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ARCHAEOLOGICAL EXCAVATION OF A MESOLITHIC SETTLEMENT MĚSTEC/OSTROV IN EASTERN BOHEMIA (CZECH REPUBLIC)

ABSTRACT: In 2018 a forager camp site located on the boundary of cadastral territories of Městec and Ostrov in eastern Bohemia was excavated by archaeologists under the auspices of a rescue excavation. The site is situated on an indistinct hillock above the Loučná River in a field called "U Stříbrníku", near Uhersko railway station. During the rescue excavation, a collection of 4982 lithic artefacts was obtained. Another 142 artefacts were collected during surface surveys at the site. Artefacts were excavated mainly from the plough horizon (top soil), where they were redeposited after having been disturbed by ploughing. Despite the disturbed context, it was possible to document an in-situ feature – a lower part of a sunken pit with a diameter of approximately 40 cm, where pine wood charcoal pieces were collected for radiocarbon dating analysis. Absolute dating results obtained from four radiocarbon dates provide an age estimate of 9200 cal BC, which dates this feature to the Preboreal period at the very beginning of the Holocene epoch, when the climate was changing due to a rapid rise in average temperatures. Characteristics of the lithic collection correspond with this dating result. Some attributes are typical for the Late Palaeolithic (tanged tool); however, the collection is essentially Mesolithic. This is indicated by the presence of geometric microliths (triangles) and small-sized, highly exhausted cores. Although we are aware that the strategic position of this site makes it likely that it was settled also at other times, we suggest that the excavated artefacts date mainly to the first half of the Mesolithic period.

KEY WORDS: Rescue archaeological excavation – Forager camp – Lithic industry – Mesolithic – Preboreal radiocarbon dating

1. INTRODUCTION

A Mesolithic site at a location called "U Stříbrníku" was excavated during the period 20 May–31 October 2018. It was a rescue archaeological excavation inside the alignment of proposed highway D35, section 6c (*Figure 1*). The excavation was funded by the Road and Motorway Directorate of the Czech Republic,

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coordinated by the EUROVIA CS Company and it was carried out by the Archaeological Centre Olomouc. A first preliminary report of this excavation was published in the Annual Proceedings of the Archaeological Centre in Olomouc (Mlejnek, Záhorák 2020). In this article we present a description of excavation methods, analyses of the find situation and excavated artefacts.

1.1 Site location and natural characteristics

The site is located on top of a hillock above the Loučná River circa 400 metres in the south-eastern direction from Uhersko railway station (*Figure 1*). The height of the hillock summit is 258 metres above sea level. GPS coordinates of the assumed centre of the site are: 49.9837222 N and 16.0174131 E (WGS 84). The site was discovered during a surface survey conducted by David Vích from the Museum in Vysoké Mýto in 2002 (Archeologická mapa ČR). The presence of lithic artefacts, probably of Mesolithic age, were confirmed before the start of the excavation by finds made by the Museum of Eastern Bohemia (Pardubice branch) archaeologists during their surface survey. David Vích also found Mesolithic artefacts at several similar locations in the general surroundings (see Archeologická mapa ČR). The field name "U Stříbrníku" refers to a nearby spring called "Stříbrník" (Silver Spring), which is located circa 100 metres in the south-eastern direction from the centre of the site in the valley of a stream, which forms the eastern edge of the hillock. This unnamed stream is a left tributary of the Loučná River. The hillock is formed by sandy gravels of the Elsterian (Mindelian) river terrace. On the top of the terrace there is an approximately 30 cm thick plough horizon and the bedrock is formed by sedimentary rocks of the Bohemian Cretaceous Basin (calcareous claystones to clayey limestones and siltstones, Upper to Middle Turonian Age), which crop out at the foot of the hillock (Geological map of the Czech Republic 1 : 50 000, Sheet 14–31 Vysoké Mýto). From a geomorphological point of view, the site is situated in the Bohemian Massif, Bohemian Table, Eastern Bohemian Table, Eastern Elbe Table, Pardubice Basin and Dašice Basin (Demek ed. 2006, MapoMat).

The salvage of the site was necessary due to the proposed construction of D35 highway, which is routed through the hillock where the site is situated. The highway alignment includes the south-western part of the hillock (*Figures 2 and 3*). The actual centre of the archaeological site is situated outside of the highway alignment and therefore it was not excavated. The excavated area of 343 m^2 is intersected by a cadastral boundary of Ostrov (eastern part) and the cadastral territory of Městec (a hamlet in the Chroustovice municipality, western part of the excavated area). Both municipalities (Ostrov and Chroustovice) belong to the Chrudim district in the Pardubice region.

FIGURE 1: Městec/Ostrov. Location of the site on a map of Bohemia (b); location of the site on the map of Uhersko village and its surroundings (a). The site location is marked with a black dot. Source: www.mapy.cz. Processed by O. Mlejnek.

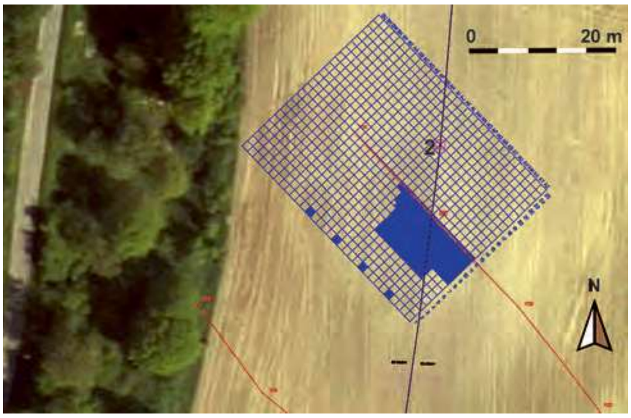


FIGURE 2: Městec/Ostrov. Aerial photograph of the site with a grid overlay. Blue area: excavated squares. 2: Assumed centre of the site based on the surface survey. Red lines: boundaries of the D35 highway alignment. Source of the photograph: www.mapy.cz. Site plan by O. Mlejnek.

2. METHODS

The area was excavated using a coordinate grid. All the sediment was excavated in 1 × 1 m squares in circa 1 cm thick artificial layers, which corresponds to a volume of one 10 litre bucket. All buckets were dry-sieved and subsequently wet-sieved with 2 mm mesh size sieves. The mesh size was determined on the basis of expected size of the lithic finds, especially microlithic tools of Mesolithic age. As most of the artefacts were recovered from secondary positions in the plough horizon, their exact find locations were not recorded. Due to their small size, the majority of them were recovered during wet-sieving. Given the meticulous documentation inside a coordinate grid, it was possible to determine the find positions of all artefacts with an accuracy, which is delimited by a diagonal of a square 1 × 1 m (i. e., $1 \times \sqrt{2}$), and therefore it was possible to carry out spatial analysis.

FIGURE 3: Městec/Ostrov. Aerial view of the excavated site from the south. Photo by E. Peha.

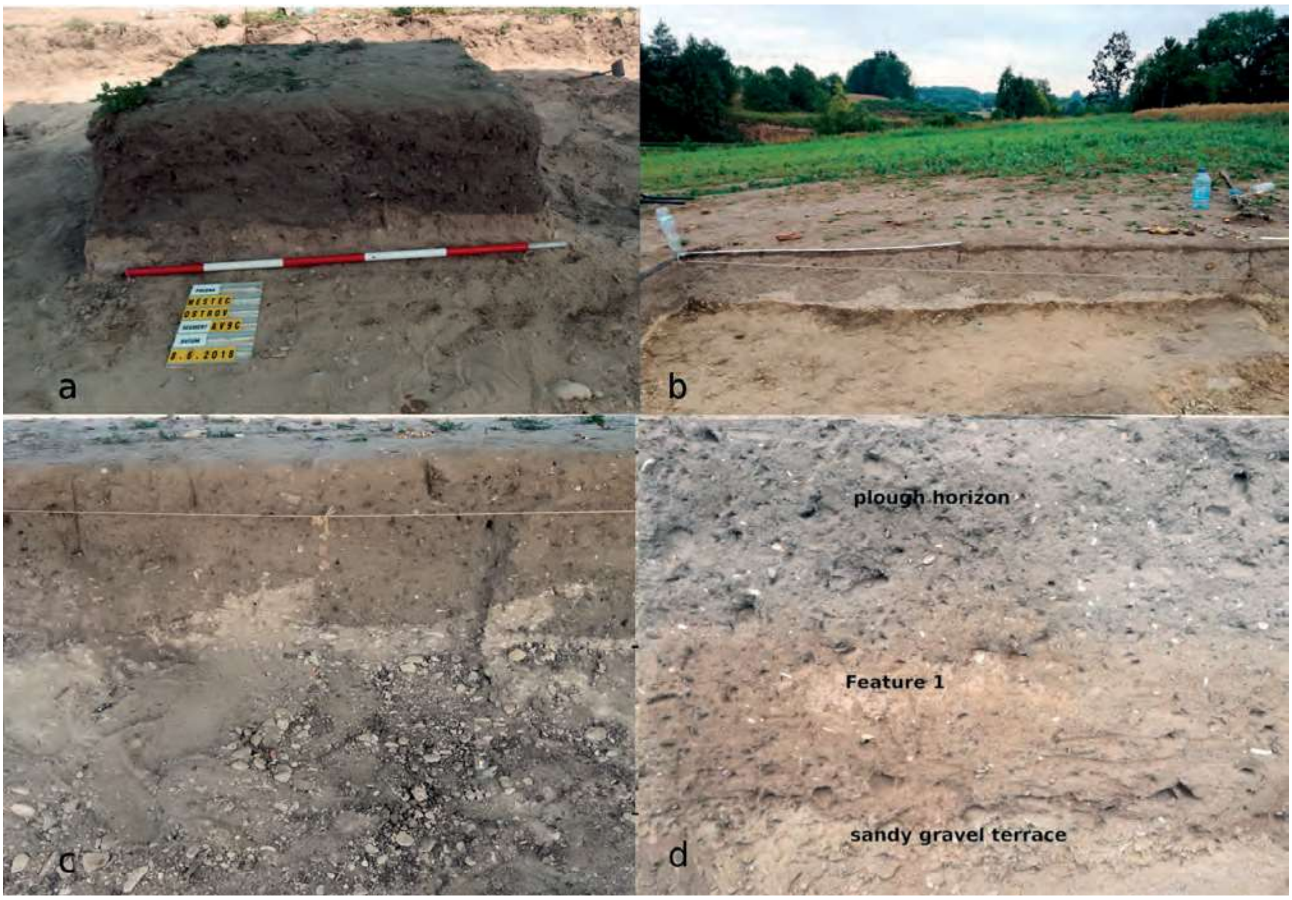


FIGURE 4: Městec/Ostrov. Site stratigraphy. a) general stratigraphy: overlying plough horizon and underlying sandy gravel terrace, b) ploughed sandy gravel terrace, c) detail, d) site stratigraphy in the area of the recently filled depression (Feature 1). Photo by O. Mlejnek and V. Záhorák.

Charcoal was recovered in the same area as the lithics and nine samples were submitted for radiocarbon dating. All samples were taxonomically identified by Romana Kočárová before radiocarbon analysis. While two samples recovered from a recently filled depression (Feature 1) were identified as plum tree (*Prunus* sp.), six samples recovered from a smaller sunken pit (Feature 2) were identified as pine tree (*Pinus sylvestris*). These situations indicate that charcoal from Feature 1 is most probably recently burnt wood, while the charcoal from Feature 2 was most probably prehistoric. Four of the pine charcoal samples were submitted to Debrecen laboratory for radiocarbon dating. Results of the dating are described later in this article. Due to the absence of *in situ* layers, the original intention to sample the excavated sediment for other scientific analyses (such as sediment micromorphology analysis, plant macro-remains analysis, pollen analysis, phytolith analysis etc.) was abandoned. It was assumed that excavated animal bones found at the bottom of Feature 1 (e. g. metatarsal bones of a bovid – *Bos taurus*) are recent due to their find context.

Excavated lithic industry was analysed using E4 (Dibble, McPherron 2002, Oldstone Age Web Page) and MS Access 2003 programmes. Raw material, technological category, percentage of cortex, degree of patination and evidence for burning were recorded for each artefact. Tool type was determined for formal tools (de Sonneville-Bordes, Perrot 1953, Klíma 1956, Kozłowski 1980). For cores, the core type, number of platforms and degree of exploitation were noted. Furthermore, weight and three dimensions were recorded for each artefact (length, width and thickness; see Andrefsky 2005: 146, Fig. 7.1). For complete detached pieces and proximal fragments, the width and thickness of the butt were also measured. Digital callipers TESA (Hexagon company) enabled measurement accuracy to one hundredth of a millimetre. Due to the tiny dimensions of the lithic artefacts, the analysis would not have been possible without the use of a high-quality magnifier Mobilux from the Eschenbach company, which enables 10× magnification of objects and illumination with a LED light. Artefacts with uncertain macroscopic raw material determination were identified by water immersion with the use of a stereomicroscope. A total of 5124 lithic artefacts were analysed. Of this number, 4982 pieces were excavated and the remaining 142 artefacts were collected during surface surveys in close proximity to the excavated area. Due to the much greater number of excavated artefacts in comparison with the number of lithics collected during surface surveys and also for simplification, we have decided to analyse the entire lithic collection as a single assemblage.

