieces; **fig. 21: 4; fig. 24: 5**) and rejuvenation flakes from the core's base (two pieces).

11.12.3.5. Blades and blade fragments

The assemblage from Přáslavice-Kocourovec contains 55 blades and blade fragments (19.6 %). If we add the 33 tools manufactured on blade blanks (from the total of 62 implements), the number of blade blanks amounts to 88 pieces.

The majority of blades were made of Krakow Jurassic silicite. The most frequent form both among the blade blanks and among the tools are the blades with broken off terminal part (blades 34.6 %, tools 36.5 %) and the blades with broken off terminal and basal parts (blades 21.8 %, tools 15.2 %). This also includes the pieces with a retouched basal end (**tables 210 & 211**).

Type of blade	Blade blanks		Blade tools	
	No. of pieces	%	No. of pieces	%
Whole blade	3	5.5	2	6
Blade with broken off terminal part	19	34.6	12	36.5
Blade with broken off basal part	2	3.6	5	15.2
Blade with broken off terminal and basal part	12	21.8	7	21.3
Basal fragment of a blade	5	9	2	6
Mesial fragment of a blade	4	7.3	2	6
Terminal fragment of a blade	2	3.6	2	6
Whole crested blade	3	5.5	1	3
Fragment of a crested blade	4	7.3	–	–
Whole secondary crested blade	1	1.8	–	–
Fragment of a secondary crested blade	–	–	–	–
Total	55	100	33	100

Table 210. Přáslavice-Kocourovec, phase II of the LBK. Blades and blade fragments.

Surface of blades and blade tools	No. of pieces	%	Krakow Jurassic	Erratic silicite	Other
Cortical	–	–	–	–	–
Partly cortical	24	27.3	20	2	2
Without cortex	64	72.7	53	4	7
Total	88	100	73	6	9

Table 211. Přáslavice-Kocourovec, phase II of the LBK. Degree of preservation of natural surface on blades including retouched tools.

Platform remnant / Dorsal reduction	Total yes	Total no	% yes	% no	Krakow Jurassic yes	Krakow Jurassic no	Erratic silicite yes	Erratic silicite no	Other yes	Other no
Unprepared	0	1	0	100	0	1				
	1		2		1		0		0	
Plain	1	12	8.3	91.7	0	11	1	1		
	13		26		11		2		0	
Prepared by several blows	1	3	25	75	0	2	1	0	0	1
	4		8		2		1		1	
Punctiform	0	2	0	100	0	2				
	2		4		2		0		0	
Primarily facetted	1	27	3.6	96.3	1	23	0	2	0	2
	28		56		24		2		2	
Dihedral	0	1	0	100	0	1				
	1		2		1		0		0	
Secondary prepared	0	1	0	100	0	1				
	0		2		0		0		0	
Total	49		100		41		5		3	

Table 212. Přáslavice-Kocourovec, phase II of the LBK. Platform remnants and dorsal reduction of blades and blade tools.

The primary and secondary crested blades and blade fragments show evidence of a crest preparation of cores (**fig. 24: 4; fig. 25: 9**). 49 blades (including tools) show a preserved basal part. The platform remnant was mostly adjusted by primary faceting – 28 pieces (56 %; **table 212**). This prevailing way of preparing blade platform remnants corresponds to the predominant preparation mode of core striking platforms. Plain platform remnants occurred in 13 cases. Dorsal reduction appeared only sporadically.

Length	No. of pieces	Min (mm)	Max (mm)	Avg (mm)	StDev (mm)
Blades	3	35	40	37.3	
Blade tools	2	31	56	43.5	

Table 213. Přáslavice-Kocourovec, phase II of the LBK. Length of whole finished blades and blade tools.

Width	No. of pieces	Min (mm)	Max (mm)	Avg (mm)	StDev (mm)
Blades	36	9	30	17.6	
Blade tools	26	11	25	16.4	

Table 214. Přáslavice-Kocourovec, phase II of the LBK. Width of whole finished blades, blades with broken off terminal part, basal part, terminal and basal parts.

Thickness	No. of pieces	Min (mm)	Max (mm)	Avg (mm)	StDev (mm)
Blades	27	2	8	4.7	
Blade tools	16	3	9	5.5	

Table 215. Přáslavice-Kocourovec, phase II of the LBK. Thickness of finished blades with preserved basal part.

11.12.3.6. Raw material transport

Krakow Jurassic silicite reached the settlement in the form of unreduced prepared cores apparently adjusted by crest preparation. The evidence for such preparation are the primary and secondary crested blades and a pre-core of Krakow Jurassic silicite with frontal crest adjustment. The relatively high ratio of blades and flakes with partly preserved natural surface and technical rejuvenation flakes also indicates that the process of core exploitation must have taken place in the settlement directly.

11.12.3.7. Tools

Typological analysis was applied to a total of 62 implements (22.1 % of all artefacts). They are mostly made on blade blanks (33 pieces; **table 216**), but flake tools are also abundant (25 pieces).

The most common types are endscrapers (16 pieces; **fig. 21: 2; fig. 23: 3; fig. 24: 6, 8; fig. 25: 7; fig. 26: 2, 6, 8, 9 & fig. 27: 1, 2**) and truncated blades (ten pieces; **table 217**; **fig. 22: 2,3; fig. 24: 7; fig. 25: 3 & fig. 27: 4, 5, 8**).

Simple endscrapers on blades (six pieces, including an endscraper on retouched blade) and on flakes (four pieces) predominate. There were also two pointed, one high and one double endscraper. Among the truncated blades, blades with one retouched end (six pieces) appear more often than blades retouched on both ends (four pieces).

Furthermore, there were retouched blades (eight pieces) – mostly those with partial retouch, combination tools (six pieces), splintered pieces (five pieces), notches (five pieces), hammerstones (four pieces), one concave sidescraper, a transverse burin, a slim perforator with well-distinguished point (**fig. 25: 1**) and one bec.

Type of tools	Total	Cores	Flakes	Blades
Endscrapers	16	–	10	6
Truncated blades	10	–	1	9
Burins	1	–	1	–
Blades with lateral retouch	8	–	–	8
Retouched flakes	–	–	–	–
Borers, perforators and becs	2	–	–	2
Notches and denticulates	5	–	3	2
Sidescrapers	1	–	1	–
Trapezes	–	–	–	–
Other microliths	–	–	–	–
Splintered pieces	5	1	4	–
Combination tools	6	–	1	5
Hammerstones	4	3	1	–
Tool fragments	4	–	3	1
Total	62	4	25	33

Table 216. Přáslavice-Kocourovec, phase II of the LBK. Tool classification by blank types.

11.12.3.8. Artefacts with sickle gloss

Sickle gloss appeared on 16 pieces of chipped stone (**tables 218 & 219**). 14 of them were manufactured from Krakow Jurassic silicite. Sickle gloss mostly occurred on

Type of tools	Total	%	Krakow Jurassic	Erratic silicite	Other
Endscrapers	16	25.8	13	2	1
pointed	2		1		1 (burnt)
on a flake	4		4		
on a blade	5		4	1	
double	1		1		
on a retouched blade	1		1		
indistinct	1		1		
high	1		1	1	
Truncated blades	10	16.1	8	2	
oblique straight	2		2		
oblique angled	1		1		
transverse concave	1		1		
transverse convex	2		2		
oblique on both ends – trapeze shape	4		2	2	
Burins	1	1.6			1
transverse	1				1 (undefined)
Blades with lateral retouch	8	12.9	7	1	
unilateral discontinuous	2		2		
unilateral partial	4		4		
bilateral partial	2		1	1	
Retouched flakes	0				
Borers, perforators and becs	2	3.2	1		1
slim borer with a well distinguished point	1		1		
bec created by notches	1				1 (burnt)
Notches and denticulates	5	8.1	5		
retouched notch	3		3		
retouch on a break/ notch fragment	1		1		
"Clactonian" notch	1		1		
Sidescrapers	1	1.6	1		
concave	1		1		
Trapezes	0				
Other microliths	0				
Splintered pieces	5	8.1	5		
two-sided opposing	3		3		
two-sided cross	2		2		
Combination tools	6	9.6	5	1	
endscraper – notch	2		2		
truncated blade – retouched blade	1		1		
retouched blade – notch	1		1		
retouched blade – denticulates	1		1		
retouched flake – notch	1			1	
Hammerstones	4	6.5	3		1
hammerstone – raw material	2		2		
hammerstone – from a core	1		1		
hammerstone fragment	1				1 (burnt)
Tool fragments	4	6.5	2		2 (burnt)
Total	62	100	50	6	6

Table 217. Přáslavice-Kocourovec, phase II of the LBK. Tool types and their raw materials.

Artefacts with sickle gloss			
Raw material	Blades and blade tools	Flakes a flake tools	Total
Krakow Jurassic silicite	12	2	14
Krumlovský Les II chert	1	–	1
Undefined	1	–	1
Total	14	2	16

Table 218. Přáslavice-Kocourovec, phase II of the LBK. Proportion of artefacts with sickle gloss by raw material.

blade tools (eight pieces), mainly on truncated and retouched blades. In one case it was detected on a flake endscraper.

11.12.3.9. Summary

The settlement at Přáslavice-Kocourovec represents a typical secondary processing village, using Krakow Jurassic silicite imported from a distance of 180 km as the main raw material. Local erratic silicite was in fact neglected. The Krakow Jurassic silicite had been transported into the settlement in form of prepared cores, and blanks were produced directly at the settlement. The find of an exhausted core of Szentgál radiolarite within a feature dating from the IIb phase is surprising. On blades, platform remnants adjusted by primary facetting without dorsal reduction predominate. Among the tools, endscrapers, as well as blades retouched to various degrees, are the most frequent. One slim perforator with well-distinguished point also occurred here.

Blades with sickle gloss	**Blade tools**		**Blades**
Type of blade	Type of tools	No. of pieces	No. of pieces
Whole blade		–	–
Blade with broken off terminal part		3	2
	truncated blade	1	
	retouched blade	2	
Blade with broken off basal part		2	1
	retouched blade	1	
	combination: retuš. čepel – notch	1	
Blade with broken off terminal and basal part		3	1
	truncated blade with retouch on both ends	2	
	retouched blade	1	
Basal fragment of a blade		–	1
Mesial fragment of a blade		–	–
Terminal fragment of a blade		–	–
Technical blade		–	1
Total		8	6
Flakes with sickle gloss	**Flake tools**		Flakes
Type	Type of tool	No. of pieces	No. of pieces
Preparation flake	endscraper	1	–
Waste		–	1
Total		1	1

Table 219. Přáslavice-Kocourovec, phase II of the LBK. Blanks and tools with sickle gloss by types.

11.13. Těšetice-Kyjovice, position "Sutny" (Znojmo district, South Moravia, Czech Republic)

11.13.1. Background information

Geographic and geomorphological site characteristics
The site lies at the meeting point of the Carpathian Foredeep and the Bohemian Massif. In terms of morphology, it is part of the Dyje-Svratka valley, which in this area merges into the Jevišovická upland of the Bohemian-Moravian highlands. The site is situated on the left bank of the Únanovka stream (sometimes called Těšetička), itself a right-bank tributary of the Jevišovka river, in turn a left-bank tributary of the Dyje river. The quaternary sediments of the site were created by massive loess drifts with fluvial sandy gravels in their subsoil. In the wider surroundings, kaolinic weathering products of granite and gneiss come to the surface. These were the source of raw material for making pottery and for white and yellow dyes. On the loess surface, a pedogenic process beginning with the Holocene resulted in the creation of chernozems.
The site lies on a hillside with an elevation of 265 – 290 m above sea level. It slopes gently in a south-easterly direction towards the Únanovka (Těšetička) stream (Podborský 1999, 115).

Blank groups	Total	%	Blanks	Tools
Pre-cores and cores	8	9.6	2	6
Flakes and waste	42	50.6	30	12
Blades and blade fragments	33	39.8	20	13
Total	83	100	52	31

Table 220. Těšetice-Kyjovice, phase II of the LBK. Chipped stone artefacts divided into basic blank groups.

Basic morphological groups	Total	%
Pre-cores and cores	2	2.4
Flakes and waste	30	36.1
Blades and blade fragments	20	24.1
Tools	31	37.4
Total	83	100

Table 221. Těšetice-Kyjovice, phase II of the LBK. Proportion of chipped stone artefacts by basic morphological groups.

Blank groups	No. of pieces	Weight (g)	Avg (g)
Pre-cores and cores	8	1006.5	125.8
Flakes and waste	42	267.8	6.4
Blades and blade fragments	33	164.2	5
Total	83	1438.5	17.3

Table 222. Těšetice-Kyjovice, phase II of the LBK. Weight of chipped stone artefacts.

Research history
The site of Těšetice-Kyjovice "Sutny" was discovered in 1956 in connection with a rescue excavation in Těšetice "Vinohrady". The site was densely occupied from the LBK culture up to the Latène period. The systematic archaeological excavation has been running from 1967 until the present day under the direction of V. Podborský. His students concentrated mainly on research into the Moravian Painted Ware culture (Podborský 2001, 17–21). In 1968, it was at this site that a ditched enclosure – rondel was discovered for the first time in central Europe (Podborský 1988, 11–12).

LBK settlement activity concentrates to the east and northeast of the rondel on a moderate SE slope, where the remains of 13 longhouses have been uncovered so far. NE of the LBK settlement, a group of eight graves with nine burials was excavated, with a further separate grave, H 11, to the west of the main group. On the basis of pottery analysis, the burials date to the early LBK culture (Dočkalová & Koštuřík 1996), but the C-14 dates are rather younger. In contrast, the settlement was preliminarily dated to the middle LBK on the basis of pottery. Unfortunately, no systematic attention has so far been paid to the LBK occupation at this site.

Feature No.	Sector	Year	No. of pieces	< 12 mm
339 B	A 3	1989	4	
350 A	A 3	1990	1	
354 KJ	A 3	1990	1	
365	A 3	1990	1	
365 A	A 3	1990	5	
365 B	A 3	1990	14	1
365 C	A 3	1990	1	
365 P	A 3	1989	6	
383 A	A 4	1992	2	
383 B	A 4	1992	7	
383 P	A 4	1991	4	
383	A 4	1992	1	
389 P	A 4	1991	1	
391 B	A 4	1992	1	
464 KB-AC	B 3	1994	2	
464 B	B 3	1994	9	2
464 C	B 3	1994	2	
464 E	B 3	1994	1	
464 EF	B 3	1994	2	
464 H	B 3	1994	1	
464 P	B 3	1994	13	
475 P	B 3	1994	3	
487 B	B 3	1994	1	
Total			83	3

Table 223. Těšetice-Kyjovice, phase II of the LBK. Proportion of chipped stone artefacts (> 12 mm) by archaeological feature.

11.13.2. Dating the site

Absolute chronology
Only ^{14}C dates from three LBK graves are available so far[114].

Grave 11 (H 11)
VERA 2610 – one date (human bone)
Dating BP: 6150 ± 35

68.2 % confidence
cal BC 5210 – 5090 (48.5 %)
cal BC 5080 – 5040 (19.7 %)
95.4 % confidence
cal BC 5220 – 5000 (95.4 %)

114 See note 109 in chapter 11.7.2.

Raw material	Artefacts > 12 mm	%	Artefacts ≤ 12 mm	Distance
Krumlovský Les I chert	39	47	1	22–28 km
Krumlovský Les II chert	12	14.5	1	
Krumlovský Les chert – burnt	4	4.8		
Siliceous weathering products of serpentinites	5	6		16–20 km
Erratic silicite	4	4.8		140–150 km
Quartz	4	4.8		
Krakow Jurassic silicite	2	2.4		290 km
Moravian Jurassic chert	2	2.4		22–28,50–60 km
Limnosilicite ?	1	1.2		180–190 km
Granite	1	1.2		
Burnt	1	1.2		
Undefined	8	9.6	1	
Total	83	99.9	3	

Table 224. Těšetice-Kyjovice, phase II of the LBK. Proportion of raw materials, including varieties and distance to outcrops.

Raw material	No. of pieces	Cores	Flakes	Blades	Tools
Krumlovský Les chert (+burnt)	55	1	15	17	22
%	100	1.8	27.3	30.9	40
Siliceous weathering products of serpentinites	5	–	5	–	–
Erratic silicite	4	1	1	–	2
Quartz	4	–	1	–	3
Krakow Jurassic silicite	2	–	1	1	–
Moravian Jurassic chert	2	–	1	–	1
Limnosilicite ?	1	–	1	–	–
Granite	1	–	–	–	1
Burnt	1	–	1	–	–
Undefined	8	–	4	2	2
Total	83	2	30	20	31

Table 225. Těšetice-Kyjovice, phase II of the LBK. Proportion of raw materials in the basic morphological groups.

Pre-cores and cores	Blanks	Tools	Total
Unworked raw material	–	4	4
Pre-cores	–	2	2
Cores	1	–	1
Splintered pieces	–	–	–
Core fragments	1	–	1
Total	2	6	8

Table 226. Těšetice-Kyjovice, phase II of the LBK. Pre-cores and cores.

Grave 18 (H 18)
VERA 2609 – one date (human bone)
Dating BP: 6210 ± 35

68.2 % confidence
cal BC 5230 – 5200 (11.2 %)
cal BC 5180 – 5070 (57.0 %)
95.4 % confidence
cal BC 5300 – 5050 (95.4 %)

Grave 20 (H 20)
VERA 2608 – one date (human bone)
Dating BP: 6240 ± 35

68.2 % confidence
cal BC 5310 – 5200 (65.8 %)
cal BC 5150 – 5130 (0.7 %)
cal BC 5090 – 5080 (1.8 %)
95.4 % confidence
cal BC 5310 – 5200 (67.6 %)
cal BC 5180 – 5060 (27.8 %)

Relative chronology
The features that yielded the chipped stone artefacts studied here were dated into phase II of the LBK on the basis of ceramic material.

11.13.3. Chipped stone industry

From Těšetice-Kyjovice, an assemblage of 83 chipped stone artefacts > 12 mm was analysed (**tables 220–222**). Most of them were found in features No. 365 and 464 (**table 223**). Flakes and waste may be predominant in the assemblage, but their ratio (including flake tools) accounts for only half the assemblage.

Pre-cores	Raw material	Preparation	Height	Width	Thickness	Weight	Tool
1	KL I	pre-core with prepared crest and striking platform	53	51	57	190	hammerstone
2	KL I	pre-core with prepared crest and striking platform	67	46	73	270	hammerstone
3	granite	unworked raw material	62	55	24	96	hammerstone
4	quartz	unworked raw material	61	-	-	170	hammerstone
5	quartz	unworked raw material	47	-	-	47	hammerstone
6	KL I	unworked raw material	54	48	35	106	hammerstone

Table 227. Těšetice-Kyjovice, phase II of the LBK. Pre-cores.

Cores	Raw material	Type of blanks	No. of platforms	Shape	Platform preparation	Dorsal reduction	Platform angle	Height	Width	Thickness	Weight	Tools
1	KL I	blade-flake core	single	prismatic	facetted	no	right	49	40	50	121	–
2	erratic silicite	blade-flake core	–	core fragment	–	–	–	30	–	–	6,5	–

Table 228. Těšetice-Kyjovice, phase II of the LBK. Cores.