3. RESULTS

3.1 Site description and stratigraphy

A 0.5 × 2 m test pit was dug out before the actual excavation to determine the local stratigraphy. Observations of the stratigraphic profile in this test pit suggested simple stratigraphy (*Figure 4*). A sandy gravel Elsterian (Mindelian) river terrace (Loučná River) was underlying a 25–35 cm thick layer of plough soil. Most of the artefacts were located in their secondary position directly in the plough horizon and also on the layer (terrace) surface. For this reason, it was decided to proceed with excavation of the plough horizon (top soil) and the upper 10 cm of the sandy gravel terrace, where artefacts could be expected, in artificial layers. In the northern part of the site, in an area of circa 64 m^2, an additional layer sandwiched between the plough horizon and the underlying terrace was identified (*Figure 4d*). This approximately 30 cm thick layer was interpreted as a natural depression on the terrace surface, which was mechanically levelled during major agricultural works in the 1950s (see *Figure 5*). This interpretation was also based on the fact that apart from the prehistoric lithic industry, this feature also contained recent pottery shards and fragments of iron objects. The large degree of terrain modification during this period can be evidenced, for example, by an approximately two-metre-deep hollow farm road, excavated circa 100 metres to the south of the site, which was completely levelled with surrounding terrain in the 1950s. Furthermore, it is necessary to mention a smaller approximately 30 cm deep pit with a diameter of 40 cm, which was labelled Feature 2. It was filled with a sandy and ashy sediment containing tiny pieces of charcoal (*Figure 6*). The pine (*Pinus silvestris*) charcoal pieces (as determined by R. Kočárová), were sent to the laboratory in Debrecen for radiocarbon dating, resulting in an Early Mesolithic (Preboreal) age. The Feature 2 is probably the only excavated relict of the Early Mesolithic settlement, which has remained preserved due to its depth. The filling of the pit was wet-sieved separately using 1mm mesh size. Apart from tiny charcoal fragments, it did not contain any other plant macroremains, or lithic artefacts.

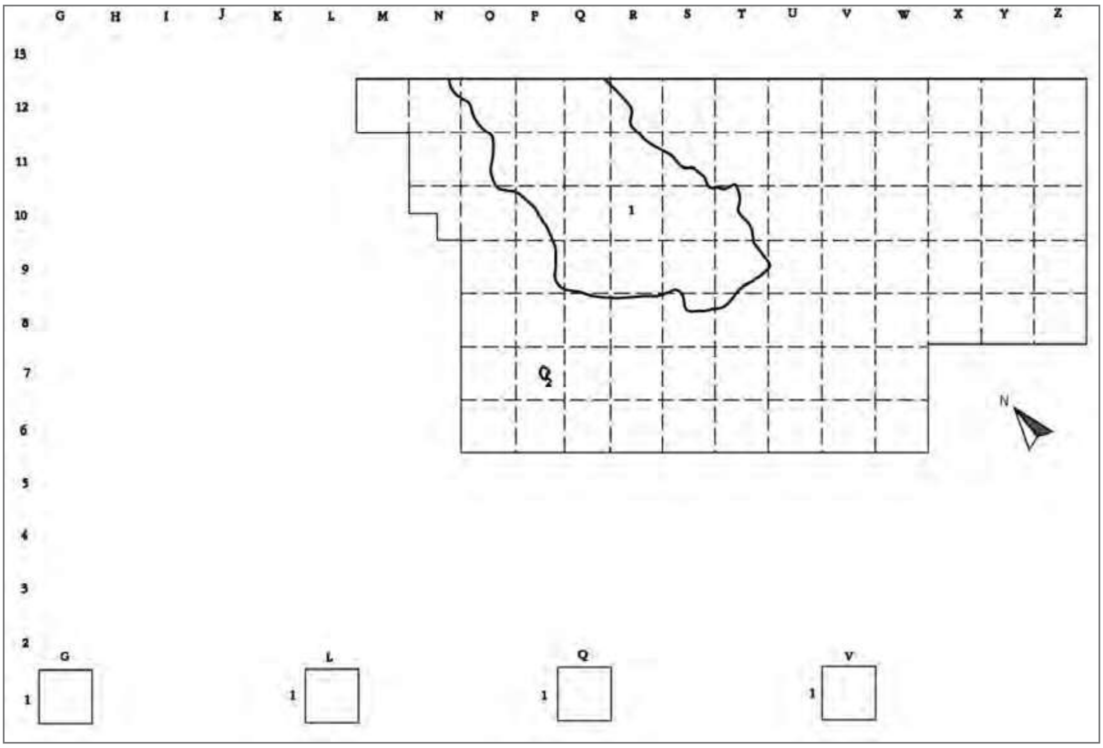


FIGURE 5: Městec/Ostrov. Site plan with locations of features 1 and 2. Drawing by O. Mlejnek and S. Bambasová.

FIGURE 6: Městec/Ostrov. Feature 2 in different stages of excavation. Photo by V. Záhorák.

3.2 Lithic raw materials

Lithic raw materials were identified predominantly macroscopically. Some of the less typical pieces, or rare raw materials, were observed in water immersion under a stereomicroscope and consequently they were contrasted with similar raw materials using a comparative collection (Přichystal 2013: 43–45; *Figures 7-9*). In this manner it was possible to identify raw materials of almost all of the lithic pieces enabling the calculation of raw material proportions in the assemblage (*Tables 1, 3 and 4*). Each lithic piece was also weighed (*Table 2*). It was not possible to identify the raw material for a small number of artefacts (3.4%), for example, for burnt or strongly patinated tiny pieces.

The most common raw material at the site are the Cretaceous spongolites (spiculites) of eastern Bohemia (type Ústí nad Orlicí). The sources of this raw material can be found close by in the Ústí nad Orlicí district (Přichystal 2013: 64–65; *Figures 7A, 7B, 10A, 10B, 10C*). The prevalent majority, i. e. 71.97% of all artefacts were manufactured from this material. Among debitage (detached pieces) it is 73.11% and in formal tools the proportion rises to 74.73%. In its typical forms these spongolites appear as laminar silicites of pale blueish grey colour (*Figures 7A, 10A*). When weathered, colours vary from honey-brown to reddish (*Figures 8B, 11B*). In this form it is not possible to distinguish them from similar Moravian spongolites which outcrop on the Velký Chlum and Malý Chlum hills near Bořitov (Přichystal 2013: 82–84). Although K. Čuláková (2015: 141–142) mentioned that it is possible to distinguish spongolites of the Ústí nad Orlicí type from the spongolites in the Bořitov area, based on our experience, this is only possible in some typical cases. Therefore, for the raw material analysis at this site, we have defined two different categories of spongolite. First category is "typical spongolite of the Ústí nad Orlicí type" and the second one is "weathered spongolite of the Ústí nad Orlicí site, or spongolite from the Bořitov area". It is highly probable that spongolites from Bořitov are present in the analysed assemblage, however, it is not possible to determine their numbers. The second group, which comprises weathered honey-coloured spongolites of the Ústí nad Orlicí type and probably also spongolites from the Bořitov area, accounts for 13.45% of all artefacts, which is 18.7% of all the spongolites.

Cretaceous spongolites of Eastern Bohemia (Ústí nad Orlicí type) are typically low-quality raw materials, pale-blue in colour, usually appearing at outcrops in thick slabs 5–8 cm thick (Čuláková 2015: 138). A common feature of this raw material is cubical disintegration, which can be observed on the outcrop surfaces

TABLE 1: Městec/Ostrov. Proportion of particular raw materials in the assemblage.

Raw materials	Number of artefacts	Percentage
Spongolites (Spiculites)	3687	71.97
Quartz	509	9.94
Silicites (flints) from glacigene sediments	292	5.7
Rock crystal	204	3.98
Quartz/Rock crystal	79	1.54
Jasper	68	1.33
Orthoquartzite, type Bečov	38	0.74
Chalcedone weathering products of serpentinites	17	0.33
Radiolarite	14	0.27
Orthoquartzite, type Skršín	12	0.23
Porcellanite	10	0.2
Other raw materials	32	0.63
Undetermined pieces	161	3.14
Total	**5123**	**100**

(Přichystal 2013: 64). The quality varies and some lithic pieces have a greater chalcedony content, and such pieces were used for the production of tiny microliths. Observations under the microscope confirmed the presence of greenish grains of glauconite (*Figure 10C*). Spongolite of the Ústí nad Orlicí type was identified in the eastern Bohemian lithic assemblages by K. Žebera. It was described by S. Vencl (1990) and later in greater detail by A. Přichystal (2009: 58–59, 2013: 64–65). It was possibly utilised on occasions as early as the Late Palaeolithic (Moník 2014: 132). Its regular use in eastern Bohemia has been documented in the Mesolithic period (Vencl, 1992, Čuláková, 2015: 138). In the later period of agricultural prehistory, it was used less frequently. In the Early Modern Period it was occasionally used for the production of striking flints (Čuláková 2015: 139). Therefore, it can be concluded, that the use of the Ústí nad Orlicí spongolite is not exclusive to the Mesolithic, although its greatest use occurred during this period. At Městec/Ostrov, it was probably transported in the form of pre-cores from its primary outcrops situated approximately 20 km to the east. This could be the reason why unworked raw material pieces and cortical flakes were so scarce at the site.

Silica minerals account for 15.46% of all the artefacts, 13.47% of debitage and 1.65% of formal tools. Quartz is the most frequently occurring silica mineral (9.94%; Přichystal 2013: 134–136). Due to its low quality, only flakes and flake fragments were manufactured from this material (e. g. *Figure 7E*). Rock crystal was also used (3.98%; Přichystal 2013: 136–144). Rock crystal and quartz can be collected as small pebbles directly at the site in the sandy gravel terrace. Rock crystal attracted the attention of prehistoric foragers presumably due to its aesthetic qualities, although it is not an easily worked material. Numerous rock crystal flakes and eight tiny cores were found during the excavation (e. g. *Figure 7D*). The possibility that the larger pieces of rock crystal were imported from its primary outcrops in the Bohemian-Moravian Highlands (Přichystal 2013: 140) or in Silesia (Bobak 1997, Přichystal 2013: 142) cannot be excluded. Rock crystal is a transparent variety of quartz and therefore it is not surprising that 79 excavated lithic artefacts (1.54% of all lithics) were made of a transitional material (i.e., between rock crystal and quartz; e. g. *Figure 8F*).

The third most common raw material at the site are high quality silicites of glacigenic or glacial sediments (erratic silicites, mainly flint) imported from moraines

TABLE 2: Městec/Ostrov. Raw material percentages according to weight.

Raw materials	Weight (gr)	%	Average weight of artefacts (gr)	Weight compared to the average weight of all artefacts (%)
Spongolites (Spiculites)	7836.33	84.44	2.13	117.68
Quartz	448.89	4.84	0.88	48.62
Rock crystal	121.2	1.31	0.59	32.6
Quartz/rock crystal	66.73	0.72	0.84	46.41
Silicites (flints) from glacigenic sediments	532.36	5.74	1.82	100.55
Jasper	60.73	0.65	0.89	49.34
Orthoquartzite, type Bečov	20.07	0.22	0.53	29.28
Chalcedony weathering products of serpentinites	16.25	0.18	0.96	53.04
Radiolarite	21.89	0.24	1.56	86.39
Orthoquartzite, type Skršín	11.17	0.12	0.93	51.38
Porcellanite	22.18	0.24	2.22	122.65
Other raw materials	56.14	0.6	1.75	96.69
Unidentified pieces	65.2	0.7	0.4	22.1
Total	**9279.14**	**100**	**1.81**	**100**

of the Pleistocene continental ice sheet north of the Orlické Mountains (Přichystal 2013: 51–54; *Figures 8C, 11E, 11F*). The overall percentage is 5.7 %, 6.79% of detached pieces (debitage) and 17.03% of formal tools. It is possible to distinguish both variants of erratic silicites; the less abundant silicites of Maastrichtian (Uppermost Cretaceous) age (flint *sensu stricto*) as well as prevalent silicites of the Danian (Tertiary) age containing frequent fossil relics of moss animals (*Bryozoa*). In Bohemia, high quality erratic silicites were used as early as the beginning of Lower Palaeolithic and in the Upper and Late Palaeolithic lithic assemblages they often prevail (Vencl 2007a: 117), while Mesolithic foragers usually preferred local raw materials (Vencl 2007b: 148). Therefore, it is possible that the higher proportions of erratic silicites (including several slightly patinated bladelets, blades and a retouched tanged point) could indicate a Late Palaeolithic admixture, or a Late Palaeolithic tradition, although it is true that the erratic silicites representation could be also affected by other factors, such as exchange intensity, movements of the Mesolithic groups etc.

Jasper and related rocks (Přichystal 2013: 146–147; *Figures 9B, 12C–F*) are represented in the assemblage by several pieces. They were probably imported from some of the Bohemian Permian volcanoes (e. g. circa 86 km distant Kozákov massif near Turnov, or another outcrop in the foothills of the Krkonoše Mountains), although their primary outcrops are present also in the Intra-Sudetic Basin in the Kłodsko Valley (Přichystal 2013: 148). Their origin from secondary outcrops, such are, for example, fluvial terraces of the Elbe River, is also possible. Jaspers typical for the Kozákov Hill have been identified, as well as other less common types of jasper and jasperoid pieces. Some jaspers (especially the small pieces) are macroscopically indistinguishable from similarly coloured radiolarites. These two materials are certainly of completely different origins (hydrothermal fillings in the Permian volcanic rocks of northern Bohemia on the one hand versus sedimentary rocks transported for a long distance mainly from the West Carpathians on the other hand). To reduce errors in identification, it was decided to analyse all the jasper and radiolarite artefacts under a stereomicroscope in water immersion. A total of 68 jasper artefacts were identified, which accounts for 1.33% of all the lithics. Only 14 artefacts were made of radiolarite, which constitutes 0.27% of all finds. Mostly they can be attributed to radiolarite of the Vršatské Podhradie type (*Figures 9A, 12A*) whose outcrops are situated near the 185 km distant Vlára Pass, which connects south-eastern Moravia with south-western Slovakia (Přichystal 2013: 120–123). Five artefacts were probably made of reddish radiolarite of the Szentgál type (*Figures 9C, 12B*) with outcrops in the Bakony Mountains in western Hungary (343 km from

TABLE 3: Městec/Ostrov. Raw materials according to particular technological categories. CO: cores, FR: fragments, RM: raw material, DP: detached pieces, FL: flakes, BL: blades, BLD: bladelets, MBLD: microblades.