Type of flake	No. of pieces	%	KL	Other	Flakes	Tools
Preparation flake	25	59.4	17	8	17	8
Blade-like flake	–	–	–	–	–	–
Splintered flake	1	2.4	–	1	1	–
Crested flakes and secondary crested flakes	1	2.4	–	1	1	–
Rejuvenation flake from a core's knapping surface	1	2.4	1	–	1	–
Rejuvenation flake from a core's striking platform	2	4.8	–	2	1	1
Rejuvenation flake from a core's base	1	2.4	–	1	–	1
Primary flake	–	–	–	–	–	–
Other technical flake	1	2.4	1	–	1	–
From polished tools	2	4.8	–	2	2	–
Waste	7	16.6	3	4	6	1
Natural raw material fragments	–	–	–	–	–	–
Undefined	1	2.4	1	–	–	1
Total	42	100	23	19	30	12

Table 229. Těšetice-Kyjovice, phase II of the LBK. Flakes and waste.

Surface of flakes and flake tools	No. of pieces	KL	Other
Cortical	-	-	-
Partly cortical	3	2	1
Partly cortical – polished	1	-	1
Without cortex	29	26	3
Total	33	28	5

Table 230. Těšetice-Kyjovice, phase II of the LBK. Degree of preservation of natural surface on flakes including retouched tools.

Length	No. of pieces	Min (mm)	Max (mm)	Avg (mm)	StDev (mm)
Flakes	17	16	61	27.4	11.46
Flake tools	8	19	56	28.4	12.07

Table 231. Těšetice-Kyjovice, phase II of the LBK. Length of preparation and blade-like flakes (including flake tools).

Width	No. of pieces	Min (mm)	Max (mm)	Avg (mm)	StDev (mm)
Flakes	17	8	51	24.6	11.08
Flake tools	8	14	34	23.4	6.9

Table 232. Těšetice-Kyjovice, phase II of the LBK. Width of preparation and blade-like flakes (including flake tools).

Thickness	No. of pieces	Min (mm)	Max (mm)	Avg (mm)	StDev (mm)
Flakes	17	3	20	9.5	4.83
Flake tools	8	4,5	16	8.4	4.35

Table 233. Těšetice-Kyjovice, phase II of the LBK. Thickness of preparation and blade-like flakes (including flake tools).

Type of blade	Blade blanks	Blade tools
Whole blade	2	1
Blade with broken off terminal part	8	2
Blade with broken off basal part	1	1
Blade with broken off terminal and basal part	1	–
Basal fragment of a blade	2	2
Mesial fragment of a blade	2	6
Terminal fragment of a blade	3	1
Whole crested blade	–	–
Fragment of a crested blade	1	–
Whole secondary crested blade	–	–
Fragment of a secondary crested blade	–	–
Total	20	13

Table 234. Těšetice-Kyjovice, phase II of the LBK. Blades and blade fragments.

11.13.3.1. Nearest outcrops of appropriate raw materials

The nearest sources of lithic raw material are the siliceous weathering products of serpentinites around Jevišovice, Jiřice and Bojanovice, at a distance of about 16 – 20 km from the site. Another high-quality resource are the Krumlovský Les cherts from the eastern edge of Krumlovský Les upland (Krumlovian Forest), at a distance of 22–28 km.

11.13.3.2. Raw material

Krumlovský Les cherts predominate in this assemblage (66 %). The coarse-grained variety KL I was used more frequently (**tables 224 & 225**). Siliceous weathering products of serpentinites occurred only five times, although their outcrops are situated much closer. Among the more remote imports were a core, a flake and two implements made of erratic silicite, the nearest sources of which can be found about 140–150 km from the settlement, as well as a flake and a blade of Krakow Jurassic silicite (ca 290 km). Other raw materials are of local or regional origin.

Surface of blades and blade tools	No. of pieces	KL	Other
Cortical	1	–	1
Partly cortical	16	8	8
Partly cortical- polished	22	15	7
Without cortex	3	–	3
Total	27	23	19

Table 235. Těšetice-Kyjovice, phase II of the LBK. Degree of preservation of natural surface on blades including retouched tools.

Platform remnant	Total	KL	Other
Unprepared	–	–	–
Plain	6	5	1
Prepared by several blows	2	2	–
Punctiform	3	1	2
Primary facetted	5	5	–
Dihedral	1	1	–
Secondary prepared	–	–	–
Total	17	14	3

Table 236. Těšetice-Kyjovice, phase II of the LBK. Platform remnants of blades and blade tools.

Length	No. of pieces	Min (mm)	Max (mm)	Avg (mm)	StDev (mm)
Blades	2	42	84	63	29.7
Blade tools	1	57	57	57	0

Table 237. Těšetice-Kyjovice, phase II of the LBK. Length of whole finished blades and blade tools.

Width	No. of pieces	Min (mm)	Max (mm)	Avg (mm)	StDev (mm)
Blades	12	9	39	17.2	8.57
Blade tools	4	17	29.5	24.1	5.45

Table 238. Těšetice-Kyjovice, phase II of the LBK. Width of whole finished blades, blades with broken off terminal part, basal part, terminal and basal parts.

Thickness	No. of pieces	Min (mm)	Max (mm)	Avg (mm)	StDev (mm)
Blades	12	3	10	5	1.96
Blade tools	5	4	19	9.8	6.14

Table 239. Těšetice-Kyjovice, phase II of the LBK. Thickness of finished blades with preserved basal part.

Type of tools	Total	Cores	Flakes	Blades
Endscrapers	9	–	6	3
Truncated blades	–	–	–	–
Burins	–	–	–	–
Blades with lateral retouch	2	–	–	2
Retouched flakes	1	–	1	–
Borers, perforators and becs	2	–	1	1
Notches and denticulates	4	–	1	3
Sidescrapers	–	–	–	–
Trapezes	–	–	–	–
Other microliths	–	–	–	–
Splintered pieces	1	–	1	–
Combination tools	2	–	1	1
Hammerstones	7	6	1	–
Tool fragments	3	–	–	3
Total	31	6	12	13

Table 240. Těšetice-Kyjovice, phase II of the LBK. Tool classification by blank types.

11.13.3.3. Pre-cores and cores

A total of eight artefacts fall into this category (**table 226**), including four unworked pieces of raw material and two pre-cores with prepared striking platform and frontal crest adjustment that were used as hammerstones (**table 227**). Furthermore, a single-platform core of KL I chert and a core fragment of erratic silicite were found. The KL I core had a platform adjusted by primary faceting without dorsal reduction (**table 228**).

11.13.3.4. Flakes and waste

42 chipped stone artefacts were assigned to the category of "flakes and waste", including 12 tools (**table 229**). A low ratio of cortical flakes and the frequent occurrence of technical flakes from core preparation and rejuvenation phases show an intensive utilization of raw material (**table 230**).

11.13.3.5. Blades and blade fragments

20 blades and 13 blade tools belong to this group (**tables 234 & 235**). Among the blade blanks, blades with broken off terminal part (eight pieces) appeared most frequently. Among the blade tools, mesial blade fragments (six pieces) predominate. 17 blades and blade tools had a preserved basal part. The blades with plain platform remnant prevail slightly (six pieces). Blades with primarily facetted platform remnant occurred five times (**table 236**).

11.13.3.6. Raw material transport

The Krumlovský Les cherts probably reached the settlement in form of prepared unreduced cores. For some purposes (hammerstones?), unworked raw material was also brought to the site. However, the raw material supply was not regular, apparently due to the longer distance. A higher ratio of technical flakes from the core rejuvenation phase also testifies to the more sparing treatment of raw material. A high ratio of blades and blade fragments does not exclude the possibility that part of the KL cherts could have reached the settlement in form of blanks.

11.13.3.7. Tools

Altogether, 31 artefacts (**tables 240 & 241**) were classified as tools. 13 of them were manufactured on blade blanks and 12 on flakes. The major part (22 pieces) was made of KL cherts. The most abundant group is formed by the endscrapers (nine pieces) and hammerstones (seven pieces). Truncated blades were found only twice. There was also one perforator with well-distinguished point made of KL chert, reminiscent of perforators of the Vedrovice type.

Type of tools	Total	KL	Other
Endscrapers	9	5	4
on a blade	3	2	1 (erratic silicite)
pointed	1		1 (undefined)
thumbnail	2	2	
circular	1	1	
high	1		1 (MJC)
double	1		1 (erratic silicite)
Truncated blades	0		
Burins	0		
Blades with lateral retouch	2	2	
unilateral continuous	1	1	
unilateral partial	1	1	
Retouched flakes	1	1	
Borers, perforators and becs	2	2	
slim perforator with a weakly distinguished point	1	1	
perforator with strong point	1	1	
Notches and denticulates	4	3	1
retouched notch	3	2	1 (undefined)
denticulated blade (flake)	1	1	
Sidescrapers	0		
Trapezes	0		
Other microliths	0		
Splintered pieces	1	1	
single sided opposing	1	1	
Combination tools	2	2	
endscraper – denticulates	1	1	
retouched blade – notch	1	1	
Hammerstones	7	3	4
hammerstone – raw material	2	1	1 (granite)
hammerstone – from a core	2	2	
hammerstone fragment	3		3 (quartz)
Tool fragments	3	3	
Total	31	22	9

Table 241. Těšetice-Kyjovice, phase II of the LBK. Tool types and their raw materials.

11.13.3.8. Artefacts with sickle gloss

In Těšetice, four tiny fragments of sickle blades were identified. They are made of the same variety of KL I chert also known from the settlement at Nové Bránice. Three of them were retouched (endscraper, truncated blade and laterally retouched blade).

11.13.3.9. Summary

Two thirds of the chipped stone industry assemblage in Těšetice-Kyjovice was made of local Krumlovský Les chert, while the closer sources of siliceous weathering products of serpentinites remained in fact neglected. In contrast to other LBK sites, the fine-grained variety KL II occurs more frequently than usual. Unfortunately, we cannot exclude a later intrusion from the features of the Moravian Painted Ware culture, where the KL II variety is predominant. The high ratio of blades and tools and the frequent occurrence of technical flakes document an intensive usage of lithic raw material and testify that the settlement, or a part thereof, was rather of a consumer character. Among the tools, a perforator with well-distinguished point appeared.

11.14. Vedrovice, positions "Za dvorem" and "Široká u lesa" (Znojmo district, South Moravia, Czech Republic)

11.14.1. Background information

Geographic and geomorphological site characteristics
The municipality of Vedrovice is situated on the south-east slopes of the Krumlovský Les upland. In terms of hydrology, it is part of the river basin of the Jihlava, a right-bank tributary of the Svratka River. A dense river network developed on impermeable rocks. The streams flowing towards the east and south-east into the Dyje-Svratka Valley have a low gradient and disappear in permeable Neogene sediments at the eastern foot of the Krumlovský Les upland (Škoda 1986, 6–7). Today, there is no stream flowing through Vedrovice.

The Krumlovský Les upland is part of the Bobrava highlands. It creates an elongated range of wooded hill running north-south between the Boskovice Furrow in the west and the Dyje-Svratka valley in the east. In the south, the Krumlovský Les upland is separated from Bohutický les (Bohutician forest) by a transverse depression. In the north it is separated by a valley from the lower-lying area called Réna (Demek 1965, 136). In its central part, at the forester's lodge of Stavení, the Krumlovský Les upland reaches an elevation of 415 m above sea level. This whole area is a plateau landscape. The edges of the Krumlovský Les upland are cut by many deep, steep-sided valleys. In terms of geology, the area of the Krumlovský Les upland lies at the eastern edge of the Bohemian Massif, where it borders the Carpathian Foredeep. The basic geological unit creating the Bobrava highlands is the Brno Massif. In the area of the Krumlovský Les upland, it consists mostly of biotitic granodiorites with veins of aplites and pegmatites (Kalášek *et al.* 1963). The Carpathian Foredeep is here filled with Neogene, lower Miocene sediments – so-called Rzehakia layers covered mostly with Quaternary loess (Cícha & Paulík 1963, 145).

The densest LBK concentrations are in the positions "Široká u lesa" and "Za dvorem", where this culture is known from surface collections, single finds and excavations from the end of the 19th century onwards. The position "Široká u lesa" lies to the south-west of the municipality, to the left of the road from Moravský Krumlov to Vedrovice. The position "Za dvorem" is situated to the right of this road, south and south-east of the position "Široká u lesa". Both positions are situated on a gentle hillock in a terrain covered with loess and sloping south-east until it ends in a ravine near the former Vinkler's brickworks. The elevation ranges between 245 and 278 m above sea level (Ondruš 1972, 28; Humpolová & Ondruš 1999, 168).

On research history
In 1890, J.N. Woldřich wrote about twelve graves found in a field near the municipality of Zábrdovice by the assistant forester Ferdinand Tilscher. According to his information, there was an almost 25 cm long stone chisel lying by each skeleton, as well as other unperforated stone implements (Woldřich 1890, 135). Based on the entries in the notebook of Florian Koudelka, dating from 1886, Alfred Jánuš, the station master from Moravský Krumlov

who deposited the finds, also took part in the excavations performed by Tilscher in 1867. A note by Skutil about the Neolithic cemetery near Vedrovice, allegedly discovered by J. Knies in 1883, probably also relates to this find (Skutil 1941, 23).

In 1899, Knies published a map of prehistoric Moravia on which the Neolithic occupation in the municipality of Zábrdovice (which today belongs to the municipality of Vedrovice) is marked. The map reflects the state of archaeological knowledge in 1895 (Skutil 1932, 262–263).

In 1902, I.L. Červinka remarks that in Vedrovice "almost around the whole settlement and then in Mokrý Žleb, extensive Neolithic layers with Bandkeramik" are present (Červinka 1902, 81). V. Maňák, in the Topography of the Moravian-Krumlovian District, also mentions some large Neolithic layers with LBK discovered by K.J. Maška in the surroundings of Vedrovice (Haňák 1913, 13).

In Vinkler's brickworks, which already belong to the position "Za dvorem", František Černý discovered six Neolithic inhumations, which he assigned to the "painted pottery", in 1910 (Černý 1911, 51). In the next year, he found two further graves. However, pottery illustrations and further finds place these graves into the LBK (Ondruš 2002, 12).

In 1931, J. Kaufmann discovered "fragments of bomb-shaped vessels, sherds with applied decorations, two complete vessels and a skeleton without grave offerings" near a Hallstatt cemetery close to the church in Vedrovice. He also uncovered some finds of the Stroke-Ornamented Ware culture and a settlement of the Moravian Painted Ware culture. In addition, in Vinkler's brickworks in Zábrdovice (position "Za dvorem") he uncovered a settlement of the Moravian Painted Ware culture, and from the pits he recovered "an elongated cylinder cut out of a shell and pierced, several flints and bone tools, a sharp polished axe and black sherds of volute pottery" (Skutil 1930–35, 142, 144, 152).

In 1961–1974 the Moravian Museum, under the direction of V. Ondruš, investigated part of a settlement of the LBK on an area of 5000 m^2 in the position "Široká u lesa". They uncovered the ground plans of ten post-built houses, the remains of 18 ovens and other settlement features. In addition, 12 inhumations were discovered (three adults and nine children; Ondruš 1972; 2002, 12). Between 1975 and 1982, a cemetery of the same culture was examined, numbering 96 graves (No. 12–108). Further excavations at the site were carried out under the direction of V. Ondruš between 1985 and 1989, and under A. Humpolová between 1996 and 2000 in the position "Za dvorem". They main focus was the verification of circular ditched enclosures (project "Prehistoric socio-cultural architecture in Moravia"; Podborský *et al.* 1999) detected by aerial prospection (Bálek 1985; Bálek & Hašek 1991). One of these ditched areas originally enclosed a settlement of the LBK. Besides the ditched enclosures, other LBK features were also investigated, some of them datable to the earliest LBK (Ia phase). In the position "Za dvorem", in the area of the former Vinkler's brickworks, 14 inhumations were also excavated. They are undoubtedly part of a larger cemetery, perhaps part of that discovered by earlier researchers (Černý 1911; Ondruš 2002, 11–21).

11.14.2. Dating the site

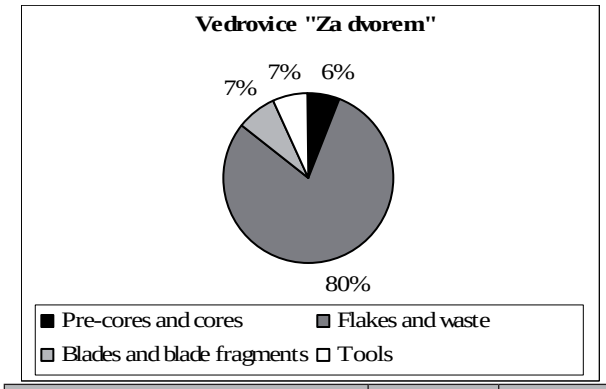
Absolute chronology

The calibration is based on Bronk Ramsey (1995; 2001) and Raimer *et al.* (2004).

Grave 15 (H 15/75)

Blank groups	Total	%	Blanks	Tools	Tools ≤ 12 mm
Pre-cores and cores	22	8.6	16	6	-
Flakes and waste	211	82.8	203	8	-
Blades and blade fragments	22	8.6	19	3	2 (trapezes)
Total	255	100	238	17	2

Table 242. Vedrovice "Za dvorem", phase I of the LBK. Chipped stone artefacts divided into basic blank groups.



Basic morphological groups	Total	%
Pre-cores and cores	16	6.3
Flakes and waste	203	79.6
Blades and blade fragments	19	7.5
Tools	17	6.7
Total	255	100.1

Table 243. Vedrovice "Za dvorem", phase I of the LBK. Proportion of chipped stone artefacts by basic morphological groups.

VERA 1832 – one date (human bone)
Dating BP: 6155 ± 35

68.2 % confidence
cal BC 5210 – 5090 (67.6 %)
cal BC 5080 – 5040 (16.4 %)
95.4 % confidence
cal BC 5220 – 5000 (95.4 %)

Grave 46 (H 46/77)
VERA 1831 – one date (human bone)
Dating BP: 6220 ± 35

68.2 % confidence
cal BC 5290 – 5260 (8.7 %)
cal BC 5230 – 5200 (13.6 %)
cal BC 5170 – 5070 (46.0 %)
95.4 % confidence
cal BC 5300 – 5190 (42.4 %)
cal BC 5180 – 5050 (53.0 %)

Relative chronology (after Tichý)
Vedrovice "Za dvorem" – settlement
Feature 176/2000 – LBK phase Ia (information by Z. Čižmář)

No. of feature	Year	No. of pieces	%	< 12 mm
176	2000	239	93.7	-
179	2000	16	6.3	13
Total		255	100	13

Table 244. Vedrovice "Za dvorem", phase I of the LBK. Proportion of chipped stone artefacts (> 12 mm) by archaeological feature.

Blank groups	No. of pieces	Weight (g)	Avg (g)
Pre-cores and cores	22	2352.8	106.9
Flakes and waste	211	2126.8	10.1
Blades and blade fragments	22	42.6	1.9
Total	255	4522.2	17.7

Table 245. Vedrovice "Za dvorem", phase I of the LBK. Weight of chipped stone artefacts.

Raw material	Artefacts > 12 mm	%	Distance
Krumlovský Les I chert	162	63.5	0–5 km
Krumlovský Les II chert	23	9	0–5 km
Krumlovský Les chert	2	0.8	0–5 km
Krumlovský Les chert I – burnt	4	1.6	0–5 km
Krumlovský Les II chert ?	2	0.8	
Krumlovský Les chert – burnt	1	0.4	
Olomučany chert	45	17.5	40 km
Olomučany chert – burnt	1	0.4	40 km
Olomučany chert ?	1	0.4	
Szentgál radiolarite	3	1.2	235 km
Úrkút-Eplény radiolarite	1	0.4	230 km
Moravian Jurassic chert	2	0.8	0–5 km, 28–40 km
Krakow Jurassic silicite	1	0.4	260–270 km
Krakow Jurassic silicite or KL II	2	0.8	
Erratic silicite ?	1	0.4	130–150 km
Quartz	1	0.4	
Amphibolite	1	0.4	
Burnt	2	0.8	
Total	255	100	

Table 246. Vedrovice "Za dvorem", phase I of the LBK. Proportion of raw materials, including varieties and distance to outcrops.

Feature 179/2000 – LBK phase Ia (information by Z. Čižmář)

Vedrovice "Široká u lesa" – settlement
LBK phase I/II and II (Podborský *et al.* 1993, 78)

Vedrovice "Široká u lesa" – cemetery
LBK phase I/II and II (Podborský *et al.* 1993, 78; Čižmář 2002; 180–185; Podborský 2002, Tab. 5.)

Raw material	No. of pieces	Cores	Flakes	Blades	Tools
Krumlovský Les I chert	194	15	156	8	15
%	100	7.7	80.4	4.2	7,7
Olomučany chert	47	–	35	10	2
%	100	–	74.5	21.2	4.3
Bakony radiolarite	4	–	4	–	–
Moravian Jurassic chert	2	–	2	–	–
Krakow Jurassic silicite	1	–	–	1	–
Krakow Jurassic silicite or KL II	2	–	2	–	–
Erratic silicite?	1	–	1	–	–
Quartz	1	1	–	–	–
Amphibolite?	1	–	1	–	–
Burnt	2	–	2	–	–
Total	255	16	203	19	17
%	100	6.2	79.7	7.5	6.6

Table 247. Vedrovice "Za dvorem", phase I of the LBK. Proportion of raw materials in the basic morphological groups.

Pre-cores and cores	Blanks	Tools	Total
Unworked raw material	2	2	4
Pre-cores	8	3	11
Cores	5	1	6
Splintered pieces	–	–	–
Core fragments	1	–	1
Total	16	6	22

Table 248. Vedrovice "Za dvorem", phase I of the LBK. Pre-cores and cores.

Pre-cores	Raw material	Preparation	Height	Width	Thickness	Weight	Tool
1	KL I	unworked raw material	89	61	47	318	hammerstone
2	KL	unworked raw material	65	33	31	81.5	–
3	KL II ?	unworked raw material	45	37	26	46.7	–
4	KL II	unworked raw material	78	49	45	206	hammerstone
5	KL I	raw material prepared by several detachments	91	53	47	288	hammerstone
6	KL I	raw material prepared by several detachments	95	49	30	146	hammerstone
7	KL I	raw material prepared by several detachments	61	42	40,5	121	–
8	KL II	raw material prepared by several detachments	77	51	40	176	hammerstone
9	KL I	raw material prepared by several detachments	61	43	39	129	–
10	Quartz	pre-core with prepared crest and striking platform	80	57	62	278	–
11	KL I	pre-core with prepared crest and striking platform	44	28	38	54.9	–
12	KL II	pre-core with prepared crest and striking platform	37	27	30	36.4	–
13	KL I	pre-core with prepared crest and inprepared striking platform	50	36	37	61.4	–
14	KL I	pre-core with prepared crest and inprepared striking platform	45	61	34	105	–
15	KL I	pre-core with prepared crest and inprepared striking platform	50	37	37	67.6	–

Table 249. Vedrovice "Za dvorem", phase I of the LBK. Pre-cores.

Cores	Raw material.	Type of blanks	No. of platforms	Shape	Platform preparation	Dorsal reduction	Platform angle	Height	Width	Thickness	Weight	Tool
1	KL I	flake core	single	prismatic	prepared by several removals	no	right	35	34	33	55.4	hammerstone
2	KL I	flake core	-	irregular	–	–	–	40	34	26	24	-
3	KL I	flake core	-	irregular	–	–	–	36	34	30	43.6	-
4	KL I	blade core	single	prismatic	plain	no	acute	34	37	44	53.2	-
5	KL I	blade core	single	prismatic	plain	yes	right	27	25	15	11.6	-
6	KL I	blade-flake core	-	prismatic	facetted	no	right	36	35	30	36.1	-
7	KL I	blade-flake core	single	core fragment	–	no	–	38	27.5	19	12.5	-

Table 250. Vedrovice "Za dvorem", phase I of the LBK. Cores.

Type of flake	No. of pieces	%	KL	Olomučany	Flakes	Tools
Preparation flake	137	64.9	111	23	134	3
Blade-like flake	1	0.5	1	–	1	–
Splintered flake	2	1	1	–	1	1
Crested flakes and secondary crested flakes	3	1.5	3	–	3	–
Rejuvenation flake from a core's knapping surface	5	2.4	2	2	4	1
Rejuvenation flake from a core's striking platform	5	2.4	2	3	5	–
Rejuvenation flake from a core's base	–	–	–	–	–	–
Primary flake	7	3.2	7	–	6	1
Other technical flake	4	1.9	3	1	3	1
From polished tools	1	0.5	–	–	1	–
Waste	38	18	28	7	37	1
Natural raw material fragments	8	3.7	5	–	8	–
Total	211	100	163	36	203	8

Table 251. Vedrovice "Za dvorem", phase I of the LBK. Flakes and waste.

11.14.3. Chipped stone industry

11.14.3.1. Nearest outcrops of appropriate raw materials

The municipality of Vedrovice lies directly at the edge of the Krumlovský Les upland exploitation area with its rich outcrops of Krumlovský Les cherts. Other not very distant resources are the outcrops of siliceous weathering products of serpentinites in south-west Moravia, at a distance of 28–35 km from the site.

11.14.3.2. Chipped stone industry at the settlement of Vedrovice "Za dvorem"

From the settlement of Vedrovice "Za dvorem", the chipped stone assemblage from two pits dating to the earliest phase (Ia) of the LBK was analysed. Feature 176/2000 contained 239 chipped stone artefacts altogether, while feature 179/2000 contained only 16 artefacts > 12 mm and 13 artefacts ≤ 12 mm (**table 244**). The chipped stone from both features was treated as one single assemblage of 255 chipped artefacts (**tables 242 & 243**). Together with the other implements, two trapezes ≤ 12 mm from feature 179/2000 were also evaluated.

11.14.3.2.1. Raw material

Just as in the settlements of Vedrovice "Široká u lesa" and Nové Bránice, in Vedrovice "Za dvorem" the local Krumlovský Les cherts also predominate (**tables 246 & 247**), with KL I as the preferred variety. However, in contrast to both younger sites, the ratio of Krumlovian cherts is not as high and they are supplemented with other kinds of raw material. A relatively high ratio of Olomučany cherts (18 %) is surprising, as in later phases of the LBK it was utilized only by the settlements in close vicinity to its primary sources. In the case of Vedrovice "Za dvorem", the composition of raw materials is rather reminiscent of some of the Mesolithic sites in this region, where Olomučany cherts appear to be a regular feature.

Just as at other sites of this horizon, four Transdanubian radiolarites (three Szentgál radiolarites and one of the Úrkút-Eplény type) also occurred in Vedrovice "Za dvorem". Only one blade was manufactured from Krakow Jurassic silicite.

11.14.3.2.2. Pre-cores and cores

Altogether, 22 pre-cores and cores were assigned to this group (**table 248**). Six of them had been used as hammerstones. Except for one of quartz, all were manufactured of KL cherts. There are no cores of Olomučany chert.

The ratio of unworked and roughly knapped raw material is relatively high (**table 249**). All prepared cores were modified by frontal crest adjustment. The negatives on reduced cores indicate that they served for the manufacture of blade and flake blanks (**table 250**). The striking platform was adjusted either by one single blow or by primary faceting. In one case, an even platform occurred in combination with dorsal reduction. The cores are prismatic, at an advanced reduction stage they are rather irregular.

11.14.3.2.3. Flakes and waste

211 (83 %) artefacts, including eight tools, belong to this category. 77 % were manufactured from KL cherts, 17 % from Olomučany chert (**table 251**). About half of all flakes of KL chert, as well as of Olomučany chert, were at least partly covered with their natural surface (**table 252**). Among the flakes of Krumlovian cherts, primary and crested flakes also occurred. They correspond well with pre-cores, a fact which proves the primary working of raw material and core prepa-

ration directly at the settlement. The core preparation during the reduction process is documented through rejuvenation flakes of a core knapping surface (**fig. 14: 8**) and of a core striking platform. The same technical flakes were detected on Olomučany chert, which is indirect evidence of cores of this raw material being present at the site. Also, all four Transdanubian radiolarites were assigned to this group. One Szentgál radiolarite was brought to the settlement as a natural fragment of raw material and remained unworked.

11.14.3.2.4. Blades and blade fragments

In the assemblage, there were 22 blades, including three retouched pieces. The fact that more than half of the artefacts (11, including one tool) were manufactured from Olomučany chert is surprising. KL cherts are present in ten cases (including two implements > 12 mm). One blade was made of Krakow Jurassic silicite.

Blades with broken off terminal part are preserved most often (**table 256**). Platform remnants occurred in 17 cases. Mostly, these are platform remnants adjusted by primary faceting without dorsal reduction (**table 258**; **fig. 14: 3, 5, 7, 13, 14, 16**). On blades of KL chert, several plain platform remnants were also detected (**fig. 14: 9**). In the younger settlement of Vedrovice "Široká u lesa", their ratio is even halved.

Surface of flakes and flake tools	No. of pieces	%	KL	Olomučany	Other
Cortical	19	9	13	3	3
Partly cortical	95	45	81	10	4
Without cortex	97	46	69	23	5
Total	211	100	163	36	12

Table 252. Vedrovice "Za dvorem", phase I of the LBK. Degree of preservation of natural surface on flakes including retouched tools.

Length	No. of pieces	Min (mm)	Max (mm)	Avg (mm)	StDev (mm)
Flakes	135	13	66	26.7	10.34
Flake tools	3	47	49	48	1

Table 253. Vedrovice "Za dvorem", phase I of the LBK. Length of preparation and blade-like flakes (including flake tools).

Width	No. of pieces	Min (mm)	Max (mm)	Avg (mm)	StDev (mm)
Flakes	135	6	79	26.6	11.19
Flake tools	3	41.5	53	48.3	6.05

Table 254. Vedrovice "Za dvorem", phase I of the LBK. Width of preparation and blade-like flakes (including flake tools).

Thickness	No. of pieces	Min (mm)	Max (mm)	Avg (mm)	StDev (mm)
Flakes	135	2	18	8.3	4.3
Flake tools	3	11.5	21	16.2	4.75

Table 255. Vedrovice "Za dvorem", phase I of the LBK. Thickness of preparation and blade-like flakes (including flake tools).

11.14.3.2.5. Raw material transport

The Krumlovian cherts found in close vicinity were brought to the settlement both as pebbles and as roughly knapped raw material. The primary processing of raw material directly at the settlement is also documented by many cortical and primary flakes.

The Olomučany cherts had been transported to the site in the form of prepared cores. Even though cores of this raw material were not detected in the assemblage, their reduction is evidenced through the technical rejuvenation flakes found.

Type of blade	Blade blanks	Blade tools	< 12 mm
Whole blade	4	–	
Blade with broken off terminal part	9	–	
Blade with broken off basal part	1	–	
Blade with broken off terminal and basal part	1	1	
Basal fragment of a blade	2	1	1
Mesial fragment of a blade	–	1	4
Terminal fragment of a blade	–	–	
Whole crested blade	1	–	
Fragment of a crested blade	1	–	
Whole secondary crested blade	–	–	
Fragment of a secondary crested blade	–	–	
Total	19	3	5

Table 256. Vedrovice "Za dvorem", phase I of the LBK. Blades and blade fragments.

Surface of blades and blade tools	No. of pieces	KL	MJC	Other
Cortical	–	–	–	–
Partly cortical	3	2	1	–
Without cortex	19	8	10	1
Total	22	10	11	1

Table 257. Vedrovice "Za dvorem", phase I of the LBK. Degree of preservation of natural surface on blades including retouched tools.

Platform remnant / Dorsal reduction	Total yes	Total no	KL yes	KL no	Olomučany yes	Olomučany no	Other yes	Other no
Unprepared	0		0		0		0	
Plain	1	3	1	2	0	1	0	
	4		3		1			
Prepared by several blows	0	1	0		0	1	0	
	1				1			
Punctiform	0		0		0		0	
Primarily facetted	0	12	0	5	0	7	0	
	12		5		7			
Dihedral	0		0		0		0	
Secondary prepared	0		0		0		0	
Total	17		8		9		0	

Table 258. Vedrovice "Za dvorem", phase I of the LBK. Platform remnants and dorsal reduction of blades and blade tools.

Length	No. of pieces	Min (mm)	Max (mm)	Avg (mm)	StDev (mm)
Blades	4	29	37	33.5	3.42
Blade tools	–	–	–	–	–

Table 259. Vedrovice "Za dvorem", phase I of the LBK. Length of whole finished blades and blade tools.

Width	No. of pieces	Min (mm)	Max (mm)	Avg (mm)	StDev (mm)
Blades	15	8	19	1.8	2.9
Blade tools	1	13	13	13	0

Table 260. Vedrovice "Za dvorem", phase I of the LBK. Width of whole finished blades, blades with broken off terminal part, basal part, terminal and basal parts.

Thickness	No. of pieces	Min (mm)	Max (mm)	Avg (mm)	StDev (mm)
Blades	16	2	7	4.25	1.35
Blade tools	1	2.5	2.5	2.5	0

Table 261. Vedrovice "Za dvorem", phase I of the LBK. Thickness of finished blades with preserved basal part.

Type of tools	Total	Cores	Flakes	Blades
Endscrapers	2	–	2	–
Truncated blades	–	–	–	–
Burins	1	–	–	1
Blades with lateral retouch	–	–	–	–
Retouched flakes	–	–	–	–
Borers, perforators and becs	1	–	–	1
Notches and denticulates	2	–	2	–
Sidescrapers	2	–	2	–
Trapezes	3	–	–	3
Other microliths	–	–	–	–
Splintered pieces	–	–	–	–
Combination tools	–	–	–	–
Hammerstones	7	6	1	–
Tool fragments	1	–	1	–
Total	19	6	8	5

Table 262. Vedrovice "Za dvorem", phase I of the LBK. Tool classification by blank types.

Type of tools	Total	KL	Olomučany
Endscrapers	2	1	1
on a flake	2	1	1
Truncated blades	0		
Burins	1		1
on a natural edge	1		1
Blades with lateral retouch	0		
Retouched flakes	0		
Borers, perforators and becs	1	1	
slim borer with a weakly distinguished point	1	1	
Notches and denticulates	2	2	
denticulates	2	2	
Sidescrapers	2	2	
ventral	1	1	
pointed	1	1	
Trapezes	3	3	
broad – dorsal retouch+retouch on a break	1	1	
short – dorsal retouch	1	1	
short – dorsal retouch + 1x damaged	1	1	
Other microliths	0		
Splintered pieces	0		
Combination tools	0		
Hammerstones	7	7	
hammerstone – raw material	5	5	
hammerstone – from a core	1	1	
hammerstone fragment	1	1	
Tool fragments	1	1	
Total	19	17	2

Table 263. Vedrovice "Za dvorem", phase I of the LBK. Tool types and their raw materials.

Blank groups	Total	%	Blanks	Tools
Pre-cores and cores	539	14.8	506	33
Flakes and waste	2707	74.5	2471	236
Blades and blade fragments	387	10.7	310	77
Total	3633	100	3287	346

Table 264. Vedrovice "Široká u lesa" – settlement, phase I/II and phase II of the LBK. Chipped stone artefacts divided into basic blank groups.

11.14.3.2.6. Tools

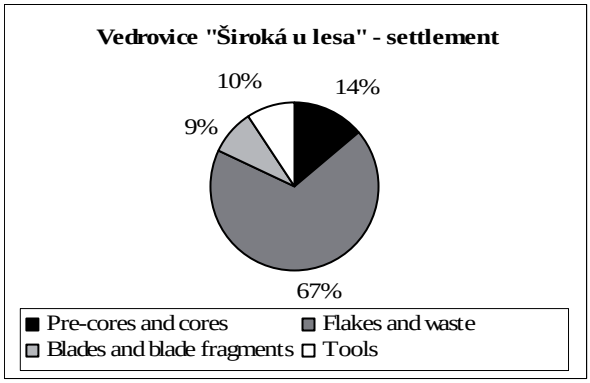
In all, 19 artefacts (including two ≤ 12 mm) were classified as tools (**tables 262 & 263**). Sidescrapers and denticulates manufactured on flakes may emerge as by-products of raw material processing. Stone working is also evident from the hammerstones that dominate among tools.

Furthermore, there are flake endscrapers, a perforator (**fig. 14: 6**), a burin (**fig. 14: 15**) and above all three trapezes. Two trapezes are short (AZ; **fig. 14: 10, 11**) and one is broad (AC; **fig. 14: 12**). All are manufactured from KL chert. The short trapezes are dorsally retouched (one is damaged). The broad trapeze is dorsally retouched, on one end entirely and on the other only partially, possibly documenting a certain technique of snapping blades (the so-called "Bruch-Technik" or "Kerb-Bruch-Technik").

Only one burin and one sidescraper were manufactured from Olomučany chert. The other tools are made of KL chert.

11.14.3.2.6. Artefacts with sickle gloss

No artefacts with sickle gloss were found in the pits.



Basic morphological groups	Total	%
Pre-cores and cores	506	13.9
Flakes and waste	2471	68
Blades and blade fragments	310	8.5
Tools	346	9.5
Total	3633	99.9

Table 265. Vedrovice "Široká u lesa" – settlement, phase I/II and phase II of the LBK. Proportion of chipped stone artefacts by basic morphological groups.

Raw material	No. of pieces	%	Distance
Krumlovský Les chert	3258	89.6	0–5 km
Krakow Jurassic silicite	57	1.5	260–270 km
Moravian Jurassic chert	46	1.3	28–40 km
Chert breccia	32	0.8	0–10 km
Radiolarite – origin undefined	5	< 0.1	
Erratic silicite	4	< 0.2	130–150 km
Szentgál radiolarite	2	< 0.3	235 km
Olomučany chert	2	< 0.4	40 km
Siliceous weathering products of serpentinites	2	< 0.5	28–35 km
Quartz	2	< 0.6	
Stránská skála chert	1	< 0.7	30 km
Krakow Jurassic silicite or KL II	1	< 0.8	
Burnt	179	4.9	
Undefined	42	1.1	
Total	3633	100	

Table 266. Vedrovice "Široká u lesa", phase I/II and phase II of the LBK. Proportion of raw materials, including varieties and distance to outcrops.

Raw material	Pre–cores	Cores	Flakes	Blades	Core tools	Blade tools	Flake tools	Total
Krumlovský Les I	103	220	1603	195	33	41	155	2350
Krumlovský Les II	25	91	649	70	–	18	55	908
Krakow Jurassic silicite	–	4	25	9	–	6	10	54
Krakow Jurassic silicite ?	–	–	–	–	1	2	–	3
MJC	1	1	35	6	–	–	3	46
Chert breccia	–	5	17	6	–	–	4	32
Radiolarite – origin undefined	–	–	2	–	–	2	1	5
Erratic silicite	–	–	1	1	–	1	–	3
Erratic silicite ?	–	–	–	1	–	–	–	1
Szentgál radiolarite	–	–	1	1	–	–	–	2
Olomučany chert	1	–	1	–	–	–	–	2
Siliceous weathering products of serpentinites	–	1	–	–	1	–	–	2
Quartz	–	–	2	–	–	–	–	2
Krakow Jurassic silicite or KL II	–	–	1	–	–	–	–	1
Stránská skála chert	–	–	–	–	–	–	1	1
Burnt	8	32	115	14	–	5	5	179
Undefined	4	10	18	4	–	4	2	42
Total	142	364	2471	310	33	77	236	3633

Table 267. Vedrovice "Široká u lesa" – settlement, phase I/II and phase II of the LBK. Proportion of raw materials in the basic morphological groups.