Raw materials	**CO**	**%**	**FR**	**%**	**RM**	**%**	**DP**	**%**	**Total**	**%**	**FL**	**%**	**BL**	**%**	**BLD**	**%**	**MBLD**	**%**
Spongolites (Spiculites)	128	81.01	913	67.78	9	81.82	2637	73.11	3687	71.97	1536	69.5	94	62.67	674	78.74	333	84.95
Quartz	8	5.06	191	14.18	0	0	310	8.59	509	9.94	257	11.63	7	4.66	37	4.32	10	2.55
Rock crystal	8	5.06	74	5.49	1	9.09	121	3.35	204	3.98	99	4.48	1	0.67	15	1.75	6	1.52
Quartz/Rock crystal	3	1.9	21	1.56	0	0	55	1.53	79	1.54	44	1.99	0	0	7	0.82	4	1.02
Silicites (flints) from glacigenic sediments	7	4.44	39	2.9	1	9.09	245	6.79	292	5.7	122	5.52	27	18	78	9.11	18	4.59
Jasper	2	1.27	22	1.63	0	0	44	1.22	68	1.33	34	1.54	3	2	3	0.35	4	1.02
Orthoquartzite, type Bečov	0	0	5	0.37	0	0	33	0.91	38	0.74	17	0.77	1	0.67	11	1.29	4	1.02
Chalcedony weathering products of serpentinites	0	0	3	0.22	0	0	14	0.39	17	0.33	9	0.41	3	2	2	0.23	0	0
Radiolarite	1	0.63	0	0	0	0	13	0.36	14	0.27	10	0.45	0	0	2	0.23	1	0.26
Orthoquartzite, type Skršín	0	0	1	0.07	0	0	11	0.3	12	0.23	4	0.18	5	3.33	2	0.23	0	0
Porcellanite	0	0	1	0.07	0	0	9	0.25	10	0.2	4	0.18	3	2	2	0.23	0	0
Others	1	0.63	10	0.75	0	0	21	0.59	32	0.63	15	0.68	3	2	3	0.35	0	0
Unidentified pieces	0	0	67	4.98	0	0	94	2.61	161	3.14	59	2.67	3	2	20	2.35	12	3.07
Total	**158**	**100**	**1347**	**100**	**11**	**100**	**3607**	**100**	**5123**	**100**	**2210**	**100**	**150**	**100**	**856**	**100**	**392**	**100**

Městec/Ostrov). This is the most distant import (Přichystal 2013: 129–130). Other Mesolithic sites in eastern Bohemia have produced a small number of pieces of this raw material, for example, Dolní Sloupnice 2 and perhaps also Kornice 1 (Čuláková 2010: 52, 2015: 149). However, both of these localities are surface sites with documented Neolithic occupation. During the Neolithic period, the Szentgál type radiolarite was regularly imported to Bohemia. This raises the possibility that the mostly Mesolithic artefacts at Městec/Ostrov may be admixed with Neolithic artefacts. One artefact was made from pale red radiolarite of unknown origin possessing a smaller number of Radiolaria.

Presence of orthoquartzites of the Bečov and Skršín types from north-western Bohemia (Přichystal 2013: 173–176) is also interesting. They were transported to the site from a distance of over 170 km. Sugar-white orthoquartzite of the Bečov type is slightly more common in this collection (38 artefacts, 0.74%; *Figures 9D, 12E*) compared to yellowish-grey orthoquartzite of the Skršín type of which 12 artefacts were made (0.23%; *Figures 10B, 13F*). Other types of orthoquartzite include two artefacts with a reddish matrix. This raw material could be probably classified as orthoquartzite, also known as sun boulder (sluňák) with outcrops in the area of Drahany Highlands in Moravia (Přichystal 2013: 176–177). However, this type of orthoquartzite appears also at several places in central Bohemia. One other artefact was made of an undefined orthoquartzite, probably of Palaeozoic age. Also, four artefacts were made from chert breccia (Přichystal 2013: 177–178).

Porcellanite is represented by ten artefacts (0.2%, *Figure 9A*). Its outcrop is located on the Kunětická hora Hill in the Pardubice district (Přichystal 2013: 180–182). Its use may have been greater than is now apparent, it is a porous material, more prone to weathering than other raw materials. Its slightly higher magnetic susceptibility can also be used as an identifying characteristic specific to this raw material. Chalcedony weathering products of serpentinites also sometimes have higher magnetic susceptibility (Přichystal 2013: 150–157). These rocks are represented by 17 artefacts

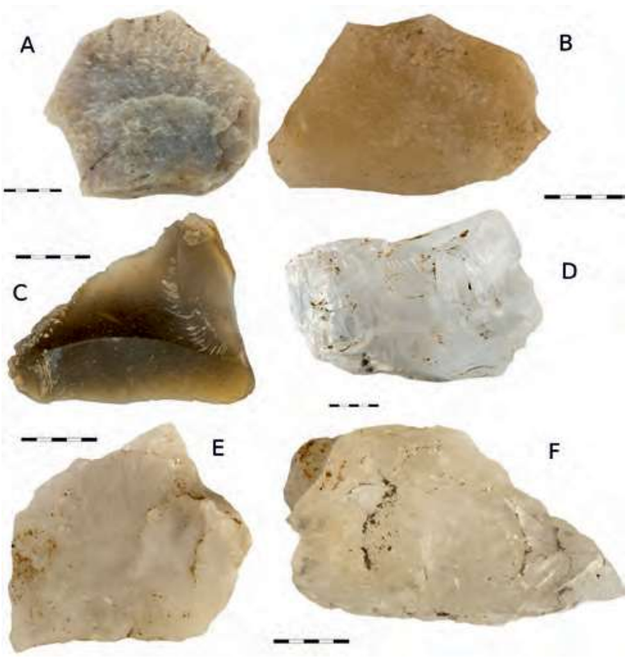


FIGURE 7: Městec/Ostrov. Macrophotographs of artefacts made of selected raw materials. A: Typical spongolite of the Ústí nad Orlicí type, B: Weathered honey-coloured spongolite, C: Erratic silicite (flint), D: Rock crystal. E: Quartz. F: Quartz/Rock crystal. Photographed by L. Vojtěchovský. Prepared by O. Mlejnek. Measuring scales are in milimetres.

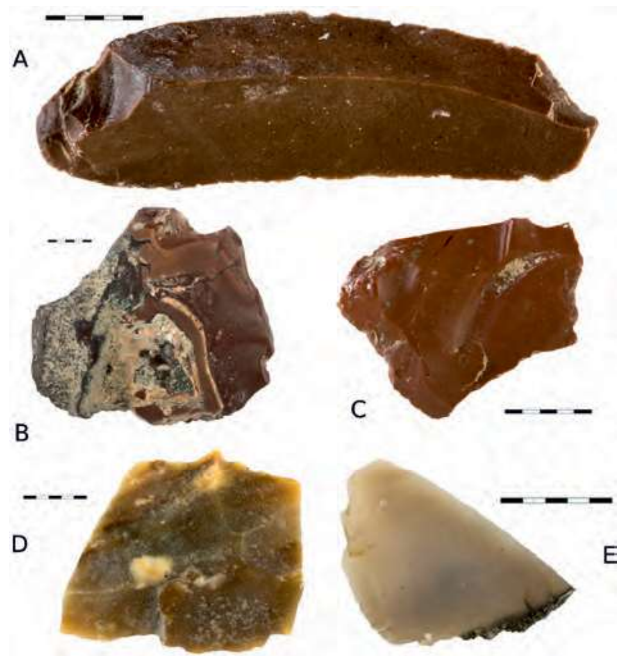


FIGURE 8: Městec/Ostrov. Macrophotographs of artefacts made of selected raw materials. A: Radiolarite of the Vršatské Podhradie type, B: Jasper. C: Radiolarite of the Szentgál type, D: Chalcedony weathering product of serpentinite. E: Krumlovský les II type chert. Photographed by L. Vojtěchovský. Prepared by O. Mlejnek. Measuring scales are in milimetres.

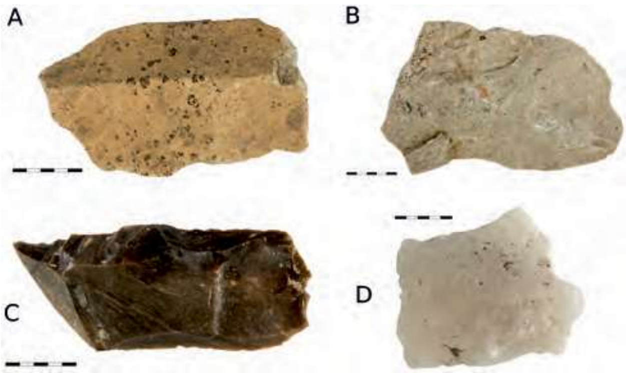


FIGURE 9: Městec/Ostrov. Macrophotographs of artefacts made of selected raw materials. A: Porcellanite, B: Orthoquartzite, type Skršín. C: Permian limnosilicite of the Hřibojedy type, D: Orthoquartzite, type Bečov. Photographed by L. Vojtěchovský. Prepared by O. Mlejnek. Measuring scales are in milimetres.

(0.33%; *Figures 8D, 12A, 12B*). Outcrops of the chalcedony weathering products of serpentinites are well known from south-western Moravia, but also from geographically closer north-western Moravia (localities in the surroundings of Boršov and Moravská Třebová), or from the Kutná Hora region in Central Bohemia. We are not sure which of these outcrop sites were utilised for the raw material found at Městec/Ostrov but sources in Central Bohemia seem to be most probable.

Other raw materials are present in very small numbers. Krumlovský les II type chert is represented by one tiny flake (Přichystal 2013: 79–82; *Figures 8E, 12C*). Two artefacts (core and flake) were made of radiolarian chert of unknown origin and another flake was identified as Moravian Jurassic Chert (Přichystal 2013: 70–71). The origin of six other chert artefacts remains undetermined. Presence of three artefacts made of the Permian limnosilicite of the Hřibojedy type is rather interesting because this raw material was identified at Hřibojedy, another Mesolithic site in eastern Bohemia

TABLE 4: Městec/Ostrov. Tool type representation according to particular raw materials. ES: end scrapers, B: burins, P: points, RB: retouched blades, SPL: splintered pieces, TR: triangles, B&TB: backed and truncated bladelets, C: combinations, O & F: others and tool fragments, TN: total number of formal tools, PRA: partially retouched artefacts.

Raw materials	ES	%	B	%	P	%	RB	%	SPL	%	TR	%	B &TB	%	C	%	O & F	%	TN	%	PRA	%
Spongolites (Spiculites)	18	69.23	21	80.77	6	66.67	19	67.86	10	66.66	15	93.75	29	82.86	2	100	16	69.57	136	74.73	44	78.56
Quartz	0	0	0	0	0	0	0	0	1	6.67	0	0	0	0	0	0	1	4.35	2	1.1	1	1.79
Rock crystal	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	5.36
Quartz/Rock crystal	0	0	0	0	0	0	0	0	1	6.67	0	0	0	0	0	0	0	0	1	0.55	0	0
Silicites (flints) from glacigenic sediments	6	23.07	3	11.53	3	33.33	8	28.57	3	20	1	6.25	2	5.71	0	0	4	17.38	31	17.02	5	8.93
Jasper	0	0	1	3.85	0	0	1	3.57	0	0	0	0	1	2.86	0	0	0	0	2	1.1	2	3.57
Orthoquartzite, type Bečov	0	0	0	0	0	0	0	0	0	0	0	0	2	5.71	0	0	1	4.35	3	1.65	1	1.79
Chalcedony weathering products of serpentinites	0	0	0	0	0	0	0	0	0	0	0	0	1	2.86	0	0	0	0	1	0.55	0	0
Radiolarite	1	3.85	1	3.85	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	1.65	0	0
Orthoquartzite, type Skršín	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Porcellanite	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Others	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Undetermined pieces	1	3.85	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	4.35	3	1.65	0	0
Total	**26**	**100**	**26**	**100**	**9**	**100**	**28**	**100**	**15**	**100**	**16**	**100**	**35**	**100**	**2**	**100**	**23**	**100**	**182**	**100**	**56**	**100**

(Vencl 1991; *Figures 9C, 12D*). Two other artefacts were made of silicified sandstone containing glauconite. Lydite, biotite granite, diorite, silicified wood and siliceous weathering cortex are represented by one artefact each. Two flake fragments and one blade fragment made of unpatinated silicites of the Cracow-Czestochowa Jurassic (Přichystal 2013: 102–105) were identified in the surface collection (*Figure 10D*). However, they are probably of Neolithic age.

The Ústí nad Orlicí spongolite dominates the assemblage, but the raw material spectrum is quite large. Even if we accept a down-the-line raw materials exchange model (Renfrew 1975), it suggests numerous networks of the local community (or communities) of foragers over large distances, specifically with north-western Bohemia (orthoquartzites of the Bečov and Skršín types), northern Bohemia or Silesia (jaspers, erratic silicites), Moravia (spongolites from Bořitov, Krumlovský les II type chert, Moravian Jurassic chert) and even western Slovakia (radiolarite of the Vršatské Podhradie type). Several artefacts made of the Szentgál type radiolarite and of the silicites of the Cracow-Czestochowa Jurassic can be cautiously regarded as a possible Neolithic intrusion. However, if they are Mesolithic, it represents distant contacts of the Mesolithic hunters and gatherers from Městec/Ostrov reaching as far as western Hungary (Bakony Mountains near Lake Balaton) and Cracow region in Poland.