11.14.3.2.7. Summary

The earliest LBK settlement at Vedrovice "Za dvorem" utilized the coarse-grained variety of the local KL cherts as main raw material. The ratio of regional Olomučany cherts is also not irrelevant. Both kinds of raw material had been worked within the settlement itself. Some imports of Transdanubian radiolarites and Krakow Jurassic silicite also occurred. Three trapezes could be identified among the tools. No artefacts with sickle gloss were found.

11.14.3.3. Chipped stone industry at the settlement of Vedrovice "Široká u lesa"

For the time being, the chipped stone assemblage from about a third of the settlement of Vedrovice "Široká u lesa" was analysed. The assemblage numbers 3633 chipped artefacts > 12 mm (**tables 264 & 265**). Flakes and waste account for the highest ratio (2707 pieces – 74.5 %, including tools). Most tools are made on flake blanks. Blades and blade tools only amount to 11 %.

11.14.3.3.1. Raw material

The most utilized raw material were the local KL cherts (90 %), among which the KL I variety predominates (**tables 266 & 267**). If further local cherts, burnt and undefined raw materials are excluded, the other raw materials are represented by 2 %. The second most abundant kind is Krakow Jurassic silicite with 57 pieces. At the same time, it is the furthest import at the settlement (260–270 km). Two artefacts of Szentgál radiolarite were also identified (235 km). Furthermore, there are four artefacts of erratic silicite, two of Olomučany chert and one of Stránská skála chert. Only two artefacts of siliceous weathering products of serpentinites occurred on the site.

If we compare the proportions of basic categories of chipped stone made from KL chert with those from Krakow Jurassic silicite, the latter assemblage shows a much higher ratio of blades and tools. In the assemblage of KL chert, flakes and cores occur much more frequently at the expense of tools and blades.

Pre-cores and cores	Blanks	Tools	Total
Unworked raw material	72	-	72
Pre-cores	70	14	84
Cores	191	14	205
Splintered pieces	-	5	5
Core fragments + exhausted cores	96 + 77	-	173
Total	506	33	539

Table 268. Vedrovice "Široká u lesa" – settlement, phase I/II and phase II of the LBK. Pre-cores and cores.

11.14.3.3.2. Pre-cores and cores

Altogether, 539 artefacts were assigned to this category (**tables 268 & 269**).

Almost 89 % of cores and pre-cores are made of KL chert. Four cores were manufactured from Krakow Jurassic

Raw material	No. of pieces	%	Unprepared raw material	Pre–cores	Cores	Exhausted cores	Core fragments	Splintered pieces
Krumlovský Les I chert	356	66	55	62	143	50	41	5
Krumlovský Les II chert	116	21.5	6	19	49	16	26	–
Moravian Jurassic chert	2	0.4	1	–	1	–	–	–
Krakow Jurassic silicite	4	0.7	–	–	3	–	1	–
Siliceous weathering products of serpentinites	1	0.2	–	–	1	–	–	–
Olomučany chert	1	0.2	–	1	–	–	–	–
Erratic silicite	–	–	–	–	–	–	–	–
Chert breccia	5	0.9	–	–	4	–	1	–
Burnt	40	7.4	7	1	3	27	2	–
Undefined	14	2.7	3	1	1	3	6	–
Total	539	100	72	84	205	96	77	5

Table 269. Vedrovice "Široká u lesa" – settlement, phase I/II and phase II of the LBK. Proportion of raw materials among pre-cores and cores.

silicite, one from siliceous weathering products of serpentinites and one pre-core from Olomučany chert. Among the pre-cores of KL chert, the low-quality varieties with petrosilex predominate (see chapter 6.1.1.). In successive stages of raw material processing, the ratio of lower-quality material decreases and its occurrence among core remnants is minimal (Mateiciucová 1992, 56).

Unworked raw materials and pre-cores account for a high ratio (29 %). Their presence documents that the raw material had been acquired in close vicinity to the settlement. In Vedrovice, pre-cores are represented in all phases of raw material processing. Their future knapping surface was usually prepared by creating a leading crest. Frontal crest adjustment occurs more often on pieces of so-called higher-quality raw material, represented by the KL I cherts without petrosilex and the fine-grained KL II variety (Mateiciucová 1992, 65).

Type of flake	No. of pieces	%	KL	Krakow Jurassic	Flakes	Tools
Preparation flake	1459	53.9	1238	18	1323	136
Blade-like flake	221	8.2	162	7	182	39
Splintered flake	–	–	–	–	–	–
Crested flakes and secondary crested flakes	62	2.3	56	–	58	4
Rejuvenation flake from a core's knapping surface	120	4.4	99	4	108	12
Rejuvenation flake from a core's striking platform	33	1.2	23	–	24	9
Rejuvenation flake from a core's base	20	0.3	15	–	17	3
Primary flake	41	1.5	29	–	34	7
Other technical flake	–	–	–	–	–	–
From polished tools	–	–	–	–	–	–
Waste	689	25.5	572	6	677	12
Natural raw material fragments	57	2.1	42	–	48	9
Undefined	5	0.2	–	–	–	5
Total	2707	100	2236	35	2471	236

Table 270. Vedrovice "Široká u lesa" – settlement, phase I/II and phase II of the LBK. Flakes and waste.

Surface of flakes and flake tools	No. of pieces	%	Flakes	Tools
Cortical	282	10.4	259	23
Partly cortical – 60–90 %	150	5.5	138	12
Partly cortical – 10–60 %	460	17	401	59
Without cortex	1815	67.1	1673	142
Total	2707	100	2471	236

Table 271. Vedrovice "Široká u lesa" – settlement, phase I/II and phase II of the LBK. Degree of preservation of natural surface on flakes including retouched tools.

Type of blade	Blade blanks		Blade tools	
	No. of pieces	%	No. of pieces	%
Whole blade	111	35.9	25	32.5
Blade with broken off terminal part	93	30	50	65
Blade with broken off basal part	20	6.5		
Blade with broken off terminal and basal part	23	7,4		
Basal fragment of a blade	19	6.1		
Terminal fragment of a blade	18	5.8		
Whole crested blade	11	3.5	2	2.5
Fragment of a crested blade	2	0.6		
Whole secondary crested blade	7	2.3		
Fragment of a secondary crested blade	4	1.3		
Burin blade	2	0.6		
Total	310	100	77	100

Table 272. Vedrovice "Široká u lesa" – settlement, phase I/II and phase II of the LBK. Blades and blade fragments.

Surface of blades and blade tools	No. of pieces	%	Blades	Tools
Cortical	14	3.6	14	–
Partly cortical	69	17.8	55	14
Without cortex	304	78.6	241	63
Total	387	100	310	77

Table 273. Vedrovice "Široká u lesa" – settlement, phase I/II and phase II of the LBK. Degree of preservation of natural surface on blades and blade tools.

Reduced cores make up 38 % of this group. They are mostly of prismatic shape (**fig. 30: 5**), but some keeled (**fig. 28: 1**), half-conical (**fig. 30: 3**), flat (**fig. 28: 2,4**) and irregular (**fig. 29: 3**) cores also appear. As for the blanks obtained, the blade-flake and flake cores are predominant. Although a considerable part of the cores was originally exploited for blade blanks, strictly defined blade blanks are relatively rare in Vedrovice compared to other settlements. This probably relates to a lower-quality raw material occurring in form of smaller pebbles, and maybe also to a rather unstandardised, domestic character of production. At the settlement of Vedrovice, uniform blade cores resembling those from Nové Bránice and Kuřim and documenting a certain degree of specialisation appear only rarely (Mateiciucová 1997b, 252). The cores are mostly single-platform, but there are also some double- and multi-platform cores with modified orientation showing evidence of an advanced reduction stage. Core fragments and exhausted remnants form a relatively large group (32 %; **fig. 28: 3**). Splintered pieces occurred in only five cases (**fig. 29: 4**).

11.14.3.3.3. Flakes and waste

2707 chipped stone artefacts fall into the category of flakes and waste (**table 270**). 236 of them are modified by retouch. In total, 93 % of all flakes and waste were manufactured from KL cherts (including chert breccias and Moravian Jurassic cherts). Just a tiny portion is made of other raw materials, the most abundant of which is Krakow Jurassic silicite (35 pieces). There are also single examples of Olomučany and Stránská skála cherts, erratic silicite and Szentgál radiolarite.

A whole third of the flakes and flake tools is at least partly covered with natural surface (**table 271**). More than 10 % are fully cortical. There is a relative abundance of primary flakes, mainly at sites where chipped stone artefacts were manufactured from raw material in pebble form. A high ratio of unprepared platform remnants on cortical flakes documents that most of them were detached at the initial stage of raw material processing. It means that the primary processing of raw material was also at least partly performed in the settlement area itself (Mateiciucová 1992, 105–110).

Three flakes of Krakow Jurassic silicite were likewise partly cortical.

Platform remnant	Total	%	Blades	%	Tools	%
Unprepared	19	6.6	15	6.1	4	9.8
Plain	94	32.5	83	33.4	11	26.8
Prim. facetted + prepared by several blows	95	32.9	74	29.8	21	51.2
Punctiform	65	22.5	61	24.6	4	9.8
Secondary prepared	16	5.5	15	6.1	1	2.4
Total	289	100	248	100	0	100

Table 274. Vedrovice "Široká u lesa" – settlement, phase I/II and phase II of the LBK. Platform remnants of blades and blade tools.

Type of tools	Total	Cores	Flakes	Blades
Endscrapers	120	–	101	19
Truncated blades	5	–	–	5
Burins	6	–	3	3
Blades with lateral retouch	20	–	–	20
Retouched flakes	15	–	15	–
Borers, perforators and becs	11	–	8	3
Notches and denticulates	75	–	59	16
Sidescrapers	28	–	28	–
Trapezes	1	–	–	1
Other microliths	–	–	–	–
Splintered pieces	11	5	6	–
Combination tools	24	–	14	10
Hammerstones	30	28	2	–
Tool fragments	–	–	–	–
Total	346	33	236	77

Table 275. Vedrovice "Široká u lesa" – settlement, phase I/II and phase II of the LBK. Tool classification by blank types.

Among the flakes of KL cherts, various technical flakes often occur. The rejuvenation flakes of the cores' knapping surface are predominant. At other sites of this period, the rejuvenation flakes of core striking platforms appear more frequently. The prevalence of rejuvenation flakes of core knapping surfaces in Vedrovice probably relates to the small size of the raw material, where the detachment of the core platform would render its further reduction impossible. This technical problem was solved by rejuvenating the cores with a change in orientation during reduction, i.e. in place of the former knapping surface, a new platform was created by removing a flake. Rejuvenation flakes of the knapping surface also occurred among the Krakow Jurassic silicites.

11.14.3.3.4. Blades and blade fragments

The ratio of blades (310 pieces) and blade tools (77 pieces) is relatively low (11 %). 84 % are made of KL chert. Here too, the KL I variety is predominant. Furthermore, there are 17 artefacts of Krakow Jurassic silicite, three of erratic silicite and one blade of Szentgál radiolarite. 18 % of all blades and blade tools were at least partly cortical (**table 273**). The overwhelming majority was manufactured from KL cherts. Remnants of the natural surface also occurred on one blade of Krakow Jurassic silicite and on another of erratic silicite.

Unlike at other settlements of the LBK, in Vedrovice there are many whole blades (**table 272**; **fig. 31: 4 , 5, 7, 8 & fig. 32: 1, 2, 4**). The crest preparation of pre-cores is documented through primary and secondary crested blades (**fig. 31: 3, 5, 6, 9**). All were made of local cherts.

Type of tools		Total	%	KL I	Krakow Jurassic	Other
Endscrapers		120	34.7	103	5	12
	on a blade	13		11		1 (burnt), 1 (undefined)
	on a retouched blade	2		2		
	on a flake	37		31	2	1 (MJC), 1 (radiolarite), 2 (burnt)
	fan-shaped	5		4	1	
	pointed	10		9		1 (burnt)
	thumbnail	9		5	1	1 (chert breccia), 1 (Stranská skála) 1 (MJC)
	circular	3		2		1 (undefined)
	keeled	10		10		
	nosed	6		5		1 (MJC)
	high	9		9		
	double	4		4		
	indistinct	8		8		
	atypical	4		3	1	
Truncated blades		5	1.5	5		
	oblique straight	1		1		
	oblique concave	1		1		
	transverse straight	3		3		
Burins		6	1.7	6		1
	on a natural edge	3		3		1 (undefined)
	transverse	1		1		
	flat-facet	1		1		
	truncation	1		1		
Blades with lateral retouch		20	5.8	16	2	2
	unilateral – dorsal	5		4		1 (burnt)
	unilateral – ventral	3		1	2	
	bilateral – dorsal	1		1		
	bilateral – dorsal-ventral	2		1		1 (undefined)
	unilateral – steep retouch	2		2		
	unilateral – fine retouch	7		7		
Retouched flakes		15	4.3	11	3	**1 (burnt)**

Type of tools		Total	%	KL I	Krakow Jurassic	Other
Borers, perforators and becs		11	3.2	9	1	1
	robust borer	1		1		
	fragment of borer	1		1		
	robust perforator	2		1		1 (burnt)
	perforator fragment	1		1		
	low bec	2		2		
	high bec	1		1		
	bec created by notches	3		2	1	
Notches and denticulates		75	**21,7**	68		7
	retouched notch	17		15		1 (undefined), 1 (burnt)
	multiple notch	10		10		
	basal notched blade	3		2		1 (radiolarite)
	"Clactonian" notch	3		3		
	denticulated blade (flake)	13		12		1 (chert breccia)
	regularly denticulated blade (flake)	5		4		1 (burnt)
	denticulates	24		22		1 (erratic silicite), 1 (chert breccia)
Sidescrapers		28	8.1	26	1	1
	straight	7		6		1 (burnt)
	convex	8		7	1	
	concave	7		7		
	transverse	1		1		
	double	2		2		
	ventral	3		3		
Trapezes		1	0.3	0	1	0
	broad (transverse arrowheads) – dorsal retouch	1			1	
Other microliths		0		0	0	0
Splintered pieces		11	3.2	10		**1 (burnt)**
Combination tools		24	6.9	18	3	**1 (radiolarite), 1 (undefined), 1 (chert breccia)**
Hammerstones		30	8.6	30		1
	hammerstone – raw material	14		14		
	hammerstone – from a core	14		14		
	hammerstone fragment	2		2		1 (burnt)
Tool fragments		0		0	0	0
Total		346	100	302	16	26

Table 276. Vedrovice "Široká u lesa" – settlement, phase I/II and phase II of the LBK. Tool types and their raw materials.

Flakes with sickle gloss	Flake tools		Flakes
Type of flake	**Type of tools**	**No. of pieces**	**No. of pieces**
Preparation flake		**–**	1
Blade-like flake	**endscraper**	1	1
Waste		**–**	1
Total		1	3

Table 277. Vedrovice "Široká u lesa" – settlement, phase I/II and phase II of the LBK. Flakes and flake tools with sickle gloss by types.

Blades with sickle gloss	Blade tools	Blades
Whole blade	6	
Blade with broken off terminal part	8	4
Blade with broken off basal part		2
Blade with broken off terminal and basal part		2
Basal fragment of a blade		
Terminal fragment of a blade		
Technical blade		
Total	14	8

Table 278. Vedrovice "Široká u lesa" – settlement, phase I/II and phase II of the LBK. Blades and blade tools with sickle gloss by types.

On a total of 289 blades and blade tools, the basal part was preserved (**table 274**). Blades with plain platform remnant are relatively abundant in Vedrovice.

This trend of a decreasing amount of primarily facetted platform remnants can also be recorded at other sites from middle phase of the LBK onwards. A higher ratio of plain platform remnants was detected in Těšetice-Kyjovice, Přáslavice-Kocourovec, Kuřim and Asparn-Schletz. In the western part of Europe, at the LBK sites west of the Rhine, the blades with plain platform remnant dominate (Erkelenz-Kückhoven, Weisweiler 110). On the contrary, at sites dating from the early phase of the LBK, blades with primarily facetted platform remnant prevail in the whole territory of this culture (Kazimierza Mała, Ostheim-Mühlweide, Brunn am Gebirge, Rosenburg, Kladníky, Szentgyörgyvölgy-Pityerdomb).

11.14.3.3.5. Raw material transport

The occurrence of unworked raw material at the settlement and a high ratio of pre-cores testify that the KL cherts had been brought to the settlement in form of unworked pebbles or roughly knapped raw material. Likewise, a high ratio of cortical flakes shows evidence of primary processing of raw material at the settlement itself. Three reduced cores and a core fragment of Krakow Jurassic silicite probably reached the site in form of prepared cores. This is also documented by cortical flakes and technical flakes from core rejuvenation.

Blade tools with sickle gloss	
Type of tool	Total
Endscrapers	5
Truncated blades	3
Blade with retouch on both ends	1
Retouched blade	3
Denticulated blade	1
Combination tool	1
Total	14

Table 279. Vedrovice "Široká u lesa" – settlement, phase I/II and phase II of the LBK. Blade tools with sickle gloss by types.

11.14.3.3.6. Tools

Altogether, 346 (9.5 %) artefacts were classified as tools (**tables 275 & 276**). The tools made on flakes (236 pieces) are definitely predominant. Only 77 implements were manufactured on blade blanks. Among flake tools, various types of endscrapers, sidescrapers, becs, notches and denticulates prevail. The abundance of these types together with hammerstones is closely connected with the workshop-like nature of the chipped stone assemblages typical for settlements in close vicinity to raw material sources. Most artefacts are manufactured from local Krumlovian cherts. On the other hand, blade tools were mostly made of Krakow Jurassic silicite.

The most abundant implements in the assemblage are endscrapers, among which single flake endscrapers predominate. Blade, pointed, keeled and high endscrapers are also common (**fig. 35: 13**). Truncated blades only amount to 1.5 % (**fig. 30: 1 & fig. 33: 12, 14**). At other sites dating from the later phase of the LBK, endscrapers also dominate at the expense of truncated blades. On the other hand, truncated blades are predominant above all at the settlements dating from the earliest phase of the LBK. The predominance of endscrapers in some settlements probably relates to a larger width of blade blanks and a higher ratio of flake blanks. At the sites with narrow blades, truncated blades occur more often (Brunn IIa, Brunn IIb, Szentgyörgyvölgy-Pityerdomb, Kladníky, Ostheim).

Retouched blades and flakes are also very frequent. Several less typical burins were also found (**fig. 32: 11**). Among perforators and borers, there are no characteristic types with distinguished point such as those originally reported from feature O 98, which are now unfortunately lost (Ondruš 1975/76, 135–137; Lech 1983a, 51; Mateiciucová 1997b, 251).

The assemblage also comprised a broad, dorsally retouched trapeze made of Krakow Jurassic silicite. On the assumption that the settlement is at least partly contemporary with the cemetery, the trapeze could correspond with similar finds from the cemetery.

11.14.3.3.7. Artefacts with sickle gloss

At the settlement, 26 artefacts with sickle gloss were found. Sickle gloss predominantly occurs on blade artefacts (22 pieces; **table 278**; **fig. 30: 1, 2, 4 & fig. 32: 11–14**). Four flakes had also been used as sickle inserts (**table 277**). 14 blade artefacts and one flake with sickle gloss were modified by retouch (**table 279**). The gloss most often occurs on endscrapers, truncated blades and laterally retouched blades.

11.14.3.3.8. Summary

In the settlement of Vedrovice "Široká u lesa", the local KL I chert predominates by far. The most frequent imported raw material is Krakow Jurassic silicite, but Szentgál radiolarite also occurred. Production of blanks and tools was carried out directly at the settlement for local consumption. Just as at Kuřim, an increasing number of blades with plain platform remnant can also be observed here.

11.14.3.4. Chipped stone industry at the cemetery of Vedrovice "Široká u lesa"

At the cemetery of Vedrovice, a total of 96 graves was investigated. In 33 of them, a total of 77 pieces of chipped stone and stone pebbles was recovered in all. 67 pieces from 25 graves were analysed (**table 280**). Ten pieces were excluded

	Blanks	Tools	Total	%
Pebbles, pre-cores and cores	5	6	11	16.4
Flakes and waste	4	3	7	10.5
Blades and blade fragments	23	26	49	73.1
Total	32	35	67	100
Excluded from further study	10		77	

Table 280. Vedrovice "Široká u lesa" – cemetery, phase I/II and phase II of the LBK. Chipped stone artefacts divided into basic blank groups.

Excluded from further study					
Burial	Sex	Morphological group	No. of pieces	Raw material	Location
17	undefined	flake – pseudoartefact	1	KL I	grave fill
23	male	flake	1	KL I	grave fill
58	empty grave	prismatic single platform core	1	KL I	empty grave pit
73	male	natural raw material fragment	1	KL I	grave fill
80	male	flake fragment	1	KL I	on the surface
91	female	flake fragment	1	KL I	grave fill
		natural raw material fragment	1	KL I	grave fill
		small pebble	1	quartz	grave fill
94	female ?	natural raw material fragment	1	quartz	grave fill
107	female ?	flake	1	KL II	on the surface

Table 281. Vedrovice "Široká u lesa" – cemetery, phase I/II and phase II of the LBK. Chipped stone artefacts excluded from further study.

Raw material	No. of pieces	%	Distance
Krakow Jurassic silicite	25	37.3	270 – 280 km
Krumlovský Les chert	17	25.4	0 – 5 km
Szentgál radiolarite	5	7.5	235 km
Úrkút-Eplény radiolarite	1	1.5	230–235 km
Reddish brown radiolarite – origin undefined	2	3	12 – 120 km
Erratic silicite	1	1.5	120 km
Krakow Jurassic silicite or KL or erratic silicite	5	7.5	
Quartz	4	6	0 – 5 km
Limestone	2	3	120 km ?
Other	5	7.5	
Total	67	100.2	

Table 282. Vedrovice "Široká u lesa" – cemetery, phase I/II and phase II of the LBK. Proportion of raw materials, including varieties and distance to outcrops.

Grave	Sex	Type of artefact	Retouch	No. of pieces	Raw material	Trapezes/trapezoidal shapes
14	female	blade with broken off terminal part		1	KL II chert	
15	male	longitudinal burnished stone		1	amphibolite	
		blade with transverse truncation	dorsal retouch	1	Krakow Jurassic silicite	
19	male	pebble – hammerstone		1	quartz	
		mesial fragment of a blade		3	silicite	AZ
21	female	whole blade		1	KL I chert	
30	boy ?, 10 years	pebble – hammerstone		1	quartz	
37	male	short trapeze	ventral retouch + ventral retouch on a break/ notch fragment	1	Krakow Jurassic silicite	AZ
39	child, 4–5 years	broad trapeze on a flake	dorsal-ventral retouch on both ends	1	Krakow Jurassic silicite	AC
		flake with retouched notch	dorsal retouched notch	1	KL II chert	AC ?
		fragment of a blade with reduced basal part	ventral retouch	1	Krakow Jurassic silicite	AC
		fragment of a blade with reduced basal part	ventral retouch	1	Krakow Jurassic silicite or KL II	AC
		mesial fragment of a blade		1	Krakow Jurassic silicite	AC
		small flake		2	Krakow Jurassic silicite or KL II	AC
		small flake		1	KL I chert	AZ ?
43	boy, 14 years	blade with broken off terminal part		1	KL I chert	
46	male	broad trapeze	ventral retouch + dorsal retouch on a break/ notch fragment	2	Krakow Jurassic silicite	AC
		broad trapeze	ventral retouch + dorsal retouch on a break/ notch fragment	1	Szentgál radiolarite	AC
		broad trapeze	ventral retouch + ventral retouch on a break/ notch fragment	1	Szentgál radiolarite	AC
		broad trapeze	ventral retouch on both ends	1	reddish brown radiolarite	AC
		mesial fragment of a blade with transverse truncation	dorsal retouch on both ends	1	Szentgál radiolarite	AC
		mesial fragment of a blade with transverse truncation	ventral retouch	1	Szentgál radiolarite	AC
		broad trapeze	dorsal retouch on a break/ notch fragment on both ends	1	Krakow Jurassic silicite	AC
		mesial fragment of a blade	ventral retouch on a break/ notch fragment	1	Krakow Jurassic silicite	AC
		mesial fragment of a blade		2	Krakow Jurassic silicite	AC, AZ
		mesial fragment of a blade		1	Szentgál radiolarite	AC
		mesial fragment of a blade		1	Úrkút Eplény radiolarite	AZ
		mesial fragment of a blade		1	reddish brown radiolarite	AZ
		small flake		1	KL I chert	AZ ?
54	male	fragment of a blade with reduced basal part	ventral retouch	1	Krakow Jurassic silicite	AC
57	male	broad trapeze	dorsal retouch on both ends	2	Krakow Jurassic silicite	AC
		broad trapeze	dorsal retouch on a break/ notch fragment + ventral retouch on a break/ notch fragment	1	KL I chert	AC
		short trapeze	dorsal retouch on both ends	1	Krakow Jurassic silicite	AZ
		short trapeze	dorsal retouch on both ends + lateral retouch	1	Krakow Jurassic silicite	AZ
		mesial fragment of a blade	dorsal retouch on a break/ notch fragment	1	KL I chert	AC
		mesial fragment of a blade	ventral retouch on a break/ notch fragment	1	KL I chert	AC
59	male ?	fragment of a blade with reduced basal part		1	erratic silicite or KL II	AC
		mesial fragment of a blade		1	erratic silicite	AZ
62	female	terminal blade fragment with pitch remnants		1	KL II chert	
65	empty grave	broad trapeze	ventral retouch + ventral retouch on a break/ notch fragment	1	Krakow Jurassic silicite	AC
66	male	whole blade – pointed		1	Krakow Jurassic silicite	
		broad trapeze	dorsal retouch + dorsal retouch on a break/ notch fragment	1	Krakow Jurassic silicite	AC
69	male	black pebble		1	KL chert	
		mesial fragment of a blade		1	Krakow Jurassic silicite	AZ
76	female robust	whole blade		1	KL I chert	
79	male	broad trapeze on a flake	ventral retouch + dorsal-ventral retouch	1	Krakow Jurassic silicite	AC
		broad trapeze	ventral retouch + dorsal retouch on a break/ notch fragment	1	KL II chert	AC

Grave	Sex	Type of artefact	Retouch	No. of pieces	Raw material	Trapezes/trapezoidal shapes
		mesial fragment of a blade	dorsal retouch on a break/ notch fragment	1	KL I chert	AC
		fragment of a blade with reduced basal part	dorsal retouch	1	Krakow Jurassic silicite	AC
		basal fragment of a blade		1	Krakow Jurassic silicite or KL I	AZ ?
		mesial fragment of a blade		1	Krakow Jurassic silicite	AC
		mesial fragment of a blade		1	KL II chert	AC
		blade with broken off terminal and basal parts		1	Krakow Jurassic silicite	
81	female and child (9 months)	light grey pebble		1	limestone	
83	female	pebble – hammerstone		1	MJC	
		pre-core – hammerstone		1	KL I chert	
85	empty grave	pebble		1	KL I chert	
86	female ?	mesial fragment of a blade		1	Krakow Jurassic silicite	AZ
90	female ?	pebble – hammerstone		1	quartz	
101	female	light grey pebble		1	limestone	
104	female ?	pebble – hammerstone ?		1	quartz	
		total		67		48

Table 283. Vedrovice "Široká u lesa" – cemetery, phase I/II and phase II of the LBK. Artefacts from individual graves.

Trapezes and trapezoidal shapes	No. of pieces	No. of grave
Trapezes	17	
Broad trapezes (transverse arrowheads) – AC	14	39, 46, 57, 65, 66, 79
Short trapeze – AZ	3	37, 57
Retouched trapezoidal shapes	11	
Mesial fragment of a blade with transverse truncation	2	46
Fragment of flake with reduced basal part	4	39, 54, 79
Fragment of a blade with retouch on a break/ notch fragment	4	46, 57, 79
Flake with retouched notch	1	39
Unretouched trapezoidal shapes	20	
Basal fragment of a blade	2	59, 79
Mesial fragment of a blade	14	19, 39, 46, 59, 69, 79, 86
Small flakes and flake fragments	4	39, 46
Total	48	**in 12 graves**

Table 284. Vedrovice "Široká u lesa" – cemetery, phase I/II and phase II of the LBK. Total number of chipped stone artefacts with trapezoidal shape.

from further study (**table 281**) because they either came from the grave fill or were found in the vicinity of a grave pit. In both cases, their identification as grave goods is very questionable.

11.14.3.4.1. Raw material

The composition of raw materials occurring in the graves of Vedrovice (**table 282**) very much resembles that of the cemetery at Kleinhadersdorf (see chapter 11.4.). In Vedrovice, Krakow Jurassic silicite is also predominant (37 %). If stone pebbles, which are mostly of quartz or KL chert, were not included in the raw material analysis, the ratio of Krakow Jurassic silicite would be much higher. The second place is taken by the KL cherts. In third place are the radiolarites, among which those from the Bakony mountains predominate.

Pebbles, pre-cores and cores

Nine pieces in this category are of local raw materials – four quartz pebbles, three pebbles and one pre-core of Krumlovský Les chert or another Jurassic chert. Two smaller pebbles are of a very fine-grained, light grey limestone, which most probably comes from river gravels. According to the petrographic determination, it is Jurassic limestone, maybe originating from the Carpathian Klippen Belt[115]. Two beads in grave No. 9 at the Vedrovice "Za dvorem" cemetery were manufactured from the same limestone (Mrázek 1989). There is also a longitudinal burnished stone of a greyish green amphibolite (Přichystal 2002, 213).

Flakes and flake fragments

Two flakes were manufactured of KL I chert and one notched flake of KL II chert. In the case of two flakes, the raw material could not be determined with certainty – it could either be Krakow Jurassic silicite or KL II chert. Trapezes were made from two flakes of Krakow Jurassic silicite.

Blades and blade fragments

Among the blade blanks and blade tools, raw materials imported from distant regions predominate. This is in contrast to the raw material composition of the adjacent settlement, where the majority of chipped stone artefacts is made of local Krumlovský Les cherts (Mateiciucová 1992; 1997a, 252).

Krakow Jurassic silicite makes up the greatest part – 25 pieces (eight unretouched pieces and 17 retouched pieces). It comes from a distance of 270–280 km.

The presence of Transdanubian radiolarites from the Bakony mountains north of Lake Balaton (230–250 km) – both the Szentgál type (four retouched pieces and one unretouched piece) and the Úrkút-Eplény type (one unretouched piece) – can be regarded as important.

The Krumlovský Les cherts were represented by only 11 pieces (six unretouched and five retouched).

One blade fragment was made of erratic silicite coming from a distance of at least 120 km. Two artefacts (one unretouched and one trapeze) are manufactured of a reddish

115 For the petrographic determination I thank Ivan Mrázek and Miroslava Gregerová from the Department of Petrography at the Faculty of Science of the Masaryk University in Brno.

brown radiolarite, the provenance of which cannot be determined with certainty. Very similar radiolarites occur in the Gerecse mountains in north Hungary and around the Vlára Pass on the Moravian-Slovakian border. The Hungarian provenance could be confirmed by the fact that all other Hungarian radiolarites come from the same grave. For three blade fragments (two of them retouched), it was impossible to definitely decide whether they are of KL chert, Krakow Jurassic silicite or erratic silicite.

Three blade fragments from grave 19 are now lost; therefore, on the basis of the finds report, it can only be stated that they were made of a silicite (Ondruš 1975).

11.14.3.4.2. Pebbles, pre-cores and cores

A total of 11 objects found in ten graves belong to this category (**figs 33–38**). Eight of them had a pebble surface, and one of these eight was formed by multiple detachments. In addition, one piece was classified as pre-core with prepared striking platform and frontal crest adjustment. A longitudinal amphibolite pebble was also assigned to this category. It is oval in cross-section and has a finely burnished surface with traces of red colorant (**fig. 33: 1**). Six of the pebbles and pre-cores bear traces of percussion (**fig. 33: 9; fig. 34: 1; fig. 35: 16 & fig.38: 1, 3, 4**).

The weight of pebble-hammerstones varies between 175–200 g. Interestingly, three ovoid quartz pebbles had an almost identical weight – 182.1 g (grave 104/81–55; **fig. 35: 16**), 182.7 g (grave 19/75–52; **fig. 33: 9**) and 182.5 g (grave 30/76–51; **fig. 34: 1**). A hammerstone of Moravian Jurassic chert is also of similar weight – 183.2 g (grave 83/80–61; **fig. 38: 3**).

An almost identical weight connects two other pebbles: a black pebble of KL chert – 96.9 g (grave 69/78–54; **fig. 36: 13**) and a light grey limestone pebble – 97 g (grave 81/79–50; **fig. 37: 9**)[116].

11.14.3.4.3. Flakes and waste

Seven artefacts were classified as flakes and flake fragments (five come from grave 39, the others from graves 46 and 79). Three flakes were adjusted by retouch.

All the flakes and tools made on flake blanks are very small. Their size does not exceed 20 mm and their thickness varies between 2 and 4 mm.

Two flakes were made into trapezes. The other flakes were also found in association with trapezes and trapezoidal shapes, and they all are believed to be projectile points (see below).

11.14.3.4.4. Blades and blade fragments

A total of 18 graves contained 23 unretouched blades and blade fragments, as well as 26 blade tools including trapezes and trapezoidal shapes (**figs 34–37**).

With 33 pieces in all (19 modified by retouch), mesial blades are the most frequent in graves. The second most abundant group are the basal blade fragments with nine pieces (seven were further retouched).

In some graves, whole blades (three pieces; **fig. 33: 5, 8 & fig. 36: 9**) or blades with broken off terminal part (two pieces – one with transverse retouch; **fig. 33: 2,4**) were also found.

The blades had probably just been broken into smaller parts ("Bruch-Technik"). On several of them, the break was subsequently partly retouched. A retouched notch and subsequent breakage of the blade at that point ("Kerb--Bruch-Technik") can also not be excluded. Both techniques of snapping blades are familiar in the LBK. Snapping blades by striking a retouched notch ("technique microburin", "Kerb-Schlag-Technik"), which is typical for the Mesolithic period (Taute 1973/74, 80–81), was not detected.

A platform remnant was preserved on eight blades. In five cases, it was adjusted by primary faceting (once together with dorsal reduction), two platform remnants are classified as plain (once with dorsal reduction) and one platform remnant was prepared by several blows.

Blade blanks with platform remnant adjusted by primary faceting come from cores with a faceted platform. The width of whole blades and blade fragments varies between 8 and 18.5 mm (average 13.2 mm) and the thickness of blade fragments between 1.5 and 4 mm (average 3 mm). With 3 – 7.5 mm (average 5 mm), whole blades and blades with broken off terminal part are thicker. The lengths of the whole blades are 31, 46 and 58 mm.

11.14.3.4.5. Tools

Altogether, 35 pieces were classified as tools. The blades with platform remnant adjusted by secondary preparation were also included, because it is obvious that it was prepared in order to impair the basal part of the artefact. Furthermore, hammerstones are included.

Tools at the cemetery can be assigned to four types:

1. Hammerstones – six piece
2. Trapezes – 17 pieces
3. Truncated blades – seven piece (six of which are trapezoidal shapes)
4. Notches and a partly retouched break/notch fragment – five pieces (all trapezoidal shapes).

As the artefacts were found in graves, i.e. it is a deliberate selection of objects placed into the grave together with the deceased, we can assume that the unretouched fragments of chipped stone artefacts and pebbles without traces of working also have a certain symbolic and ritual meaning as funerary equipment. This positive selection in graves also allows us to re-interpret artefacts (e.g. the unretouched fragments of chipped stone) which are otherwise, if found in a settlement, taken for common waste from tool production. In graves, these artefacts can, in a purely symbolic way, take the place of real, functional tools. On the other hand, we can assume that unretouched artefacts could also fulfil the same function as the retouched ones, which are often the only ones interpreted as real tools.

1. Hammerstones

This group comprises six pieces altogether, four quartz pebbles (**fig. 33: 9; fig. 34: 1; fig. 35: 16 & fig. 38: 1**), one pre-core with platform and frontal crest adjustment of KL I chert (**fig. 38: 4**) and one pebble of Moravian Jurassic chert

116 From the limestone pebble, a sample for thin sectioning had already been detached in the past, so that its weight is rounded.

with some chipped-off negatives (**fig. 38: 3**) caused by percussion.

2. Trapezes
Seven graves yielded a total of 17 artefacts which can be typologically denoted as trapezes or transverse arrowheads. For their classification into long – AA, short – AZ and transverse arrowheads (broad trapezes) – AC, I retained the designations and definition by S.K. Kozłowski (1980, 16, fig. 28–32).

I am personally inclined to designate the trapeze – AC as broad trapeze, because the designation transverse arrowhead already directly defines its use as a projectile point, as well as the way of hafting. However, some shorter trapezes – AZ could also have been mounted in this way. On the contrary, the designation broad trapeze only defines the shape and enables us to discuss the matters of function and hafting separately.

Of 17 trapezes, three were classified as short trapezes (**fig. 34: 2 & fig. 36: 4, 6**) and 14 as broad trapezes (transverse arrowheads; **fig. 34: 10, 12; fig. 35: 1, 2, 7–9, 12; fig. 36: 1, 2, 5, 8 & fig. 37: 1, 6**).

12 trapezes were manufactured from Krakow Jurassic silicite, two from Szentgál radiolarite, one from an unspecified radiolarite, one from KL I chert and one from KL II chert.

The trapezes are dorsally, ventrally or dorsally and ventrally retouched. In some cases they were only half-retouched on one or both ends (dorsally or ventrally). A partial retouch on a break can be either a notch remnant that made the snapping of the blade easier, or indicate additional retouch of the blade break to to flatten the broken surface or to obtain a desired shape. According to W. Taute, partial retouch on a break, as well as dorsal and ventral retouch, are known from the Neolithic only and do not occur in the Mesolithic. Ventral retouch on both ends is also regarded as a Neolithic feature (Taute 1973/74, 81).

3. Truncated blades
I assigned a total of seven tools to this group. Six of them (including basal fragments with secondarily prepared platform remnant – four pieces) resemble a trapeze shape and were found in association with trapezes, so that we can assume they had an identical function.

These fragments of truncated blades do not exceed 14.5 mm in length. Three are made of Krakow Jurassic silicite, two of Szentgál radiolarite and in one case there could be no definite decision between Krakow Jurassic silicite and KL II chert.