3.3 Technological analysis of the lithic industry

Technological and typological analysis of the lithic collection was performed in 2019 using the methods described in the methodological section of this paper. Among basic technological categories, the detached pieces (Andrefsky 2005: 12–13) prevailed (70.4%), followed by further unidentified fragments (26.3%). Number of cores was lower (3.1%) and imported, but unworked raw material (manuports) was represented only by eleven pieces (0.2%) – mostly spongolite of the Ústí nad Orlicí type (*Table 5*). Small amount of unworked raw material present at the site is interesting especially when compared to nearby surface sites in the Ústí nad Orlicí district (Čuláková 2015), where the number of unworked spongolite pieces is greater. This is probably caused by the fact that the Městec/Ostrov site is situated already outside the area with outcrops of the spongolite of the Ústí nad Orlicí type, and therefore it was necessary to import this raw material from a distance of about 25–30 km. This is also the reason for more economical processing of this raw material, which resulted in maximum core exploitation.

There are 158 cores (*Figure 14c, Figure 20, Figure 21, Table 6*), with irregular cores the most common type (39.2%), followed by prismatic cores (37.3%), cone- or wedge-shaped cores (8.2%), pencil-shaped cores (2.5%) and one flat core (0.6%). Eleven pieces (7%) cannot be assigned to any of above-mentioned categories (mostly cores on thick flakes) and eight artefacts (5.1%) can be described as core tools, mostly splintered pieces, rarely polyhedral core burins. In terms of the number of platforms, single platform cores prevail (62%). Cores with changed orientation (14%) and double platform cores (11.3%) were less common. It was not possible to determine the number of platforms for some of the cores (12.7%), especially the irregularly shaped pieces. The predominance of single platform cores was also supported by the analysis of the directions of negative scars on the dorsal side of detached pieces. Bidirectional reduction was evident on just 4.2% of the analysed artefacts (*Table 7*). In terms of core exploitation stages, extremely exhausted cores were most common (74.7%) followed by moderately exhausted cores (20.7%). Pre-cores (2%) and tested raw material (2.7%) occurred rarely. Based on the dimensions of negative scars on debitage surfaces, most of the cores in the terminal phase of exploitation were used for production of flakes (45.3%), less often microblades (31.3%), bladelets (19.3%) and blades (4%). In sum, the cores used for production of blades, bladelets and microblades prevail and it is also probable that some flake cores, which were in the final phase of their exploitation, were earlier used for the production of bladelets, which appear to be the target product. Most of the cores were very small, mean – 23.5 × 20.1 × 14.7 mm (median – 21.8 × 25.4 × 13.5 mm) with an average weight of 9.8 g (median 6.1 g).

Flakes (61.3%) are more common than blades (*Table 5*, *Table 13*) among detached pieces (debitage). Most of them are very small. The average dimensions of complete flakes are 12.9 × 11.1 × 3.6 mm and median dimensions are even smaller (11.6 × 9.9. × 3 mm). The average weight of unbroken flakes is 0.8 g (median is 0.3 g). Among the "bladey" blanks bladelets prevail (width 6–12 mm, 23.7%), followed by microblades (width under 6 mm, 10.8%) and blades (width over 12 mm, 4.2%). Blade width distribution is regular peaking between five and nine millimetres (*Graph 3*). The target blanks were thus bladelets with a width of about 8 mm. The average dimensions of unbroken blades are 20.2 × 8.3 × 4 mm (median is 18.7 × 8 × 3.4 mm) with an average weight of 1 g (median is 0.5 g). However, most of the "bladey" products are broken. Blades were usually broken intentionally and segments of broken

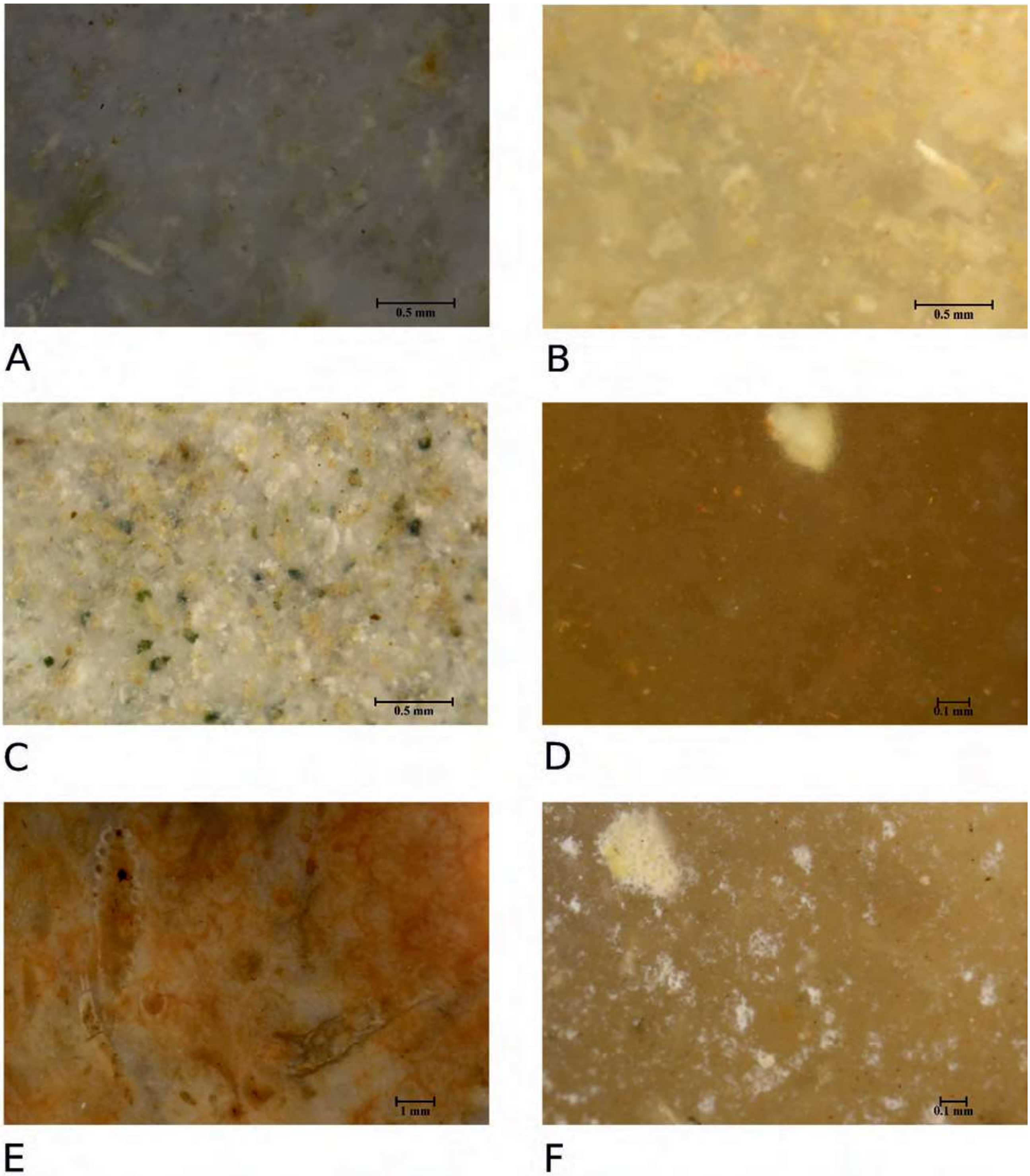


FIGURE 10: Městec/Ostrov. Selected raw materials photographed in water immersion under a stereomicroscope. A: Typical spongolite of the Ústí nad Orlicí type, B: Weathered honey-coloured spongolite, C: Spongolite containing grains of glauconite, D: Silicite of the Cracow-Czestochowa Jurassic, E: Erratic silicite, F: Patinated erratic silicite. Photographed by A. Přichystal. Processed by O. Mlejnek.

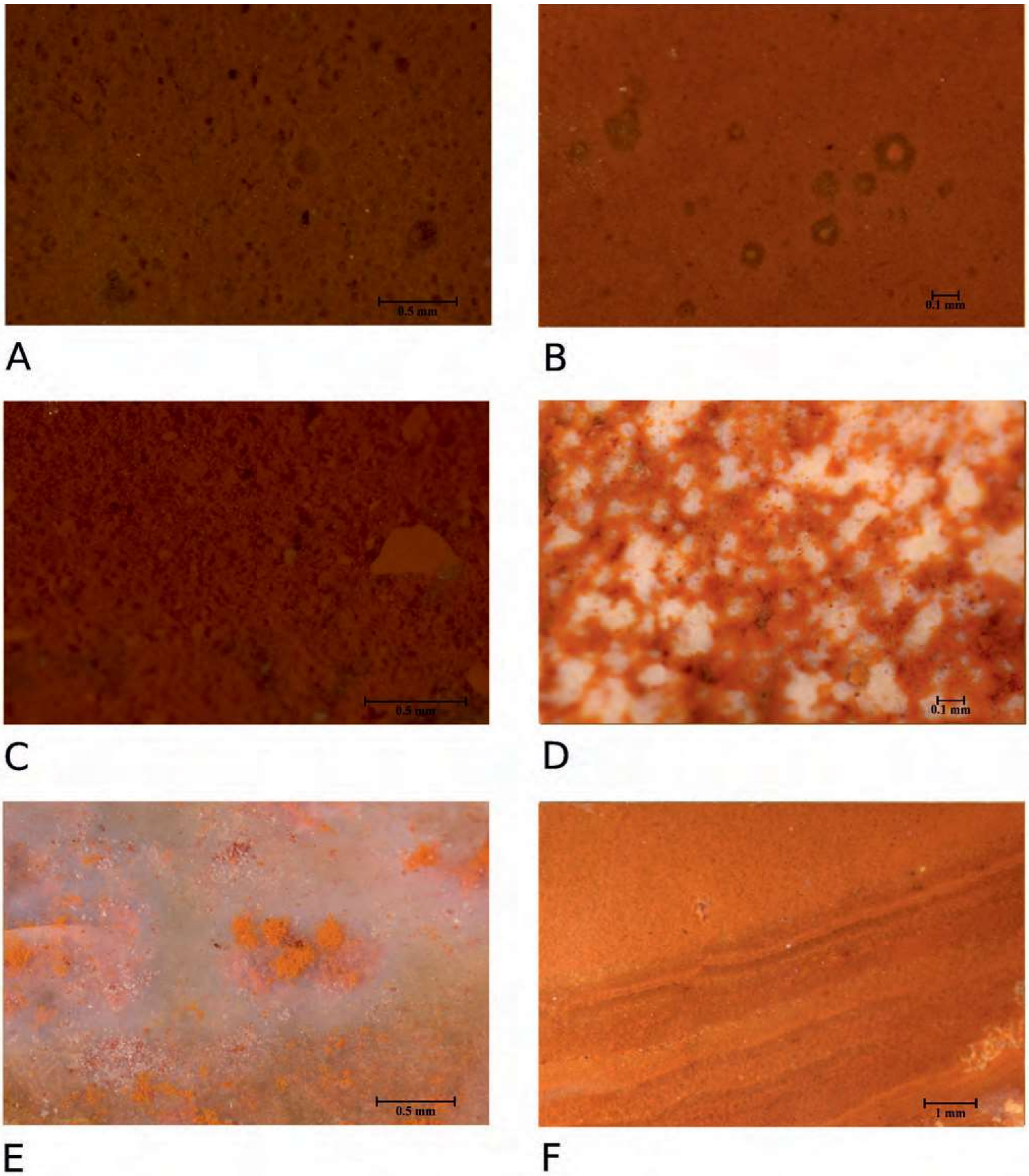


FIGURE 11: Městec/Ostrov. Selected raw materials photographed in water immersion under a stereomicroscope. A: Radiolarite of the Vršatské Podhradie type, B: Radiolarite of the Szentgál type, C: Jasper, D: Jasper, E: Jasper, F: Vein jasper. Photographed by A. Přichystal. Processed by O. Mlejnek.