Transverse truncation was detected on a longer blade with broken off terminal part (length 34 mm). It is manufactured from Krakow Jurassic silicite (**fig. 33: 2**).

5. Notches and a partly retouched break/notch fragments
One dorsally retouched notch on the basal part of a flake was assigned to this group (**fig. 34: 7**), as were four blade fragments with partial retouch on one end that could be a notch remnant (**fig. 35: 4; fig. 36: 3,7 & fig. 37: 2**). In another case, it could be a retouched blade break. The transition between the notch remnant and the break could have been additionally retouched (Taute 1973/74, Abb. 6). In two cases, retouch was carried out on the dorsal and in two cases on the ventral surface. The flake with retouched notch is made of KL II chert, three blade fragments are of KL I chert and one of Krakow Jurassic silicite.

11.14.3.4.6. Artefacts with sickle gloss
Artefacts with sickle gloss did not occur in any of the graves.

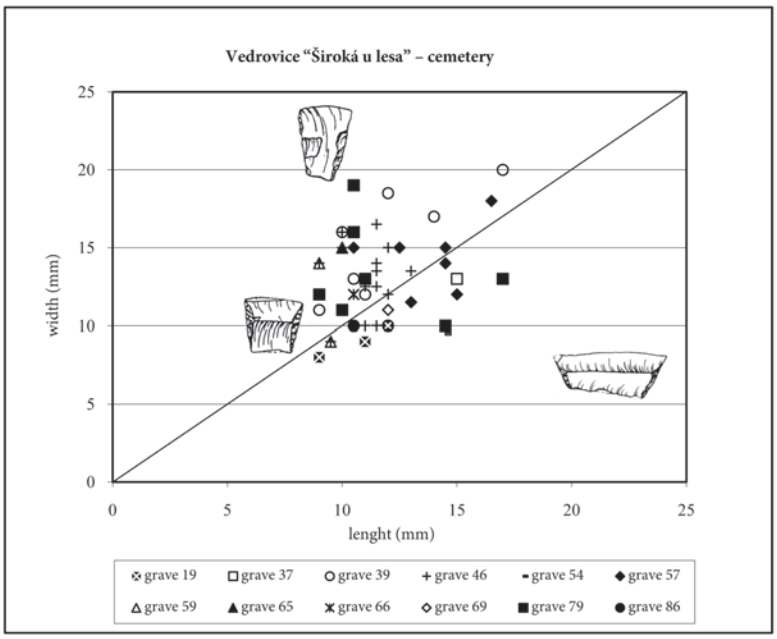
11.14.3.4.7. Trapezes and trapezoidal shapes in graves and their function
In 12 graves, microlithic chipped stone artefacts were found – 48 pieces in all (**table 284**). Only some – 28 pieces – were retouched (mostly to a trapeze). As these microliths occurred mostly together, either retouched or unretouched, and because of their almost identical size and shape, they may have fulfilled a similar function. For this reason, a separate section is devoted to them in which they are treated as a whole, regardless of some technological and typological differences.

To this group belong 17 trapezes, six blade fragments with transverse retouch, four blade fragments with partial retouch or a notch remnant on one end, one flake with base notch, 16 unretouched blade fragments and four unretouched flakes. My working designation for these artefacts, except for the trapezes, is "trapezoidal shapes".

Trapezes and trapezoidal shapes occurred with male burials. Only one belonged to a child (grave 39) and one to a woman (grave 86).
In the literature, the groups of trapezes and trapezoidal shapes from some graves were first presented as sickle inserts (Lech 1983a, 51–52).

There are several arguments against this interpretation:

1) The artefacts with sickle gloss found at the settlement in Vedrovice, position "Široká u lesa", are much longer (mostly blades with broken off terminal part or broken off terminal and basal parts were used) than the blade fragments found in graves, the size of which does not exceed 16.5 mm (Mateiciucová 1992).
2) The sickle blades found at the settlement were made of a local KL chert. On the contrary, most trapezes and trapezoidal shapes from the cemetery were manufactured from imported raw material – 31 pieces (64.6 % from a total of 48 pieces). Only 17 % are made of local raw materials.
3) The trapezes and trapezoidal shapes found in graves did not show a typical sickle gloss on their surface. J. Lech explains this with the suggestion that they were manufactured with the aim to be placed in graves (Lech 1983a, 52).
4) Some graves yielded only one or two trapezes or trapezoidal shapes each, and one can hardly believe this would be sufficient for a sickle. V. Ondruš and J. Lech interpreted the trapezes and trapezoidal fragments from graves 46 and 57 as sickles. Grave 46 allegedly contained two sickles, each with seven or eight inserts, and the sickle from grave 57 consisted of seven components (Lech 1983a, 51).



Graph 27. Trapezes and trapezoidal shapes at the cemetery in Vedrovice "Široká u lesa".

5) An example of a blade with sickle gloss in a grave is known from the cemetery in Nitra (Pavúk 1972, 56, Abb. 28. 6), where a blade with sickle gloss, ca 32–34 mm long, was found in grave 58. Two artefacts with gloss also occurred with a male burial (grave 17) at the cemetery in Kleinhadersdorf (Lenneis, Neugebauer-Maresch & Ruttkay 1995, Abb. 16.1). However, the character of the gloss on the artefacts from grave 17 rather indicates that it did not result from using the blade tools as sickle inserts (see chapter 11.4.3.7.). Likewise, the blade from the cemetery in Nitra cannot be studied in detail, but only from a picture. It cannot be excluded that in this case, too, there is no sickle gloss, but a gloss originating from another activity.

Most trapezes (just like trapezoidal shapes) are rather broader than longer and their size mostly varies between 9 and 15 mm. In terms of typology, we would designate them as broad trapezes (transverse arrowheads) and short trapezes. This leads us to another interpretation of these artefacts. Broad trapezes (transverse arrowheads) served as projectile points for arrows (Taute 1973/74, 76–77; Hahn 1993, 265). They were mounted so that their longer edge was perpendicular to the shaft and created a transverse cutting edge. The other unretouched and retouched trapezoidal shapes most probably had the same function (Mateiciucová 1992; 1998). The trapezes designated as short trapezes – AZ (three pieces) were probably mounted in the same way, because they are not very distinctly different from the broad trapezes (transverse arrowheads) at the cemetery in Vedrovice (**graph 27**). However, some other way of mounting must also be considered[117].

Projectile points occur relatively regularly, mostly in the western part of the LBK territory. But these points are either of a symmetric or an asymmetric triangular shape (Löhr 1994; Gronenborn 1990b; 1997, 100–101); trapezes occur only rarely. In central Europe, the triangular shape is almost missing in the LBK. On the other hand, trapezes and transverse arrowheads are present, mainly at sites dated to phase I of the LBK. The number of trapezes and trapezoidal shapes in graves varies between one and 15 pieces. Besides the cemetery in Vedrovice, they were found in Lower Austria, at the cemetery in Kleinhadersdorf and at the settlement of Brunn II (burials in loam pits), and in a grave at the settlement of Schwanfeld in Bavaria (Lenneis, Stadler & Windl, 1996, 102; Gronenborn 1997, 41–43). The trapezoidal shapes found at the cemetery in Kleinhadersdorf are similar in size, shape and raw material to the microliths from the cemetery in Vedrovice (see chapter 11.4.).

We can assume that most projectile points at the cemetery in Vedrovice, together with a bow, were part of the personal equipment of the deceased; therefore it is likely that they were made by the deceased themselves for personal use. In this way, we can explain certain differences between the arrowheads in particular graves. Two arrowheads from grave 46, made of Szentgál radiolarite, are manufactured from the same blade. Likewise, two arrowheads of a russet radiolarite from grave 46 come from the same block of raw material.

The arrowheads found in a child's grave (eight pieces) are distinguished from the other assemblages by a lower accuracy of manufacture (half of them are made on flakes and they are mostly unretouched) and by the raw material used. While the arrowheads from the graves of adult individuals were mainly made of imported raw material, most arrowheads from grave 39 are manufactured from a local KL chert. They are mostly unretouched blade fragments or small flakes. The arrowheads in the child's grave could represent a toy or gift for the deceased made only with the aim to be laid into a grave. In either case, functionality may not have been the main concern. The arrows occurring as single pieces in five of the graves could also be a gift. These graves probably contained no bows. On the other hand, some graves could also have contained entirely wooden arrows[118].

11.14.3.4.7.1. Function of transverse arrowheads

Is there any difference between transverse arrowheads and triangular points in their use as projectile points?

Projectile points with transverse cutting edge should cause a larger wound and thus also a fast bleeding to death of the prey (Piel-Desruisseaux 1990, 157–159). Likewise, according to E. Keefer, the projectile with transverse cutting

117 Trasological analysis could give satisfactory answers to questions of how the arrowheads were mounted and whether they were used at all.

118 Dome-shaped or club-shaped arrowheads were also manufactured of wood, bone (joint) or antler. In the bird hunt, they served for stunning the prey. Smaller fur-bearing animals were also hunted in a similar way to prevent possible damage to their fur (Paulsen 1990, 305; Weiner 1995, 369).

edge did not penetrate deeply, but caused a large wound from which the prey soon bled death (Keefer 1994, 99).

During the archery experiments concerning the properties of arrows with triangular and transverse points, no distinct differences between both types of points were observed (Paulsen 1990, 303). Where J.L. Piel-Desruisseaux speaks of transverse arrowheads causing weakening and bleeding to death of prey, he can only mean those transverse arrowheads with a cutting edge much longer than their width. Such deadly arrowheads had been used in Japan to hunt big game, which was injured by the broad tip of a point, so that it began to bleed profusely and could thus be easily traced and run to ground (e.g. the Karimata type points) (Hoff 1990, 65, Abb. 8. 2)[119].

On the transverse arrowheads known from the LBK for which we can assume this way of hafting, the cutting edge is no longer than the basal width of a triangular arrowhead; therefore, the wound caused by a transverse projectile is almost the same as that caused by a triangular point.

Transverse and triangular points could have been used for hunting, an activity that did not disappear even in later periods, in spite of gradually loosing its importance as a means of subsistence. However, hunting did not vanish at once, and later played an important role in some areas, above all in the social sphere (as a way of gaining prestige). Unfortunately, so far we do not know the ratio of game among the osteological material from the settlement of Vedrovice (in the phase contemporary with the cemetery). It seems likely that there were some individuals in early agrarian society who engaged in hunting for a certain time. The person who hunted had to cultivate appropriate abilities and skills, thanks to which he could enjoy a special social status that could also be reflected in his funerary equipment. Such an interpretation would be possible for grave 46. However, archery could also be part of defence and aggression, as documented by some arrowheads stuck in human bones of the later and final phases of the LBK[120].

11.14.3.4.8. Closing reflections and summary

From the cemetery in Vedrovice, position "Široká u lesa", a total of 67 pieces of chipped stone artefacts and stone pebbles was analysed. More than half of the chipped artefacts were made of raw material from remote outcrops, despite the fact that Krumlovian chert, of which the majority of chipped stone artefacts at the "Široká u lesa" settlement was made, could be obtained close by (Mateiciucová 1992; 1997a, Fig. 4.). The chipped stone industry at the cemetery falls into three basic groups:

1) hammerstones, stone pebbles and cores – 11 pieces
2) trapezes and trapezoidal shapes – 48 pieces
3) blades – eight pieces

Stone pebbles occurred with both male and female burials. Raw material of local origin, quartz and KL chert predominate. It is worth noting that both limestone pebbles were found with female burials (graves 81 and 101). The light grey pebbles found in these graves had almost the same weight as a black pebble of KL chert found with a male burial (grave 69). Ovoid quartz pebbles (graves 19, 30 and 104) and a chert pebble (grave 83) also had the same weight, and all showed traces of percussion. Could these pebbles symbolize eggs? The egg as a symbol of beginning and rebirth is part of myths in many traditional societies all around the world. Eggs also relate to fertility symbolism. The pebbles are found in graves in association with stone plates (quern-stones?) (female burials in graves 81, 101). In male burials, this group is also accompanied by red colorant (graves 15, 30, 69). Grave 15, in which a stone pad was found alongside a longitudinal amphibolite tool and red colorant in a bottle-like vessel, belonged to a man with trepanated skull (Crubézy 1996, 331).

Among blades and transverse points, the imported raw materials predominate. These are mainly Krakow Jurassic silicite and Hungarian radiolarite of the Szentgál and Úrkút-Eplény types.

Imported raw materials were found with male burials only, and also in one child's grave. The exception is grave 86, in which a woman was buried. The greatest number of imported raw materials is present in the group of trapezes and trapezoidal shapes, coming from male burials and here interpreted as transverse arrowheads. On the other hand, if chipped stone artefacts occurred with a female burial, they were always made of local raw material.

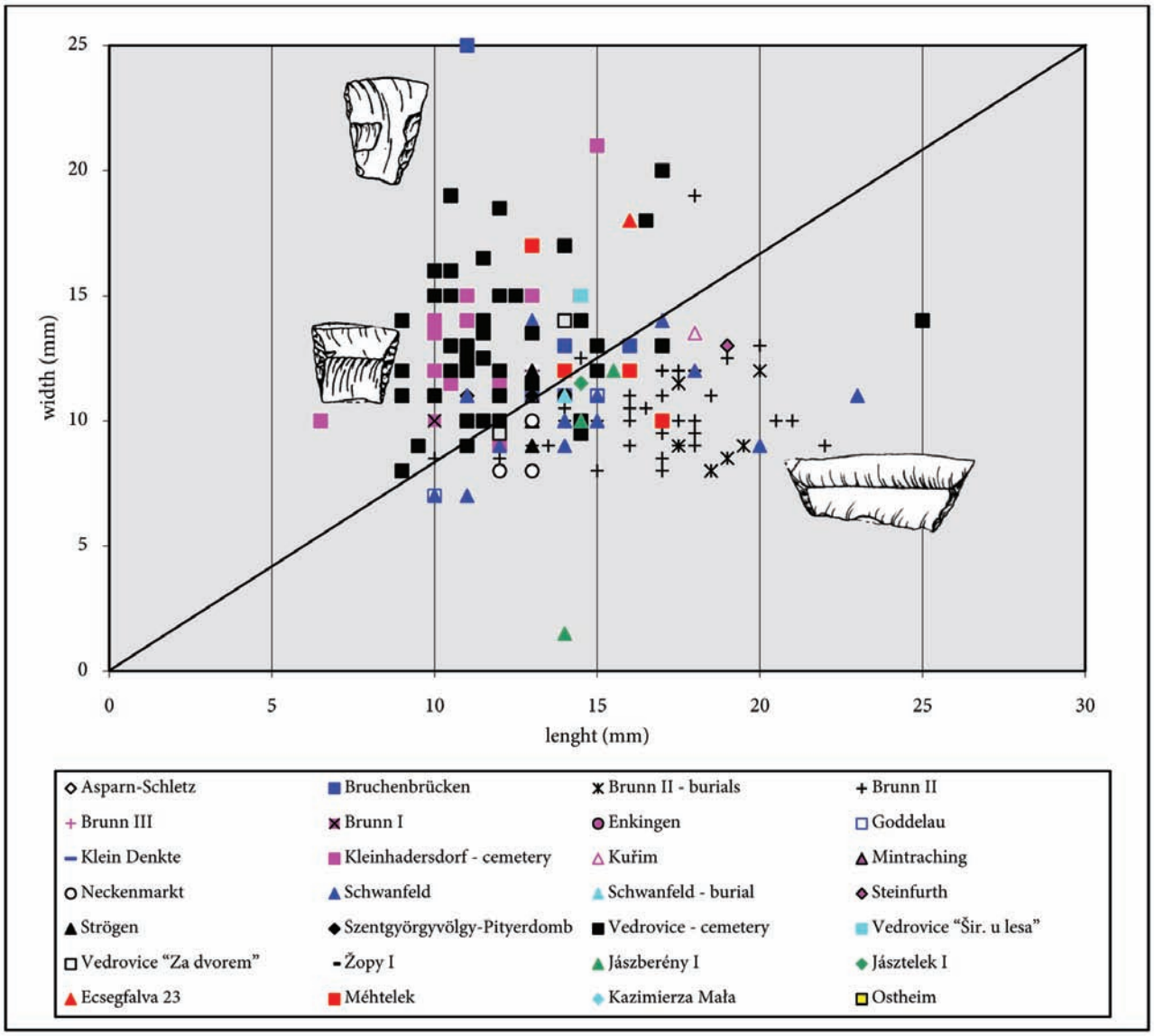
Imported raw material in male burials at a site with own raw material sources helps us to enlighten the character of contacts with more distant regions in this early agrarian society, and it indicates the role of men and women in this society.

A mainly economic meaning is assigned to the raw materials imported from large distances at those sites where there is a lack of high-quality domestic raw materials. In case of settlements without own raw material sources, an economic need is very likely. On the contrary, the occurrence of imports at sites that are sufficiently supplied with raw material indicates contacts of a different nature.

Mostly, existing opinion is that it is above all the quality of raw materials that should determine their selection. For example, the assemblage of borers from feature O 98 at the settlement of Vedrovice mostly consists of Krakow Jurassic silicite, which was preferred compared to local raw material (KL chert) mainly because of its higher quality (Ondruš 1975/76; Lech 1983a, 51). However, it is interesting that the borers from the early Neolithic settlement of Rosenburg I in Lower Austria are manufactured only of KL chert. Unlike at the cemetery, at the settlement only an insignificant part of the chipped stone artefacts, including

119 In medieval Japan, transverse arrowheads in the shape of a "goose foot" were used to kill horses, as we can see from the illustrations in the Hojo Godaiki Chronicle from the 17th century (Turnbull 1994, 42). Likewise, in the European Middle Ages arrows with broad heads were used for killing horses.

120 For example, there are two cases of wounds caused by arrowheads from the mass grave in Talheim, Baden-Württemberg (Kiefer 1994, 108) and an arrow fragment in the bone of the deceased in grave 5 at the cemetery of Hoenheim-Souffelweyersheim in the Rheinland, as well as a point in the right hip bone of burial 10 at the cemetery of Quatzenheim, also in the Rheinland (Storch 1984/85, 31, 41).



Graph 28. Length/width indices of trapezes and trapezoidal shapes from LBK, Körös culture and Mesolithic sites (Mesolithic – green, Körös – red).

a single sickle blade, was made of imported raw material – Krakow Jurassic silicite.

On the other hand, at the cemetery, where there was a positive selection of objects, imported raw material makes up more than half of all chipped artefacts and pebbles and was used mainly to manufacture trapezes (ca 90 %). The facts that 1) it is only the trapezes that dominate in graves, 2) they were mostly made of an imported raw material, 3) this imported raw material occurs mainly with male burials, and 4) we see only local raw material with female burials, together indicate that the people involved in contacts between distant regions were men. They used the raw material obtained in such way to produce arrowheads.

At the settlement, there was no lack of raw material. Most implements here are manufactured of local cherts, which means that for the production of tools they did not prefer the "higher-quality" imported raw material. Thus, the contacts documented in Vedrovice were not concentrated on the acquisition of raw material, but had above all a social and maybe also ritual meaning. Their purpose was probably the meeting of relatives or otherwise related groups.

Such encounters may have been of a seasonal nature and the participants were most probably men, representing also from the biological point of view the active component of human society with a need for presentation. Women, due to the fact that they had to look after children and the household, were much less mobile in comparison with men. The finds of imported raw materials with male burials do not, however, mean that the role of women in prehistoric society was less important. The significant role of women and the female aspect in the first agrarian communities is documented by the finds of richly equipped female burials (cemetery Vedrovice "Za dvorem", grave 9) and female clay figurines.