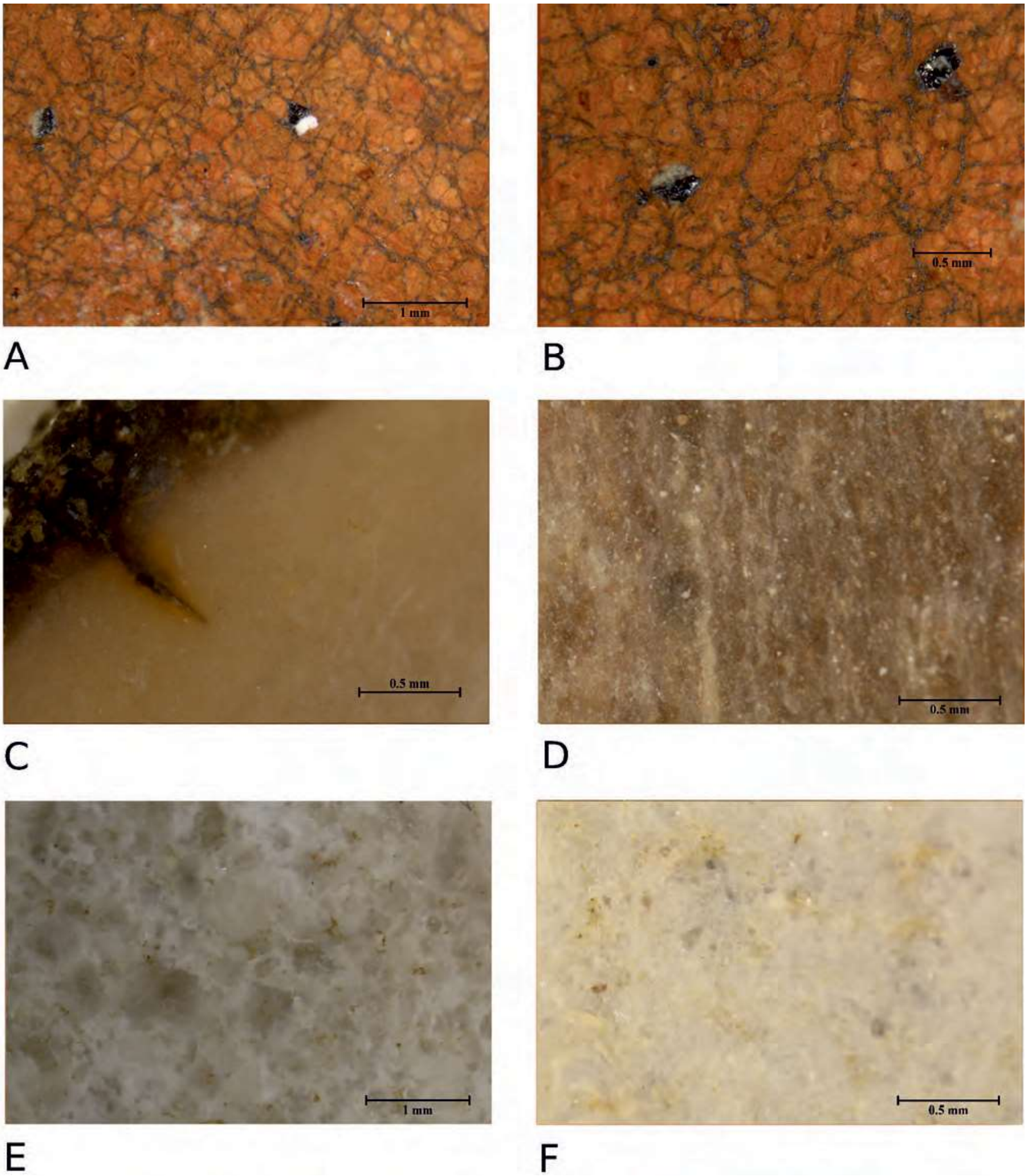


FIGURE 12: Městec/Ostrov. Selected raw materials photographed in water immersion under a stereomicroscope. A: Chalcedony weathering product of serpentinite, B: Chalcedony weathering product of serpentinite, C: Krumlovský les II type chert, D: Permian limnosilicite of the Hřibojedy type, E: Orthoquartzite of the Bečov type, F: Orthoquartzite of the Skršín type. Photographed by A. Přichystal. Processed by O. Mlejnek.

TABLE 5: Městec/Ostrov. Representation of the basic technological groups.

Technological category	Number of specimens	%	Detached pieces	Number of specimens	%
Raw material	11	0.21	Flakes	2210	61.27
Cores	158	3.08	Blades	150	4.16
Detached pieces	3607	70.41	Bladelets	856	23.73
Fragments	1347	26.3	Microblades	391	10.84
Total	**5123**	**100**	**Total**	**3607**	**100**

TABLE 6: Městec/Ostrov. Core categories according to core shape (upper left table), number of platforms (upper right table), types of detached pieces (lower left table) and core exhaustion (lower right table).

Core shape	Number of specimens	%	Core category	Number of specimens	%
Prismatic	59	37.34	Single platform cores	93	62
Irregular	62	39.24	Double platform cores	17	11.33
Cone-shaped	13	8.23	Cores with changed orientation	21	14
Pencil-shaped	4	2.53	Undetermined	17	11.33
Flat	1	0.63			
Others	11	6.96	Others	2	1.34
Core tool	8	5.07			
Total	**158**	**100**	**Total**	**150**	**100**

Core type	Number of specimens	%	Stage of core exploitation	Number of specimens	%
Flake cores	68	45.33	Tested raw material	4	2.67
Blade cores	6	4	Pre-cores	3	2
Bladelet cores	29	19.33	Moderate stage of exploitation	31	20.67
Microcores	47	31.34	Final stage of exploitation	112	74.66
Total	**150**	**100**	**Total**	**150**	**100**

TABLE 7: Městec/Ostrov. Proportion of bidirectional reduction based on negative scars on dorsal surface of detached pieces.

Bidirectional reduction	Number of detached pieces	%
Undeterminable	735	20.38
Present	151	4.19
Absent	2721	75.43
Total	**3607**	**100**

blades were furthermore retouched to microliths, or they were directly inserted as armatures into composite tools. A question we are interested in is whether the microburin technique was applied during the production of blade segments. If it was, it must have been used to a limited extent, because there were just two atypical microburins identified in the analysed lithic assemblage (e. g. *Figure 19:28*).

Fragmentation patterns of particular lithic artefacts found at Městec/Ostrov were also analysed. Complete (unbroken) flakes (50.5%) prevail over distal (22.5%),

TABLE 8: Městec/Ostrov. Fragmentation of detached pieces.

Fragmentation	Flakes	Blades	Bladelets	Microblades	"Bladey" products	Detached pieces
Proximal fragments	354	57	271	98	426	780
Mesial fragments	241	36	235	120	391	632
Distal fragments	498	20	193	98	311	809
Complete pieces	1117	37	157	75	269	1386
Total	**2210**	**150**	**856**	**391**	**1397**	**3607**

proximal (16%) and mesial (10.9%) flake fragments. For blades, proximal (30.5%), mesial (28%) and distal (22.3%) fragments prevail over complete blades (19.3%). This difference is due to blade length; blades are more prone to breaking due to their shape. They were also broken intentionally. For complete flakes and flake fragments with the distal segment it was possible to also analyse the types of artefact terminations (*Table 11*). Most of the distal segments possess a feathered termination (89.2%), followed by hinged terminations (6.3%) and plunging, or overshot terminations (4.5%) (e. g. Andrefsky 2005: 87).

Butt type and butt dimensions were also recorded for complete flakes and proximal debitage fragments (*Table 9*, *Table 10*). Flat butts (53.1%) prevailed over reduced (25.5%), linear (8.5%), facetted (7.7%) and dihedral (4.2%) butts. Cortical butts were rare (1.1%). It is apparent that maximum effort was directed at reducing butt size. The average width of butts is 5.5 mm and their average thickness is 1.9 mm. The median values are even smaller (5 × 1.4 mm), also the average dimension of butts of blades, bladelets and microblades (3.8 × 1.5 mm). Bulb type analysis (*Table 9*) showed that indistinct bulbs (62.2%) prevail over rims (31.4%) and distinct bulbs (6.3%). Combining this evidence, it appears that direct percussion with a soft hammer (probably soft stone, antler or bone) was preferred at this site. Some characteristics of cores also support this assumption, in particular, sharp angles between core platforms and flaking surfaces.

TABLE 10: Městec/Ostrov. Butt dimensions.

Butt dimensions (mm)	Detached pieces in total	Flakes	Blades
Mean width	5.45	6.23	3.82
Median width	5	5.48	3.97
Mean thickness	1.88	2.08	1.46
Median thickness	1.42	1.59	1.13
Total number of artefacts	**2166**	**1471**	**695**

The percentage of surface covered by cortex on the relatively small number of artefacts that do have some cortex is very small (*Table 11*). Most of the artefacts (92.5%) do not possess any cortex. For this reason, it is highly probable that the raw material was transported to the site in the form of prepared pre-cores. Utilising whole pebbles was possible in the case of quartz, which

TABLE 9: Městec/Ostrov. Butt types (left) and bulb types (right) counts and percentages.

Butt type	Number of specimens	%	Bulb type	Number of specimens	%
Flat	1152	53.11	Indistinct	1347	62.19
Reduced	553	25.5	Distinct	136	6.28
Linear	185	8.53	Rim	681	31.44
Facetted	166	7.65	Undeterminable	2	0.09
Dihedral	90	4.15	**Total**	**2166**	**100**
Cortical	23	1.06			
Total	**2169**	**100**			

TABLE 11: Městec/Ostrov. Proportions of debitage terminations (left) and percentage of cortex on the surface of analysed artefacts (right).

Types of endings	**Number of specimens**	**%**	**Cortex**	**Number of specimens**	**%**
Feathered	1917	89.21	0%	4739	92.5
Hinged	135	6.28	1–25%	220	4.29
Plunging	97	4.51	26–50%	63	1.23
Total	**2149**	**100**	51–75%	32	0.62
			76–99%	26	0.51
			100%	43	0.85
			Total	**5123**	**100**

comes directly from the Loučná River terrace, where the excavated site is situated. In contrast, cores of long-distance imports such as orthoquartzites from northern Bohemia, or radiolarite, are almost completely absent so it is probable that these raw materials were transported to the site in the form of flakes and blades.

Relatively high percentage of burnt lithics (4.5% strongly, 4.7% moderately and 2.9% slightly burnt artefacts; *Table 12*) strongly suggests that hearths were present at the site. This could be interpreted as evidence for a repeatedly visited settlement. Another possible explanation for the presence of burnt artefacts in the assemblage is special treatment of the cores by annealing (Čuláková 2015: 139–141). However, this has not been convincingly demonstrated in the Mesolithic lithic collections from Bohemia. In future these artefacts could perhaps be dated using the thermoluminescence method. However, the absence of intact sediments that these artefacts were originally deposited in, is an obstacle for this kind of absolute dating, because it is not possible to measure particular physical characteristics (such us background radioactivity, or humidity), which is necessary for the application of the luminescence dating methods (e. g. Aitken 1985).

Analysis of artefact patination is somewhat more problematic (*Table 12*). Analysed lithics were categorized according to patination on the basis of macroscopic observations and subjective evaluation. Most of the artefacts were not patinated at all (67%). 10.7% of lithics were slightly patinated, 12.9% were moderately patinated and 6.7% of artefacts were strongly patinated. 0.4% of artefacts were partly covered by patina and in the case of 2.3% of mostly burnt artefacts, it was not possible to determine the degree of patination. This analysis was useful for some artefacts, such as a blade made of erratic silicite, where the strong patina suggests an Upper Palaeolithic antiquity (*Figure 10:4*). The degree of patination need not be a reliable of indicator of age though and other factors can influence this (e. g. time of deposition of artefacts on the surface, chemical composition and

TABLE 12: Městec/Ostrov. Degree of patination (left) and intensity of burning of artefacts (right).

Patina	**Number of specimens**	**%**	**Degree of burning**	**Number of specimens**	**%**
None	3432	66.99	None	4455	86.96
Slight	548	10.7	Slight	146	2.85
Moderate	663	12.94	Moderate	243	4.74
Strong	341	6.66	Strong	229	4.47
Partial	22	0.43	Uncertain	50	0.98
Undeterminable	117	2.28	**Total**	**5123**	**100**
Total	**5123**	**100**			

TABLE 13: Městec/Ostrov. Dimensions and weight of particular artefact types. RM: raw material, CDP: complete detached pieces, CF: complete flakes, CB: complete blades.

Artefact metric	Lithics	Cores	Detached pieces	Flakes	Blades	RM	Formal tools	CDP	CF	CB
Mean length (mm)	13.37	23.48	13.04	12.3	14.21	35.23	16.28	14.34	12.94	20.16
Median length (mm)	11.5	21.8	11.29	10.7	12	33.6	14.7	13	11.6	18.7
Mean width (mm)	9.82	20.1	9.89	11.08	8.01	27.42	10.52	10.55	11.09	8.31
Median width (mm)	8.6	25.4	8.89	9.99	7.62	27.25	9.03	9.41	9.9	7.99
Mean height (mm)	3.91	14.65	3.31	3.51	2.99	16.17	4	3.69	3.63	3.96
Median height (mm)	2.95	13.5	2.75	2.87	2.58	14.15	3.06	3.09	2.98	3.39
Mean weight (g)	1.81	9.79	0.67	0.77	0.51	20.98	1.06	0.84	0.81	0.96
Median of weight (g)	0.27	6.05	0.26	0.28	0.23	13.5	0.36	0.33	0.29	0.51
Number of artefacts in total	**5123**	**158**	**3607**	**2210**	**1397**	**11**	**182**	**1386**	**1117**	**269**

acidity of the sediment, etc.) (Hurst, Kelly 1961, Stapert 1976). Post-Palaeolithic artefacts can also be patinated. Furthermore, the chronological position of the assemblage on the boundary between the Late Palaeolithic and Mesolithic can also explain the presence of slight or moderate patina on the surface of several artefacts.

3.4 Typological analysis of the lithic industry

The analysed formal tool collection numbered 182 artefacts (*Table 16, Table 17, Graph 1*). Another 56 artefacts were partially retouched (*Table 14*). In terms of blanks (*Table 15*), 59 tools were manufactured on flakes, 53 on bladelets, 39 on microblades, 16 on blades, 8 on cores and 7 on undetermined fragments. In general, the tools made on blades, bladelets and microblades prevailed over the tools made on flakes, cores and fragments. Altogether, 31 tools, such as splintered pieces, dihedral burins and burins on breaks, were not retouched. In 151 retouched tools and 56 partially retouched artefacts, abrupt retouch or "backing" prevailed (46.3%), followed by marginal (24.1%) and standard (22.2%) retouch. Other retouch types, such as steep (3.9%), flat (2%), or invasive (1.5%) retouch, appeared rarely (e. g. *Table 15*).

Due to the Mesolithic antiquity of the lithic collection, its principal component are the microliths. Microliths can be further subdivided into backed bladelets and microblades (*Figure 14a*, *Figure 18*) and geometric microliths, represented exclusively by triangles (*Figure 14d*; *Figure 17*). The first group is dominated by backed bladelets and microblades (22 pieces, e. g. *Figures 18:1, 18:3, 18:4, 18:19*), followed by bladelets and microblades with a truncated end (11 pieces, e. g. *Figures 18:7, 18:11, 18:22*). Backed

TABLE 14: Městec/Ostrov. Categories of lithics including tools and partially retouched artefacts.