The blades found in some male and female burials could have fulfilled the function of knives, for instance a terminal blade fragment (length 23 mm) with glue remnants along one edge (grave 62).

11.14.3.4.9. Attempt at a chronological classification of the Vedrovice cemetery based on the analysis of the chipped stone industry and a comparison with other sites

In the attempt of assigning the cemetery in Vedrovice to a certain phase of the LBK, the following facts are important:

1) The occurrence of Szentgál and Úrkút-Eplény radiolarites from Northeast Hungary.

These radiolarites relate to the early phase of the LBK, as they were distributed up to the westernmost border of the territory then occupied (Ostheim – Mühlweide). In this period, they are also known from Bohemia and Moravia (Mateiciucová 2002b). In phase II of the LBK, their distribution faded out. In this period, they only rarely occur in Moravia. At the cemetery in Vedrovice, five trapezes and trapezoidal shapes were made of Szentgál radiolarite, and one of the Úrkút-Eplény radiolarite.

2) The occurrence of Krakow Jurassic silicite.

The Krakow Jurassic silicites are the most frequent raw materials in central and northern Moravia in LBK times. They predominate here from the oldest phase onwards (Žopy I, Mohelnice, Kladníky). In that phase, they also spread southwards (Vedrovice "Za dvorem"). Further south, they occurred at the sites Rosenburg I, Mold? and Brunn I. They could not be detected at the settlements of Brunn IIa and Brunn IIb, which are a little older. At the cemetery in Vedrovice, about half of all trapezes and trapezoidal shapes were manufactured of Krakow Jurassic silicite. They are also predominant at the cemetery in Kleinhadersdorf.

3) The occurrence of trapezes.

The trapezes made on regular blades represent a phenomenon typical for the Late Mesolithic and Early Neolithic. In the LBK, their occurrence is in fact limited to phase I. In phases II and III of the LBK, they appear only very rarely.

4) Predominance of broad trapezes (AC).

In Vedrovice, the broad trapezes and the broad trapezoidal shapes are predominant. Their shape often approaches a rectangle. Likewise, the proportions of short trapezes approach those of broad trapezes. The comparison of the size and proportions of the trapezes from LBK sites shows some differences which may help a chronological classification.

Graph 28 shows that the proportions of symmetrical trapezes from sites in Hungary, Austria, Moravia, Poland and Germany (Gronenborn 1997, 213–18) generally lie between those of the trapezes from the cemetery in Vedrovice and the trapezes from Brunn II. The trapezes from the cemetery in Vedrovice are very similar to the trapezoidal shapes from the cemetery in Kleinhadersdorf, which should at least partly belong to the same chronological horizon as Vedrovice (Jeunesse 1997, 39). Very similar trapezes also occurred at the settlement of Brunn I, also dated to the terminal phase I of the LBK.

On the contrary, the trapezes in Brunn II are mostly long (AA) or short (AZ). Also, the proportions of short trapezes approach those of long trapezes. The acute angles between their longer lateral edges and shoulders are notable. Very similar long trapezes were found at the sites of Steinfurth and Schwanfeld.

The trapezes from other sites are mostly short trapezes (AZ), but some differences can also be observed among them.

5) The way of retouching the trapezes and the technique of snapping blades.

At the cemetery in Vedrovice, the trapezes had been retouched dorsally, ventrally or dorsally and ventrally. On about half of them, ventral retouch appears. Ventrally retouched or alternately (dorsally and ventrally) retouched trapezes also occurred at other sites of the LBK (Brunn I, Brunn IIa, Neckenmarkt, Goddelau, Bruchenbrücken and Flomborn; Fiedler 1979, Abb. 10–4; Gronenborn 1997, Taf. 1.2–6, Taf. 6.2–8, Taf. 7.2–6, 8). The dorsal-ventral retouching of trapezes was described for Brunn II and Schwanfeld (Gronenborn 1997, Taf. 5.3–5).

At the settlements of Brunn IIa and Brunn IIb, dorsal retouch on both ends predominates (Mateiciucová 2002b).

At the cemetery in Vedrovice, trapezes and trapezoidal shapes which are only half retouched on one or both ends occur relatively often (Mateiciucová 1998). Similar retouching also occurred at other sites (Žopy I, Brunn IIa, Brunn IIb, Vedrovice "Za dvorem", Kazimierza Mała, Strögen, Schwanfeld and Bruchenbrücken; Gronenborn 1997). Half retouch can come about in two ways and documents the technique used for snapping blades. Either, the blade from which the trapeze was produced was simply broken and the break then partly retouched. This way of snapping blades is designated by W. Taute as the so-called "Bruch-Technik". Alternatively, there was first a notch retouched on a blade, and only then the blade was broken at that place – the so-called "Kerb-Bruch-Technik" (Taute 1974/75). This means that the half retouch on trapezes is in fact a notch fragment. Dorsal-ventral retouch on trapezes could have originated from retouching over the notch from the other side.

W. Taute regards both these techniques of breaking blades as typical for the Neolithic period. On the contrary, the so-called "Kerb-Schlag-Technik" ("technique microburin", burin blow technique; Taute 1974/75, Abb. 6) is considered typical for the Mesolithic. It was not detected at the cemetery in Vedrovice.

In Brunn IIa and Brunn IIb, the transverse burin blow technique ("burin transversale") was also used to snap blades and produce trapezes. Sometimes, the edge emerging in this way was still partly retouched.

On the basis of a raw material and morphological analysis of chipped stone, the cemetery in Vedrovice, position "Široká u lesa", can at least partly be assigned to phase I of the LBK (trapezes, Szentgál and Úrkút-Eplény radiolarites). According to the size and proportions of trapezes, it appears technologically and typologically younger than Brunn II and maybe also a little younger than Neckenmarkt, Strögen, Žopy and the sites in Germany. The trapezes mostly resemble the pieces from Brunn I and from the cemetery in Kleinhadersdorf, dating from the terminal phase I and from phase II of the LBK.

It cannot be excluded that the shape of trapezes had also been influenced by local traditions, as suggested for western Europe (Gronenborn 1990a; Löhr 1994).

11.15. Žopy, position "Cihelna" (Kroměříž district, south Moravia, Czech Republic)

11.15.1. Background information

Geographic and geomorphological site characteristics
Žopy lies about 2 km away from the town of Holešov on the western foot of the Hostýn mountains in the valley of the Rusava river, a left-bank tributary of the Morava River. In terms of geology, the Hostýn mountains form the western part of the West Carpathians. They have the character of flat highlands with rounded edges, divided by the valleys of watercourses. The average elevation of the Hostýn mountains is 506.4 m. The mountains consist of tertiary rocks (Demek & Novák *et al.* 1992, 34).

Research history
The site was discovered in Žopy near Holešov in 1954. While exploiting clay for brickworks, two pits appeared in the section. One pit contained pottery of the Tumulus culture and the second of the LBK. A rescue excavation followed, carried out by Jan Pavelčík from the Regional Museum in Gottwaldov (today Zlín). At the bottom of the pit, in its north-east part, a fireplace was detected. The pit was interpreted as a "hut with fireplace". According to J. Pavelčík, the whole slope between the brickworks and the road Holešov – Dobrotice was covered with similar "huts", as the workers had been finding similar pottery while working at the road. The "hut" was dated on the basis of pottery into the oldest phase of the LBK, the Ia phase (Tichý 1960; 1962, 287, 289). From its fill, a total of 73 pieces of chipped stone was recovered (Pavelčík 1955).

In 1957, Rudolf Tichý (Institute of Archaeology of the Czechoslovak Academy of Sciences in Brno) continued the excavation of J. Pavelčík. An area of 500 m^2 was uncovered and revealed 32 pits. These pits, except for pit No. 13, dated unequivocally into the later phase of the LBK, as pottery with music-note design was present, but could not be dated more precisely. Consequently, the chipped stone found in them was excluded from analysis (Tichý 1960; 1962, 268, 289). Only the 18 artefacts from pit No. 13 were studied.

Further rescue work in the Žopy brickworks was carried out by Vít Dohnal (Museum in Gottwaldov) in 1959. It revealed two disturbed pits (pits No. 1/59 and No. 2/59) dating from the older phase of the LBK, in which a total of three chipped stone artefacts was found (Dohnal 1964).

11.15.2. Dating the site

Absolute chronology

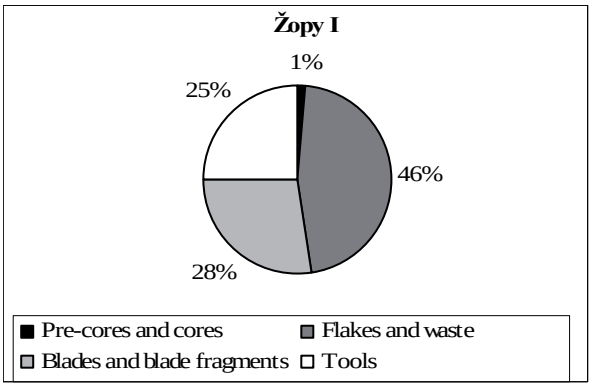
Laboratory Bln-57 Žopy (Breunig 1987, 123; Gronenborn 1997, 169)
Dating BP: 6430 ± 100
68.3 % confidence
cal BC 5440 – 5280 (1.00)
95.4 % confidence
cal BC 5570 – 5550 (0.02)
5530 – 5210 (0.97)
5170 – 5140 (0.02)

Blank groups	Total	%	Blanks	Tools
Pre-cores and cores	2	2.6	1	1
Flakes and waste	47	61.8	35	12
Blades and blade fragments	27	35.6	21	6
Total	76	100	57	19

Table 285. Žopy I, phase I of the LBK. Chipped stone artefacts divided into basic blank groups.

Feature	Year	No. of pieces
"hut"	1954	73
pits No. 1 and No. 2	1959	3
		76

Table 286. Žopy I, phase I of the LBK. Proportion of chipped stone artefacts (> 12 mm) by archaeological feature.



Basic morphological groups	Total	%
Pre-cores and cores	1	1.3
Flakes and waste	35	46.1
Blades and blade fragments	21	27.6
Tools	19	25
Total	76	100

Table 287. Žopy I, phase I of the LBK. Proportion of chipped stone artefacts by basic morphological groups.

Blank groups	No. of pieces	Weight (g)	Avg (g)
Pre-cores and cores	2	56	28
Flakes and waste	47	268.7	5.7
Blades and blade fragments	27	18.8	0.7
Total	76	343.5	4.5

Table 288. Žopy I, phase I of the LBK. Weight of chipped stone artefacts.

Raw material	Artefacts > 12 mm	%	Distance
Krakow Jurassic silicite	48	63.1	170–180 km
Szentgál radiolarite	8	10.5	230–250 km
Úrkút-Eplény radiolarite	2	2.7	
Hárskút radiolarite	1	1.3	
Erratic silicite (+ 1 burnt)	5	6.6	40–50 km
Erratic silicite or Krakow Jurassic silicite	4	5.3	
Limnosilicite ?	3	3.9	130 km
Quartz	2	2.7	
Krumlovský Les I chert	1	1.3	90–100 km
Green schist ?	1	1.3	80 km
Burnt	1	1.3	
Total	76	100	

Table 289. Žopy I, phase I of the LBK. Proportion of raw materials, including varieties and distance to outcrops.

Raw material	No. of pieces	Cores	Flakes	Blades	Tools
Krakow Jurassic silicite	48	1	24	11	12
%	100	2,1	50	22.9	25
Radiolarit-pohoří Bakony	11	–	5	2	4
Erratic silicite (+ 1 burnt)	5	–	3	2	–
Erratic silicite or Krakow Jurassic silicite	4	–	1	2	1
Limnosilicite ?	3	–	1	2	–
Quartz	2	–	–	–	2
Krumlovský Les I chert	1	–	–	1	–
Green schist ?	1	–	1	–	–
Burnt	1	–	–	1	–
Total	76	1	35	21	19

Table 290. Žopy I, phase I of the LBK. Proportion of raw materials in the basic morphological groups.

Pre-cores and cores	Blanks	Tools	Total
Unworked raw material	–	–	–
Pre-cores	–	–	–
Cores	–	1	1
Splintered pieces	1	–	1
Core fragments	–	–	–
Total	1	1	2

Table 291. Žopy I, phase I of the LBK. Pre-cores and cores.

them were found in the features dating to the earliest Ia phase of the LBK (Tichý 1962, 287–289). 18 artefacts come from pit No.13, dating from phase II (Tichý 1962, 268). The artefacts from mixed or undatable features were not included in this study.

11.15.3.1. Nearest outcrops of appropriate raw materials

The nearest and most accessible raw material appears to be the erratic silicite occurring at a distance of 40 km north-east of the settlement (about 10 km north of Hranice na Mor.).

11.15.3.2. Chipped stone industry at the settlement of Žopy I

Most chipped stone artefacts were found in 1954, during the investigation of the so-called "hut" by J. Pavelčík (1955). In total, there are 73 artefacts (**table 286**). A further three artefacts come from pits No. 1 and 2 (Dohnal 1964). This

Cores	Raw material	Type of blanks	No. of platforms	Shape	Platform preparation	Dorsal reduction	Platform angle	Height	Width	Thickness	Weight	Tools
1	Krakow Jurassic	blade-flake core	single	prismatic	–	–	–	39	28	31	42	hammerstone
2	Krakow Jurassic	former blade-flake core	–	splintered piece	–	–	–	27	30	20	14	–

Table 292. Žopy I, phase I of the LBK. Cores.

Type of flake	No. of pieces	%	Krakow Jurassic	Bakony rad.	Flakes	Tools
Preparation flake	25	53.2	17	4	19	6
Blade-like flake	1	2.1	1	–	–	1
Splintered flake	3	6.4	2	1	3	–
Crested flakes and secondary crested flakes.	1	2.1	–	1	1	–
Rejuvenation flake from a core's knapping surface	0		–	–	–	–
Rejuvenation flake from a core's striking platform	1	2.1	1	–	1	–
Rejuvenation flake from a core's base	0		–	–	–	–
Primary flake	1	2.1	1	–	–	1
Other technical flake	3	6.4	1	–	–	3
From polished tools	1	2.1	–	–	1	–
Waste	9	19.3	9	1	9	–
Natural raw material fragments	2	4.2	2	–	1	1
Total	47	100	34	7	35	12

Table 293. Žopy I, phase I of the LBK. Flakes and waste.

Relative chronology (after Tichý; Tichý 1960; 1962; Čižmář 1998*)*

"hut"/1954 – LBK phase Ia
pit No. 2/1957 – LBK phase I
pit No. 13/1957 – LBK phase II
pit No. 1/1959 – LBK phase I
pit No. 2/1959 – LBK phase I

11.15.3. Chipped stone industry

During the archaeological excavations in Žopy, a total of 138 pieces of chipped stone had been recovered. 76 of means that 76 artefacts were analysed as a unit dating from the early Ia phase of the LBK (**tables 285 & 287**). Among the production categories, flakes and waste predominate with 61.8 %. The ratio of blades and blade fragments is also relatively high – 35.6 %.

11.15.3.2.1. Raw material
The range of raw materials in the early phase is very varied. This makes it distinctly different from the raw materials used in the production of a small assemblage of chipped artefacts in the later phase. In both phases (Ia and II), Krakow Jurassic silicite may be predominant, but in the early phase it is accompanied by a considerable ratio of raw materials of south-western and mainly south-eastern origin

Surface of flakes and flake tools	No. of pieces	%	Krakow Jurassic	Erratic silicite	Bakony rad.	Other
Cortical	3	6.4	–	1	–	2
Partly cortical	16	34	11	1	4	–
Partly cortical – polished	1	2.1	–	–	–	1
Without cortex	27	57.5	20	1	3	3
Total	47	100	31	3	7	6

Table 294. Žopy I, phase I of the LBK. Degree of preservation of natural surface on flakes including retouched tools.

(**tables 289 & 290**). However, a comparison with the later phase could be misleading, as the entire material comes from only one feature. On the other hand, similar differences can also be detected at other sites (e. g. Vedrovice "Za dvorem" and Vedrovice "Široká u lesa" – settlement).

In Žopy I, more than half of the chipped stone artefacts are made of Krakow Jurassic silicite (63.2 %). Its primary outcrops are situated about 170–180 km away from the site. Krakow Jurassic silicite also predominates in the early phase of the settlements of Mohelnice and Kladníky (Mateiciucová 2000).

Contacts towards the south-east are illustrated above all by the Transdanubian radiolarites (14.5 %). Alongside Szentgál radiolarite (eight pieces), further varieties occurred – the Hárskút type (one piece) and the Úrkút-Eplény type (two pieces)[121]. They all come from the Bakony mountains north of Lake Balaton, from a distance of 230–250 km. The limnosilicites of milky-white to yellow-white colour (three pieces) also have a south-eastern origin. Such colour tones occur in the Žiarska Basin in south Slovakia (ca 130 km), as well as in the Tokay mountains (300–320 km) in north-east Hungary. In the Mátra mountains in northern Hungary (230–250 km) on the other hand, limnosilicites of more red and violet colours are more common. They are less homogeneous (Biró & Dobosi 1991).

A connection with south-west Moravia is indicated by an artefact of KL I chert (90–100 km) and by a flake detached from a polished axe probably made of green schist, the primary outcrops of which are known from the vicinity of Želešice (ca 80 km) south of Brno.

Erratic silicite, the sources of which can be regarded as the nearest and most accessible (ca 40 km), remains marginal (only five pieces – 6.6 %). In contrast, in Bylany erratic silicite predominates in the early phase of the LBK, although it is transported from a distance of more than 100 km. Only in later phases does Krakow Jurassic silicite come to dominate (Přichystal 1985, 483; Lech 1989a).

Four artefacts could not be definitely classified as either erratic silicite or Krakow Jurassic silicite.

Two pieces of quartz detached from a hammerstone may come from local fluvial gravels.

11.15.3.2.2. Pre-cores and cores

The chipped stone assemblage contained just two cores, one of them further used as a hammerstone (**tables 291 & 292**). Both are made of Krakow Jurassic silicite, thus revealing in what form this raw material reached the settlement. As in other settlements of the LBK, the material here had been transported in the form of prepared, unused cores. Both cores are considerably exhausted. On the core used later as a hammerstone, which I designated as single-platform core of prismatic shape, blade-flake negatives resulting from the exploitation of blanks can be identified. As the core was subsequently used as a hammerstone, the original platform preparation became obscured. The second core may also originally have served for producing blade and blade-flake blanks, but after the blanks were exploited some tiny sharp flakes were detached from it using the splintering technique (**fig. 39: 3**).

Generally, production was oriented towards the manufacture of blade and flake blanks from single-platform cores. Before being exploited, the cores were adjusted by crest preparation. Blade platform remnants indicate that the core platform was adjusted by primary faceting.

11.15.3.2.3. Flakes and waste

A total of 47 pieces falls into this category (including 12 tools; **table 293**). Most of them are manufactured from Krakow Jurassic silicite (31 pieces). Alongside common flakes related to core preparation and exploitation, there are also some technical flakes, which better illustrate the way of core preparation and the technology of blank production. Among the flakes of Krakow Jurassic silicite there was one primary flake. This kind of flake is mostly produced during the initial phase of raw material working. Its detachment creates the so-called primary striking surface, which in turn serves as the original striking surface for additional core preparation or as the platform of a core already prepared for the production of blanks. Furthermore, a flake rejuvenating the core platform was found. Two flakes of Krakow Jurassic silicite were produced using the splintering technique. A total of 11 flakes of Krakow Jurassic silicite were partly covered with cortex.

Among the flakes of Transdanubian radiolarite (seven pieces) there was one crested flake, which can indicate the crest adjustment of the leading edge of a core. One flake comes from a splintered piece (**fig. 40: 11**). On four artefacts of this raw material there was at least a partly preserved cortex (**table 294**).

The assemblage also included a flake detached from a polished stone implement (**fig. 39: 6**). This could be an accidental by-product of the polished tool's secondary use e. g. as a chisel. However, the flake bears traces of use wear[122]. Using polished stone to produce chipped artefacts is also documented at the late LBK settlement of Asparn-Schletz in Lower Austria, where even a flake with sickle gloss was found.

121 For the determination of particular radiolarite types from the Bakony mountains, I thank K.T. Biró from the National Museum in Budapest.

122 I do not know whether more such flakes were originally found in Žopy, as it is a very old excavation where the material recovered had already been divided into pottery, polished and chipped stone industry. Therefore it is likely that this flake of a polished implement was in fact found accidentally.

Length	No. of pieces	Min (mm)	Max (mm)	Avg (mm)	StDev (mm)
Flakes	19	15	33	23.1	5.83
Flake tools	7	15.5	54	30.3	13.01

Table 295. Žopy I, phase I of the LBK. Length of preparation and blade-like flakes (including flake tools).

Width	No. of pieces	Min (mm)	Max (mm)	Avg (mm)	StDev (mm)
Flakes	19	11	33.5	22.2	6.81
Flake tools	7	13	59	26.4	15.32

Table 296. Žopy I, phase I of the LBK. Width of preparation and blade-like flakes (including flake tools).

Thickness	No. of pieces	Min (mm)	Max (mm)	Avg (mm)	StDev (mm)
Flakes	19	3	11	5.7	2.48
Flake tools	7	5	16	10.1	3.81

Table 297. Žopy I, phase I of the LBK. Thickness of preparation and blade-like flakes (including flake tools).

11.15.3.2.4. Blades and blade fragments

The assemblage contained 27 pieces of blades and blade fragments (including six blade tools; **tables 298 & 299**). Half of them are made of Krakow Jurassic silicite.

Only one blade made by splintering technique was preserved in its entirety (**fig. 39: 4**). Mostly, the blades were found with a broken off or unpreserved terminal part (nine pieces – including two tools); furthermore, there were basal fragments (seven pieces – two tools) and mesial blade fragments (four pieces – two tools).

A platform remnant was preserved on 18 blades. In 12 cases it was prepared by primary faceting (**fig. 40: 1,2**), in three cases it was adjusted by several blows, two platform remnants were designated as plain and one as punctiform (**table 302**). Dorsal reduction of a platform remnant did not occur.

On a blade made of KL I chert some remains of pitch were detected, probably of so-called birch tar (Germ. *Birkenpech*; Weiner 1988). This is the only KL I chert blade in Žopy Ia. Together with the traces of tar on its surface, this may point to a tool (knife?) which may have been brought to the settlement in a finished form.

Type of blade	Blade blanks	Blade tools
Whole blade	–	–
Blade with broken off terminal part	8	2
Blade with broken off basal part	2	–
Blade with broken off terminal and basal part	2	–
Basal fragment of a blade	5	2
Mesial fragment of a blade	2	2
Terminal fragment of a blade	1	–
Whole crested blade	–	–
Fragment of a crested blade	–	–
Whole secondary crested blade	–	–
Fragment of a secondary crested blade	–	–
Splintered blade	1	–
Total	21	6

Table 298. Žopy I, phase I of the LBK. Blades and blade fragments.

Surface of blades and blade tools	No. of pieces	Krakow Jurassic	Erratic silicite	Bakony rad.	Other
Cortical	0	–	–	–	–
Partly cortical	3	–	1	1	1
Without cortex	24	15	1	3	5
Total	27	15	2	4	6

Table 299. Žopy I, phase I of the LBK. Degree of preservation of natural surface on blades including retouched tools.

Width	No. of pieces	Min (mm)	Max (mm)	Avg (mm)	StDev (mm)
Blades	12	7.5	19.5	12	4.15
Blade tools	2	9	10	9.5	0.7

Table 300. Žopy I, phase I of the LBK. Width of whole finished blades, blades with broken off terminal part, basal part, terminal and basal parts.

Thickness	No. of pieces	Min (mm)	Max (mm)	Avg (mm)	StDev (mm)
Blades	13	2	7	4	1.41
Blade tools	4	2.5	5	3.9	1.11

Table 301. Žopy I, phase I of the LBK. Thickness of finished blades with preserved basal part.

Platform remnant / Dorsal reduction	Total yes	Total no	Krakow Jurassic yes	Krakow Jurassic no	Erratic silicite yes	Erratic silicite no	Bakony rad. yes	Bakony rad. no
Unprepared	0		0		0		0	
Plain	0	2	0	1	0		0	
Prepared by several blows	0	3	0	1	0	1	0	1
Punctiform	0	1	0	1	0		0	
Primarily facetted	0	12	0	6	0	1	0	2
Dihedral	0		0		0		0	
Secondary prepared	0		0		0		0	
Total	18		9		2		3	

Table 302. Žopy I, phase I of the LBK. Platform remnants and dorsal reduction of blades and blade tools.

Type of tools	Total	Cores	Flakes	Blades
Endscrapers	4	–	4	–
Truncated blades	1	–	–	1
Blades with lateral retouch	1	–	–	1
Retouched flakes	1	–	1	–
Borers, perforators and becs	–	–	–	–
Notches and denticulates	1	–	1	–
Sidescrapers	2	–	2	–
Trapezes	1	–	–	1
Other microliths	–	–	–	–
Splintered pieces	–	–	–	–
Combination tools	2	–	1	1
Hammerstones	4	1	3	–
Tool fragments	2	–	–	2
Total	19	1	12	6

Table 303. Žopy I, phase I of the LBK. Tool classification by blank types.

11.15.3.2.5. Raw material transport

What can we say about the form in which raw material was transported? Krakow Jurassic silicite most probably reached

Type of tools	Total	%	Krakow Jurassic	Bakony rad.	Other
Endscrapers	4	21	3	1	
on a flake	1		1		
thumbnail	1		1		
high	1		1		
circular	1			1	
Truncated blades	1	5.3	1		
oblique straight	1		1		
Burins	0				
Blades with lateral retouch	1	5.3		1	
bilateral discontinuous	1			1	
Retouched flakes	1	5.3			1 (erratic sil. or Krakow Jurassic)
Borers, perforators and becks	0				
Notches and denticulates	1	5.3	1		
"Clactonian" notch			1		
Sidescrapers	2	10.5	2		
convex	1		1		
pointed	1		1		
Trapezes	1	5.3		1	
short – dorsal retouch + dorsal retouch on a break/ notch fragment	1			1	
Other microliths	0				
Splintered pieces	0				
Combination tools	2	10.5	1	1	
endscraper – denticulates	1			1	
notch fragment – transverse burin	1		1		
Hammerstones	4	21	2		2
hammerstone – from a core	1		1		
hammerstone fragment	3		1		2 (quartz)
Tool fragments	2	10.5	2		
Total	19	100	12	4	3

Table 304. Žopy I, phase I of the LBK. Tool types and their raw materials.

the settlement in form of prepared unexploited cores, as indicated by the presence of cores and technical flakes, as well as by the artefacts covered with cortex. The occurrence of a primary flake of Krakow Jurassic silicite can also point to transport of raw material in an early stage of preparation.

On the other hand, the blade of KL I chert with traces of tar from hafting could have reached the settlement as a finished tool.

11.15.3.2.6. Tools

A total of 19 artefacts (25 %) were classified as tools. The implements are mostly made on flake blanks (nine pieces; **table 303**). Three flake fragments from hammerstones also formally belong to this category. Six tools were manufactured on blade blanks. The vast majority of implements was made from Krakow Jurassic silicite (12 pieces; **table 304**). Four tools are manufactured from radiolarite from the Bakony mountains.

Most abundant are the endscrapers (four pieces) made on flakes. Among them, short types (thumbnail and round endscraper), known also from the settlements of Brunn IIa and Brunn IIb, (**fig. 39: 1; fig. 40: 5, 7, 8, 10**) occur. There was also one blade endscraper (in combination with denticulates). Besides endscrapers, several hammerstones are also documented (a core hammerstone and three fragments). The other tool types appeared only as single pieces. A transverse burin in combination with a notch fragment indicates the way of snapping blades – by retouching a notch and breaking (**fig. 40: 3**). This was also recorded on a trapeze made of Szentgál radiolarite. It is a short trapeze with dorsal retouch on one end and the remnant of a dorsally retouched notch on the other end (**fig. 40: 4**). Borers and perforators are absent.

11.15.3.2.7. Artefacts with sickle gloss

There are no specimens with sickle gloss among the studied artefacts.

11.15.3.2.8. Summary

It appears that a very wide range of raw materials was utilised at the Žopy I settlement. Krakow Jurassic silicite dominates, but the ratio of Transdanubian radiolarites is also not negligible. Blades with platform remnant adjusted by primary faceting predominate. One single trapeze occurred. There were no borers/perforators and no artefacts with sickle gloss.

11.15.3.3. Chipped stone industry at the settlement of Žopy II

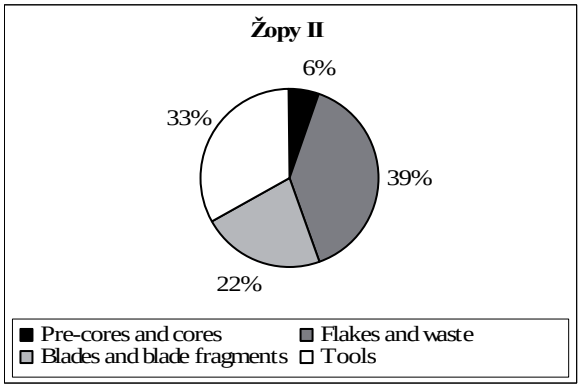
In total, 18 pieces of chipped stone were found in feature No. 13, investigated by R. Tichý in 1957. On the basis of pottery dating, the feature was assigned to phase II of the LBK (**tables 305 & 306**).

11.15.3.3.1. Raw material

All artefacts but one were manufactured from Krakow Jurassic silicite (**table 308**). The single piece was made of erratic silicite. There are no raw materials which could originate from southern or south-eastern regions, unlike in the phase Ia features at Žopy, where raw materials from Transdanubia are present. However, this is just one single feature.

Blank groups	Total	Blanks	Tools
Pre-cores and cores	2	1	1
Flakes and waste	9	7	2
Blades and blade fragments	7	4	3
Total	18	12	6

Table 305. Žopy II, phase II of the LBK. Chipped stone artefacts divided into basic blank groups.



Basic morphological groups	Total
Pre-cores and cores	1
Flakes and waste	7
Blades and blade fragments	4
Tools	6
Total	18

Table 306. Žopy II, phase II of the LBK. Proportion of chipped stone artefacts by basic morphological groups.

Blank groups	No. of pieces	Weight (g)	Avg (g)
Pre-cores and cores	2	233.6	116.8
Flakes and waste	9	45.8	5.1
Blades and blade fragments	7	20	2.9
Total	18	299.4	16.6

Table 307. Žopy II, phase II of the LBK. Weight of chipped stone artefacts.

11.15.3.3.2. Pre-cores and cores

There were two cores in the feature, one of them used as hammerstone after being exhausted (**tables 309 & 310**). Both are made of Krakow Jurassic silicite.

One was classified as irregular core originally serving for the manufacture of blade blanks. Because of its later use as hammerstone, the platform preparation was not identifiable. On the fragment of a single-platform blade-flake core, the way of platform preparation was equally not identifiable.

11.15.3.3.3. Flakes and waste

A total of eight artefacts falls into this category (including two tools; **table 311**). All are made of Krakow Jurassic silicite. There are no technical flakes found.

Raw material	No. of pieces	Cores	Flakes	Blades	Tools	Distance
Krakow Jurassic silicite	17	1	7	4	5	170–180 km
Erratic silicite	1	–	–	–	1	40–50 km
Total	18	1	7	4	6	

Table 308. Žopy II, phase II of the LBK. Proportion of raw materials in the basic morphological groups and the distance of outcrops.

Pre-cores and cores	Blanks	Tools	Total
Unworked raw material	–	–	–
Pre-cores	–	–	–
Cores	–	1	1
Splintered pieces	–	–	–
Core fragments	1	–	1
Total	1	1	2

Table 309. Žopy II, phase II of the LBK. Pre-cores and cores.

One artefact was completely and two others were partially covered with cortex (**table 312**).

11.15.3.3.4. Blades and blade fragments

Seven pieces (including three tools) were classified as blade blanks (**tables 316 & 317**). Except for one blade tool (burin) made from erratic silicite, all other pieces were manufactured from Krakow Jurassic silicite. Three blades remained complete (one was of erratic silicite). Two are 39.5 and 40 mm long respectively. The third was manufactured by splintering technique. The fragment of a secondary crested blade points to the crest preparation of a core.

On four blade blanks there was a preserved platform remnant, in three cases adjusted by primary faceting without dorsal reduction. On the blade coming from a splintered piece, a punctiform platform remnant with dorsal reduction was detected (**table 321**).

11.15.3.3.5. Raw material transport

The presence of cores and the ratio of flakes and cortical blades indicate that Krakow Jurassic silicite could have been transported to the settlement in the form of prepared cores.

11.15.3.3.6. Tools

Six out of 18 artefacts were additionally modified, which is a relatively high ratio.

Three of them were made on blade blanks, two on flakes and one – the hammerstone – from a core (**table 322**).

All the implements, with the exception of one blade burin, are made of Krakow Jurassic silicite. The burin is manufactured from erratic silicite and is the only artefact of this raw material in the whole assemblage.

Besides a hammerstone and a burin on natural edge, a low bec, a convex sidescraper, a retouched notch and a fragment of a retouched notch on a break in combination with sickle gloss could also be identified. There were no endscrapers, truncated blades, borers, perforators or trapezes.

Cores	Raw material	Type of blanks	No. of platforms	Shape	Platform preparation	Dorsal reduction	Platform angle	Výška	Width	Thickness	Weight	Tool
1	Krakow Jurassic	blade core?	–	–	–	–		54	58	35	160	hammerstone
2	Krakow Jurassic	blade-flake core	single	core fragment	–	–	right	63	40	26	73,6	no

Table 310. Žopy II, phase II of the LBK. Cores.

Type of flake	No. of pieces	Krakow Jurassic	Flakes	Tools
Preparation flake	6	6	5	1
Blade-like flake	1	1	–	1
Splintered flake	1	1	1	–
Technical flakes	0	–	–	–
Waste	1	1	1	–
Natural raw material fragments	0	–	–	–
Total	9	9	7	2

Table 311. Žopy II, phase II of the LBK. Flakes and waste.

Surface of flakes and flake tools	No. of pieces	Krakow Jurassic
Cortical	1	1
Partly cortical	2	2
Without cortex	6	6
Total	9	9

Table 312. Žopy II, phase II of the LBK. Degree of preservation of natural surface on flakes including retouched tools.

Length	No. of pieces	Min (mm)	Max (mm)	Avg (mm)	StDev (mm)
Flakes	5	20	32	24.8	4.44
Flake tools	2	30	34	32	2.83

Table 313. Žopy II, phase II of the LBK. Length of preparation and blade-like flakes (including flake tools).

Width	No. of pieces	Min (mm)	Max (mm)	Avg (mm)	StDev (mm)
Flakes	5	22	41	29.2	7.73
Flake tools	2	16	30	23	9.9

Table 314. Žopy II, phase II of the LBK. Width of preparation and blade-like flakes (including flake tools).

Thickness	No. of pieces	Min (mm)	Max (mm)	Avg (mm)	StDev (mm)
Flakes	5	4.5	8	6.7	1.3
Flake tools	2	8	21	14.5	9.19

Table 315. Žopy II, phase II of the LBK. Thickness of preparation and blade-like flakes (including flake tools).

Type of blade	Blade blanks	Blade tools
Whole blade	2	–
Blade with broken off terminal part	–	1
Blade with broken off basal part	–	–
Blade with broken off terminal and basal part	–	1
Basal fragment of a blade	–	–
Mesial fragment of a blade	–	1
Terminal fragment of a blade	–	–
Whole crested blade	–	–
Fragment of a crested blade	–	–
Whole secondary crested blade	–	–
Fragment of a secondary crested blade	1	–
Splintered blade	1	–
Total	4	3

Table 316. Žopy II, phase II of the LBK. Blades and blade fragments.

11.15.3.3.7. Artefacts with sickle gloss

One sickle blade with broken off basal and terminal parts made of Krakow Jurassic silicite occurred in the feature. A notch fragment on one end indicates that the blade was snapped by retouching a notch and then breaking it. However, it cannot be excluded that it is simply a retouch after breaking the blade.

11.15.3.3.8. Summary

Imported platform remnants by far predominate in this feature dating from the middle phase of the LBK culture. Neither borers/perforators nor trapezes were found here.

Surface of blades and blade tools	No. of pieces	Krakow Jurassic
Cortical	–	–
Partly cortical	2	2
Without cortex	2	2
Total	4	4

Table 317. Žopy II, phase II of the LBK. Degree of preservation of natural surface on blades including retouched tools.

Length	No. of pieces	Min (mm)	Max (mm)	Avg (mm)	StDev (mm)
Blades	2	39.5	40	39.75	0.35
Blade tools	–	–	–	–	–

Table 318. Žopy II, phase II of the LBK. Length of whole finished blades and blade tools.

Width	No. of pieces	Min (mm)	Max (mm)	Avg (mm)	StDev (mm)
Blades	2	11.5	12	11.75	0.35
Blade tools	2	14	14	14	0

Table 319. Žopy II, phase II of the LBK. Width of whole finished blades, blades with broken off terminal part, basal part, terminal and basal parts.

Thickness	No. of pieces	Min (mm)	Max (mm)	Avg (mm)	StDev (mm)
Blades	2	3	5	4	1.41
Blade tools	1	4	4	4	0

Table 320. Žopy II, phase II of the LBK. Thickness of finished blades with preserved basal part.

Platform remnant / **Dorsal reduction**	**Total** yes	**Total** no	**Krakow Jurassic** yes	**Krakow Jurassic** no	**Erratic silicite** yes	**Erratic silicite** no
Unprepared	0		0		0	
Plain	0		0		0	
Prepared by several blows	0		0		0	
Punctiform	0	1	1	0		
	1		1		0	
Primarily facetted	0	3	0	2	0	1
	3		2		1	
Dihedral	0		0		0	
Secondary prepared	0		0		0	
Total	4		3		1	

Table 321. Žopy II, phase II of the LBK. Platform remnants and dorsal reduction of blades and blade tools.

Type of tools	Total	Cores	Flakes	Blades
Endscrapers	–	–	–	–
Truncated blades	–	–	–	–
Burins	1	–	–	1
Blades with lateral retouch	–	–	–	–
Retouched flakes	–	–	–	–
Borers, perforators and becs	1	–	–	1
Notches and denticulates	2	–	1	1
Sidescrapers	1	–	1	–
Trapezes	–	–	–	–
Splintered pieces	–	–	–	–
Combination tools	–	–	–	–
Hammerstones	1	1	–	–
Tool fragments	–	–	–	–
Total	6	1	2	3

Table 322. Žopy II, phase II of the LBK. Tool classification by blank types.