Artefacts	Number of specimens	%
Undetermined fragments	1334	26.08
Detached pieces (without tools)	3393	66.33
Cores	150	2.93
Partially retouched artefacts	56	1.09
Retouched tools	151	2.95
Unretouched tools	31	0.62
Total	**5115**	**100**

TABLE 15: Městec/Ostrov. Representation of particular types of formal tool blanks (left) and type of retouch (right).

Formal tools	Number of specimens	%	Retouch	Number of specimens	%
On cores	8	4.4	Abrupt	94	46.31
On flakes	59	32.42	Marginal	49	24.14
On blades	16	8.79	Standard	45	22.17
On bladelets	53	29.12	Steep	8	3.94
On microblades	39	21.43	Flat	4	1.97
On fragments	7	3.84	Invasive	3	1.47
Total	**182**	**100**	**Total**	**203**	**100**

bladelets with a truncated end are represented by three specimens (e. g. *Figures 18:2, 18:24*). Small backed points, which are another tool type similar to backed bladelets, are represented by eight pieces (e. g. *Figures 18:10, 18:15, 18:16*, *19:11*). In contrast, typical points of the Tardenoisian type are missing in this collection as well as in Northern Bohemian (Svoboda ed. 2017: 79, Šída, Pokorný eds. 2020: 61) and Moravian (Valoch 1978) Mesolithic assemblages in contrary to German lithic collections of the Beuronian technocomplex (Taute 1974, Cziesla 2015).

There are 16 microlithic triangles (*Figures 15d*, *17*) with two broken backed fragments which were probably originally triangles (*Figures 17:4*, *18:15*). Formal definition of the triangle can be formulated in this manner: It is a triangular tool, which has two triangle sides backed or retouched. Retouch is usually abrupt and was intended to facilitate its insertion as a segment into a composite tool (e. g. Heinen 2012: 606–608). It is possible that the original number of triangles was even greater as some fragments could have been classified as fragments of backed bladelets. Triangles form a morphological continuum with backed bladelets and functionally both tool types served as armatures for composite tools. According to the typology suggested by S. K. Kozłowski (1980), it was possible to distinguish five isosceles triangles of the TN type (proportion of length to width is less than 3:1, *Figures 17:5, 17:10, 17:8, 17:15, 17:16*), five tiny triangles of the TH – Pieńki type (non-isosceles triangle with a length less than 25 mm and width less than 5 mm, *Figures 18:1, 18:3, 18:6, 18:11, 18:13*), four wide non-isosceles triangles of the TO type (proportion of length to width is less than 3:1, *Figures 17:2, 17:7, 17:9, 17:12*), one tiny and wide triangle of the TI – Janisławice type (non-isosceles triangle less than 25 mm long and less than 5 mm wide, *Figure 17:17*) and one backed triangular bladelet of the TR type (angle between backed sides of the triangle is greater than 119°, *Figure 17:14*). Specific triangle types occur along a morphological continuum and this continuum also subsumes backed bladelets (e. g. triangle of the TR type). This is a problem for a detailed typological system based on morphology. Presence of impact negatives on several triangles is interesting (*Figures 13, 17:3, 17:10, 17:12, 17:13*). These features suggest that these artefacts were segments inserted as armatures into composite tools.

End scrapers (*Figures 14c, 15*) and burins (*Figures 14b, 16*) have been a frequent tool form since the beginning of the Upper Palaeolithic. In this assemblage, they are usually of smaller dimensions and less distinct. End scrapers are represented by 26 specimens. Flat end scrapers on flakes prevail (14 pieces, e. g. *Figures 15:1, 15:3, 15:9, 15:11–15, 15:17, 15:18, 15:20, 15:22*). Some of them are just marginally or indistinctly retouched and therefore they could also be categorised as scraper-like retouched tools (cf. Vencl 1991: 12). There are five flat end scrapers on a blade, with four being indistinct (e. g.

FIGURE 13: Městec/Ostrov. Photograph of a microlithic triangle depicted in Fig. 18:10 (a) with detail of an impact negative on ventral side of the artefact (b). Photo by O. Mlejnek.

TABLE 16: Městec/Ostrov. List of tool types including raw materials. SO: spongolite, SGS: silicites of glacial sediments, rad: radiolarite, jas: jasper, under: undetermined, SWS: chalcedone weathering products of serpentinites.

Type no.	Type	No. of specimens	%	Raw material
1	End scraper on a blade	1	0.55	1×SO
2	Indistinct end scraper on a blade	4	2.2	3×SO, 1×SGS
8	End scraper on a flake	14	7.69	8×SO, 4×SGS, 1×rad, 1×undet
9	Round end scraper	2	1.1	2×SO
10	Thumbnail end scraper	3	1.65	2×SO, 1×SGS
12	Indistinct keel-shaped end scraper	1	0.55	1×SO
14	Nosed flat end scraper	1	0.55	1×SO
27	Dihedral straight burin	1	0.55	1×SO
28	Dihedral curved burin	3	1.65	2×SO, 1×jas
29	Dihedral lateral burin	3	1.65	2×SO, 1×rad
30	Burin on a break	6	3.3	4×SO, 2×SGS
32	Polyhedral curved burin (burin busqué)	2	1.1	2×SO
35	Burin on an oblique truncation	1	0.55	1×SO
37	Burin on a convex truncation	3	1.65	3×SO
38	Transversal burin	1	0.55	1×SO
43	Core burin	5	2.75	5×SO
44	Flat burin	1	0.55	1×SGS
50	Small point of the La Gravette type	8	4.4	6×SO, 2×SGS
55	Tanged point	1	0.55	1×SGS
60	Transversally retouched blade	2	1.1	2×SGS
61	Obliquely retouched blade	10	5.9	9×SO, 1×SGS
65	Unilaterally retouched blade	13	7.14	8×SO,4×SGS, 1×jas
66	Bilaterally retouched blade	3	1.65	2×SO, 1×SGS
74	Notch	2	1.1	2×SO
76	Splintered piece	15	8.24	10×SO, 3×SGS. 1×quartz, 1×quartz/rock crystal
77	Side scraper	1	0.55	1×quartz
79	Triangle	16	8.79	15×SO, 1×SGS
84	Bladelet with a retouched end	11	6.04	9×SO, 1×SGS
85	Backed bladelet	22	12.09	17×SO, 1×SGS, 2×Bečov, 1×jas, 1×SWS
86	Backed bladelet with a retouched end	3	1.65	3×SO
92	Others and tool fragments	11	6.04	6×SO. 2×SGS, 1×Bečov, 1×undet
93	Retouched flake	10	5.49	8×SO, 2×SGS
94	Splintered piece – burin	2	1.1	2×SO
	Total	**182**	**100**	

Figures 15:7, 15:19, 15:21, 15:23). Round end scrapers are represented by two typical specimens (*Figures 15:2, 15:10*) and flat thumbnail end scrapers by three pieces (*Figures 15:4, 15:6, 15:8*). One tiny end scraper could be categorised as an indistinct keel-shaped scraper (*Figure 15:16*) and one as a flat nosed end scraper (*Figure 15:5*). Indistinct dihedral burins are more common than burins on a truncation. Burins on a break are represented by six specimens (e. g. *Figures 16:4, 16:10, 16:13*) and dihedral burins by seven specimens (one straight: *Figure 16:12*, three curved: e. g. *Figures 16:2, 16:6* and three side burins: e. g. *Figure 17:16*). There are also two curved polyhedral burins reminiscent of Aurignacian burins (*burin busqué*) (*Figures 16:5, 16:14*). These burins probably served as cores for the manufacture of microblades. Burins on truncations are represented by four pieces, three of them on a convex truncation (e. g. *Figures 16:8, 16:17*) and one on an oblique truncation (*Figure 16:7*). The collection of burins is complemented by five core burins (e. g. *Figures 16:1, 16:9, 16:11*), one transversal burin and one flat burin (*Figure 16:3*). The number of burins is equal to the number of end scrapers and most of them, similarly to most of the end scrapers, are not very distinct. Some of them were probably used as cores for the production of microblades and tiny flakes.

Retouched blades and bladelets are the most common type of the other tools. However, some of them were broken and in some cases, it was difficult to determine the original tool type. There are thirteen unilaterally retouched blades and bladelets (e. g. *Figures 19:14, 19:17, 19:19, 19:22*), three bilaterally retouched pieces (e. g. *Figures 19:2, 19:10*), ten bladelets with oblique retouch (e. g. *Figures 19:1, 19:3, 19:4, 19:6, 19:12, 19:20, 19:23, 19:24, 19:25*) and two transversally retouched specimens (*Figures 19:8, 19:21*) in the collection. Some of the terminally oblique retouched bladelets could be classified as Zonhoven type points

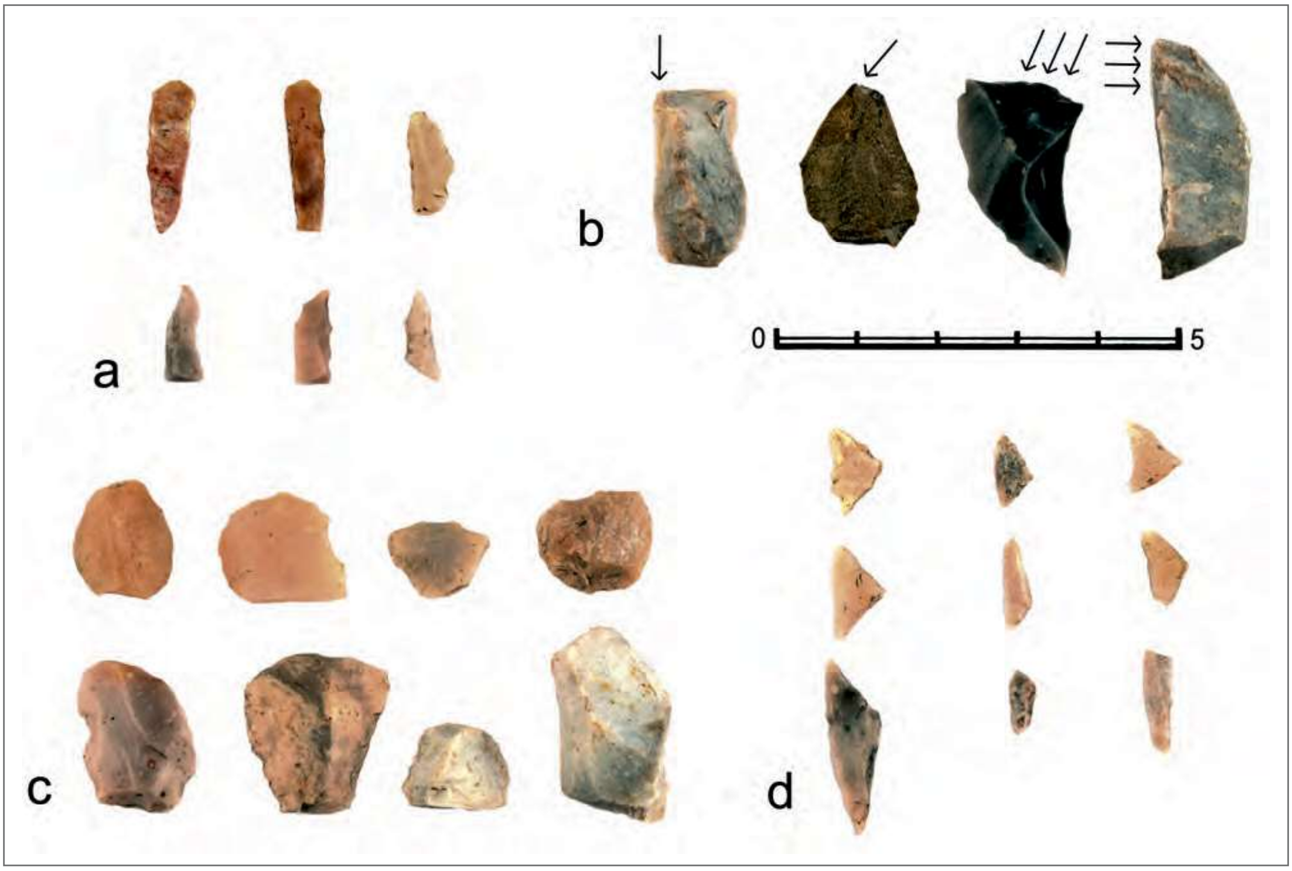


FIGURE 14: Městec/Ostrov. Photograph of selected tools. a) backed bladelets b) burins c) end scrapers d) triangles. Photo by M. Kršková. Measuring scale is in centimetres. Adopted from Mlejnek and Štefanisko 2022: 64.

(e. g. *Figures 19:5, 19:16*), which are typical tools in western European Early Mesolithic lithic collections of Preboreal age (e. g. Vermeersch 2013). Fifteen splintered pieces were also identified (e. g. *Figures 16:19, 16:20, 16:21*). These artefacts could have served as tools for splintering of bones, but also as cores for production of tiny flakes using the bipolar technique (cf. Andrefsky 2005: 125; Mateiciucová 2008: 178–179). Combined tools include two artefacts where a splintered piece was combined with a burin. One of them can be classified as a combination of a laterally retouched dihedral curved burin with a splintered piece (*Figure 16:18*) and the second one as a combination of a transversal polyhedral burin with a splintered piece (*Figure 16:15*). One small side scraper and two notched tools were also identified – these types are uncommon in Mesolithic assemblages. One of the notches was retouched on a fragment of a microblade and the second one on a flake (*Figure 19:26*). The tool collection is complemented by ten mostly indistinct retouched flakes and eleven closer undetermined retouched tool fragments.

A tanged tool with a bilaterally retouched tip is certainly a unique find (*Figures 22*, *19:13*). It was made on a blade from erratic silicite (Maastrichtian flint). The blade is coated with a slight patina and possesses bidirectional negatives on its dorsal surface, which indicates that it originated from a double platform core. Length of the tool is 55.6 mm; width is 20.1 mm and its weight is 6.35 g. The distal part of the tool is asymmetric and the tip is distinctly and, in some places, even abruptly retouched. Functional analysis (Mlejnek, Štefanisko 2022) indicates that it was used (at least at the end of its use life) as a multifunctional domestic tool, specifically as a perforator (in contrast to borers with alternately retouched tips, perforators are retouched just from one side, in this case dorsally, cf. Mateicucová 2008: 178), or a knife. Use wear analysis has revealed traces of drilling, cutting and whittling of hard tissues (e. g. bones and wood). However, morphologically the tool resembles other large tanged points from Northern European Late Palaeolithic (e. g. Taute 1968, Kozłowski *et al.* eds. 1999*,* Burdukiewicz 1999, Riede 2009). If it is a reutilised tip of a hunting weapon, given its dimensions, it is more likely that it was a spear point rather than an arrow point. Also, it cannot be excluded that it was from the very beginning intended and used as a domestic tool (cf. Pyżewicz 2022: 123). Possible analogies for this unique find are

TABLE 17: Městec/Ostrov. Values of selected indexes (e.g., de Sonneville-Bordes, Perrot 1953, Klíma 1956: 208).

Index	Index explanation	Number	%
IG	Percentage of end scrapers among tools	26	14.29
IGA	Percentage of the Aurignacian types of end scrapers among tools	2	1.1
iGA	Percentage of the Aurignacian types of end scrapers among end scrapers	2	7.69
IGC	Percentage of thick end scrapers among tools	1	0.55
iGC	Percentage of thick end scrapers among tools	1	3.85
IGM	Percentage of nosed end scrapers among tools	1	0.55
iGM	Percentage of nosed end scrapers among end scrapers	1	3.85
IB	Percentage of burins among tools	26	14.29
IBA	Percentage of the Aurignacian types of burins among tools	2	1.1
iBA	Percentage of the Aurignacian types of burins among burins	2	7.69
IE	Percentage of splintered pieces among tools	17	9.34
IM	Percentage of microliths among tools	52	28.57
IOC, M	Percentage of combined and multiple tools among tools	2	1.1
IOLam	Percentage of tools on blades among tools	108	59.34
IOEcl	Percentage of tools on flakes among tools	59	32.42
ION	Percentage of tools on cores and fragments among tools	15	8.24

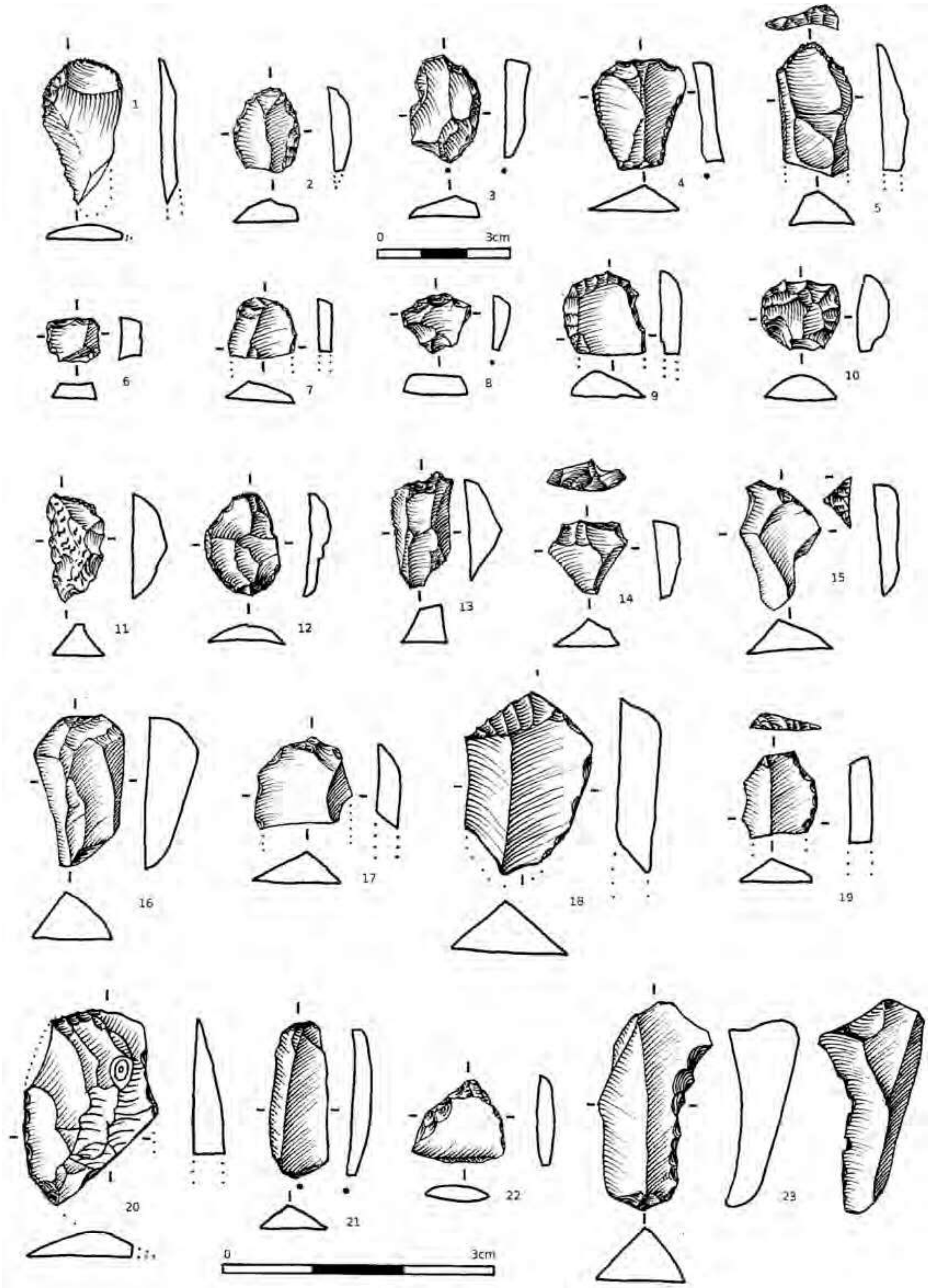


FIGURE 15: Městec/Ostrov. Selected tools. 1–23: End scrapers and scraper-like tools. 1–15: Original size (1:1), 16–23 Enlarged (1:2). 1, 4, 12, 20, 21, 22: Erratic silicites, 2, 3, 5–11, 14–19, 23: Spongolite, 13: Radiolarite. Drawings by L. Dvořáková, processed by O. Mlejnek.

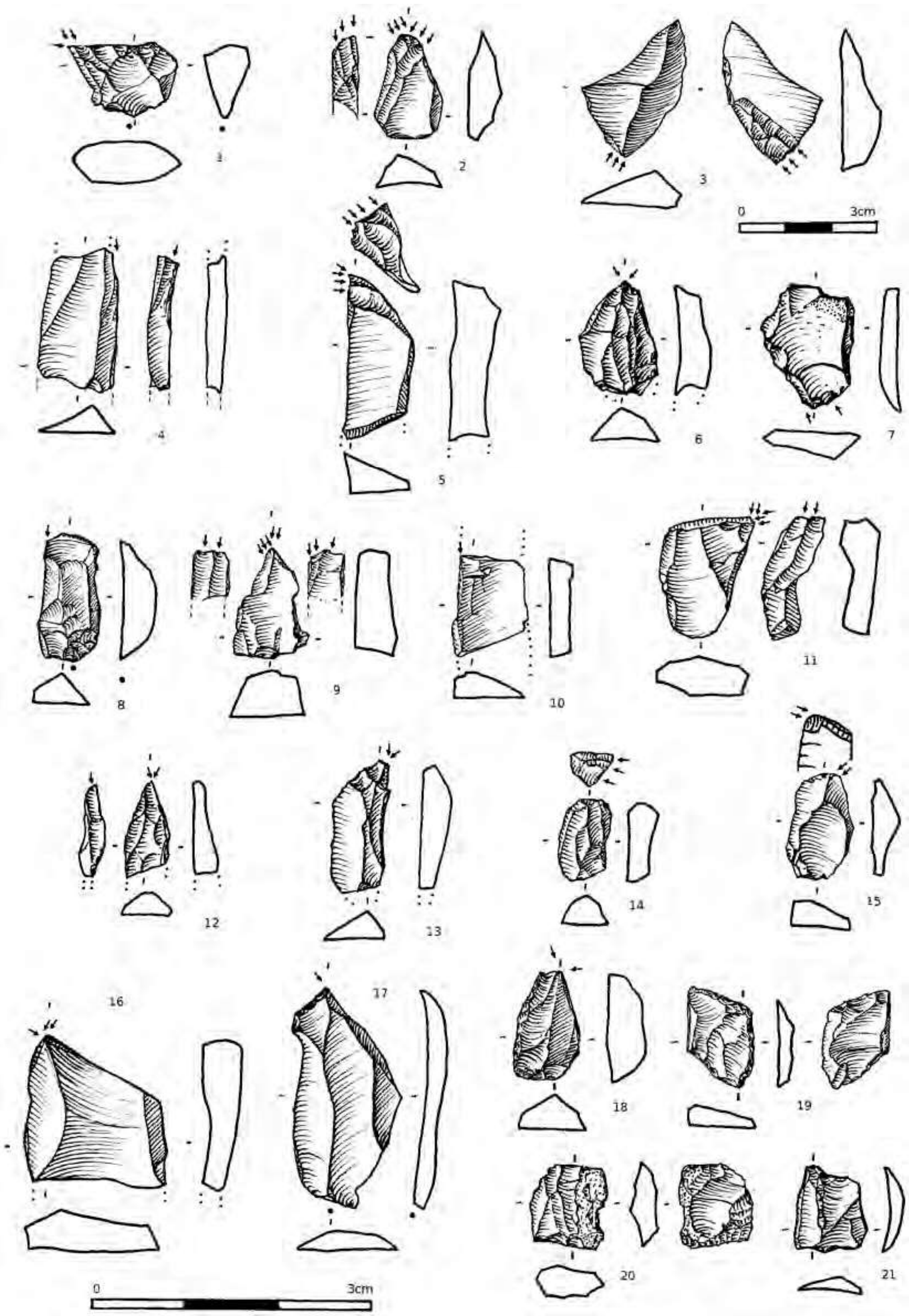


FIGURE 16: Městec/Ostrov. Selected tools. 1–14, 16, 17: Burins. 15, 18: Burin/splintered piece, 19–21: Splintered pieces. 1–15, 18–22: Original size (1:1), 16 and 17 enlarged (1:2). 1, 2, 5, 7–18, 20, 21: Spongolite, 3, 4, 19: Erratic silicite, 6: Jasper. Drawings by L. Dvořáková, processed by O. Mlejnek.

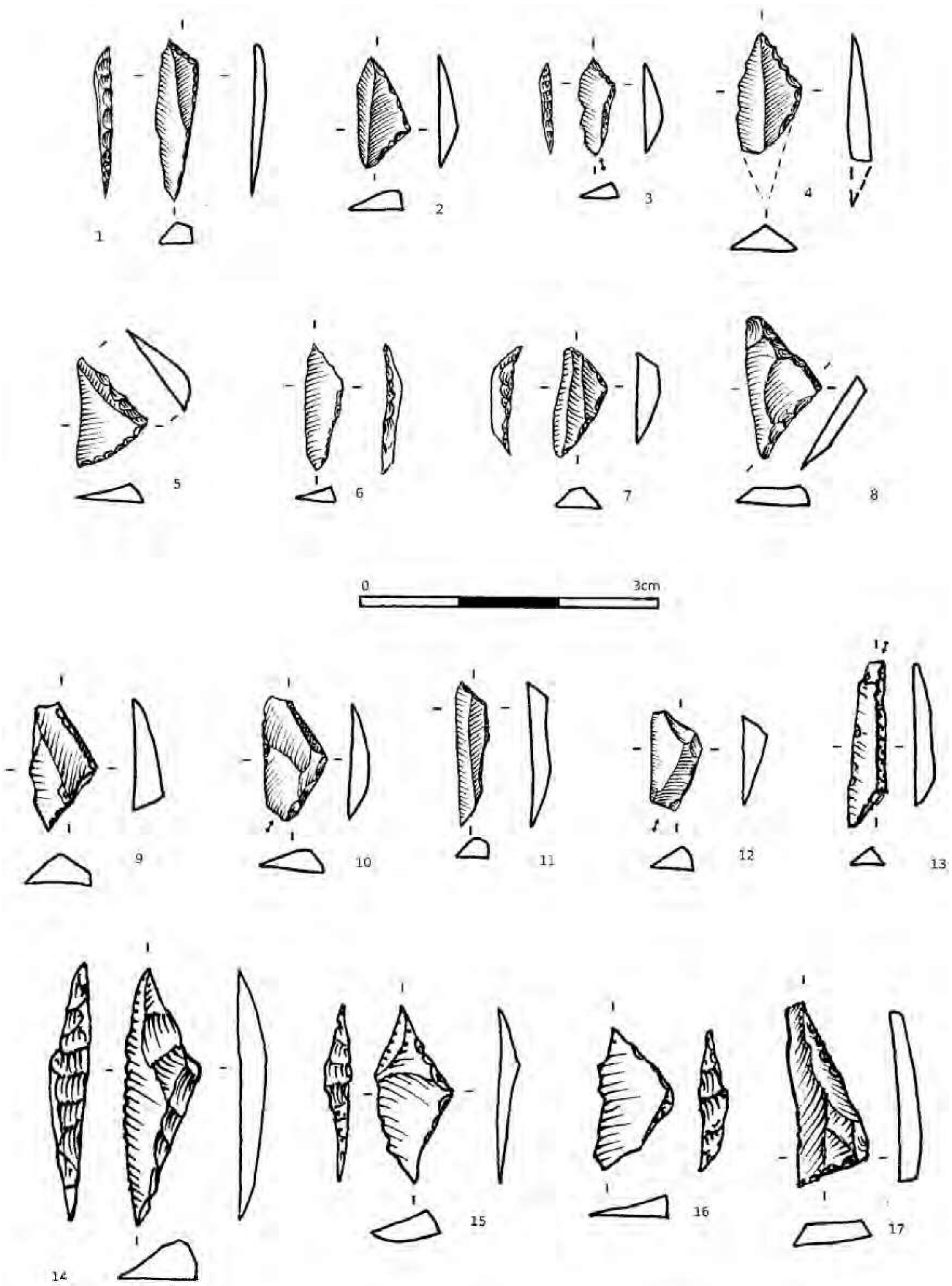


FIGURE 17: Městec/Ostrov. Selected tools. 1–3, 5–17: Triangles. 4: Fragment of a triangle, 1–17: Enlarged (1:2). 1–3, 5–13, 15–17: Spongolite, 4: Undeterminable (burnt), 14: Erratic silicite. Arrows with dots show direction of impact. Drawings by L. Dvořáková, processed by O. Mlejnek.

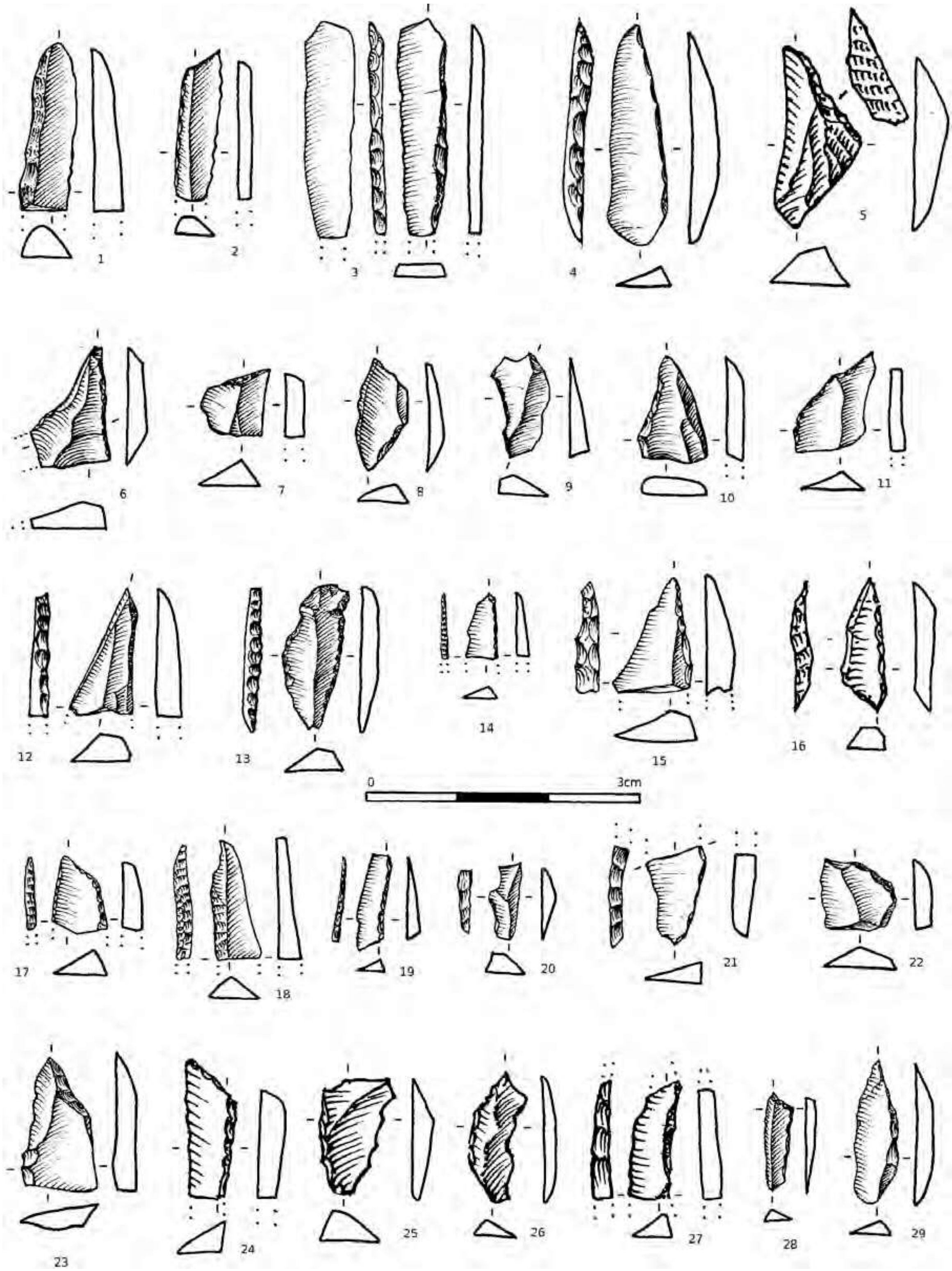


FIGURE 18: Městec/Ostrov. Selected tools. 1–29: Backed tools. 1–29: Enlarged (1:2). 1–8, 10–24, 26–28: Spongolite, 9, 25: Jasper, 29: Chalcedony weathering product of serpentinites. Drawings by L. Dvořáková, processed by O. Mlejnek.

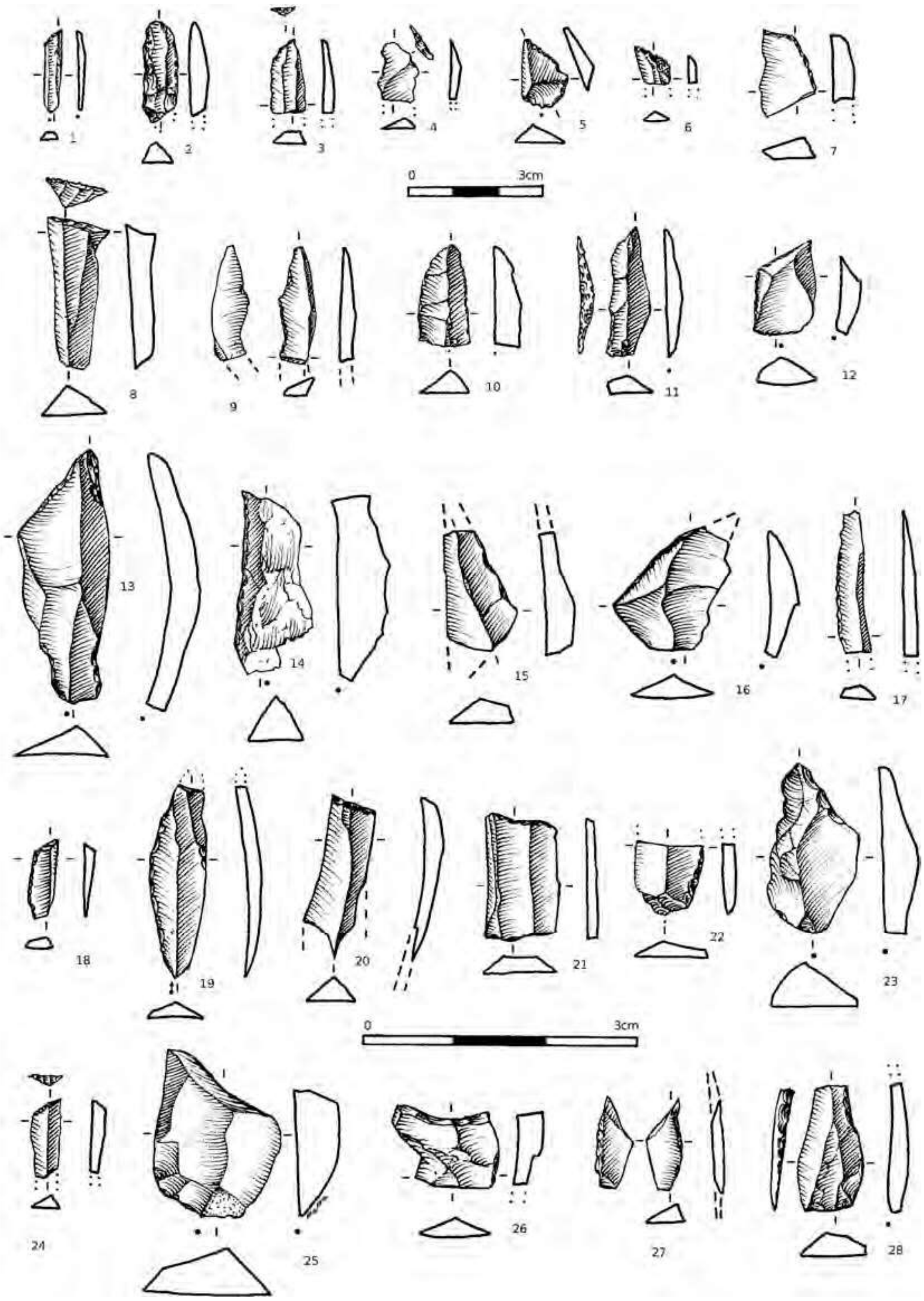


FIGURE 19: Městec/Ostrov. Selected artefacts. 1–8, 10, 12, 14, 16–25, 27: Retouched blades, bladelets, flakes, points and their fragments. 9: Burin spall, 13: Tanged point, 15: Tool fragment, perhaps a triangle, 26: Notch, 28: Atypical microburin. 1–17: Original size (1:1), 18–28: Enlarged (1:2). 1, 8, 9, 11, 13, 19–22, 27: Erratic silicite, 2–7, 10, 12, 14–18, 23–26, 28: spongolite. Drawings by L. Dvořáková, processed by O. Mlejnek.

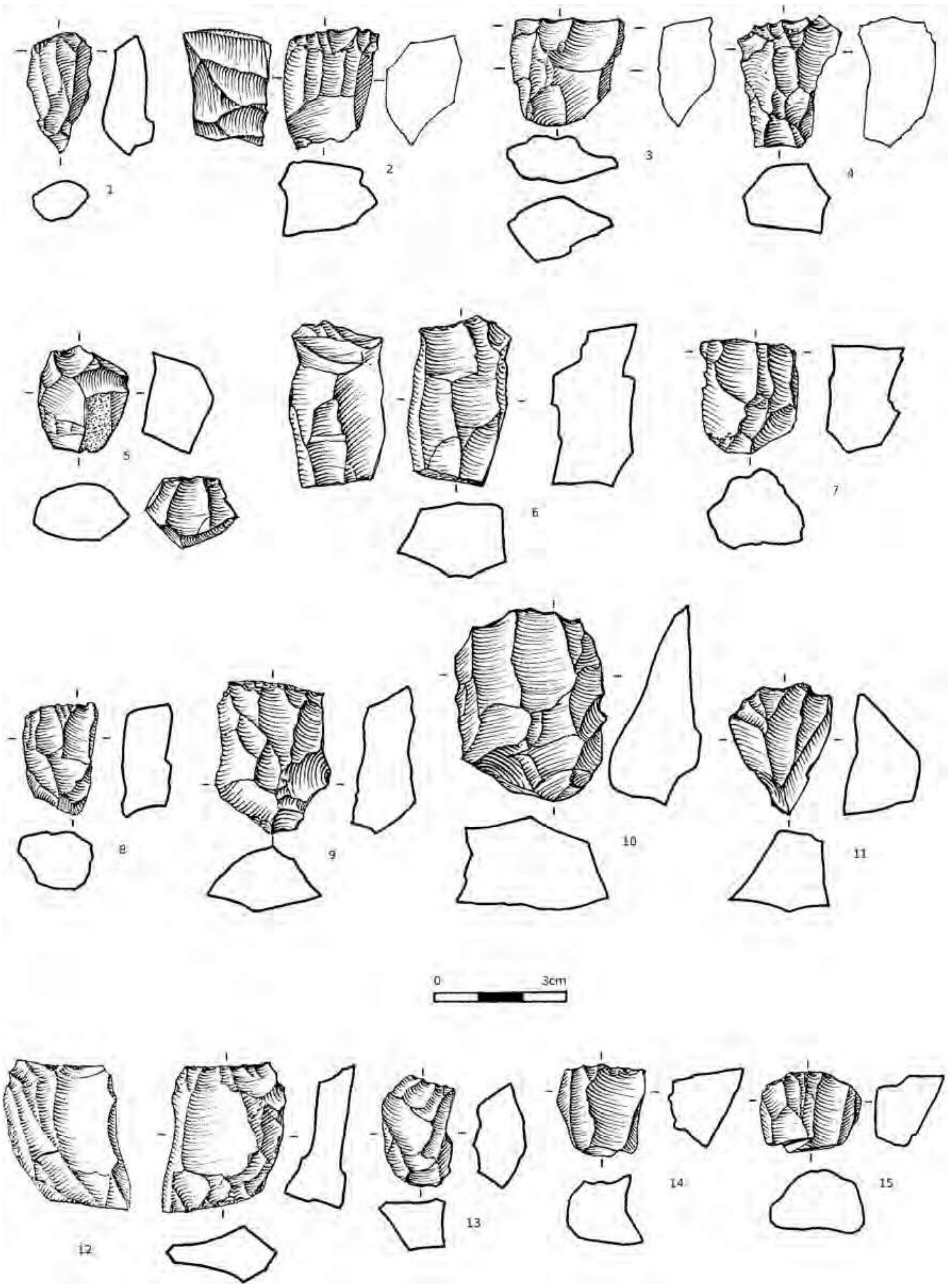


FIGURE 20: Městec/Ostrov. Selected artefacts. 1–15: Cores. 1–15: Original size (1:1). 1–6, 8–12, 14, 15: Spongolite, 7: Radiolarite, 13: Rock crystal. Drawings by L. Dvořáková, processed by O. Mlejnek.

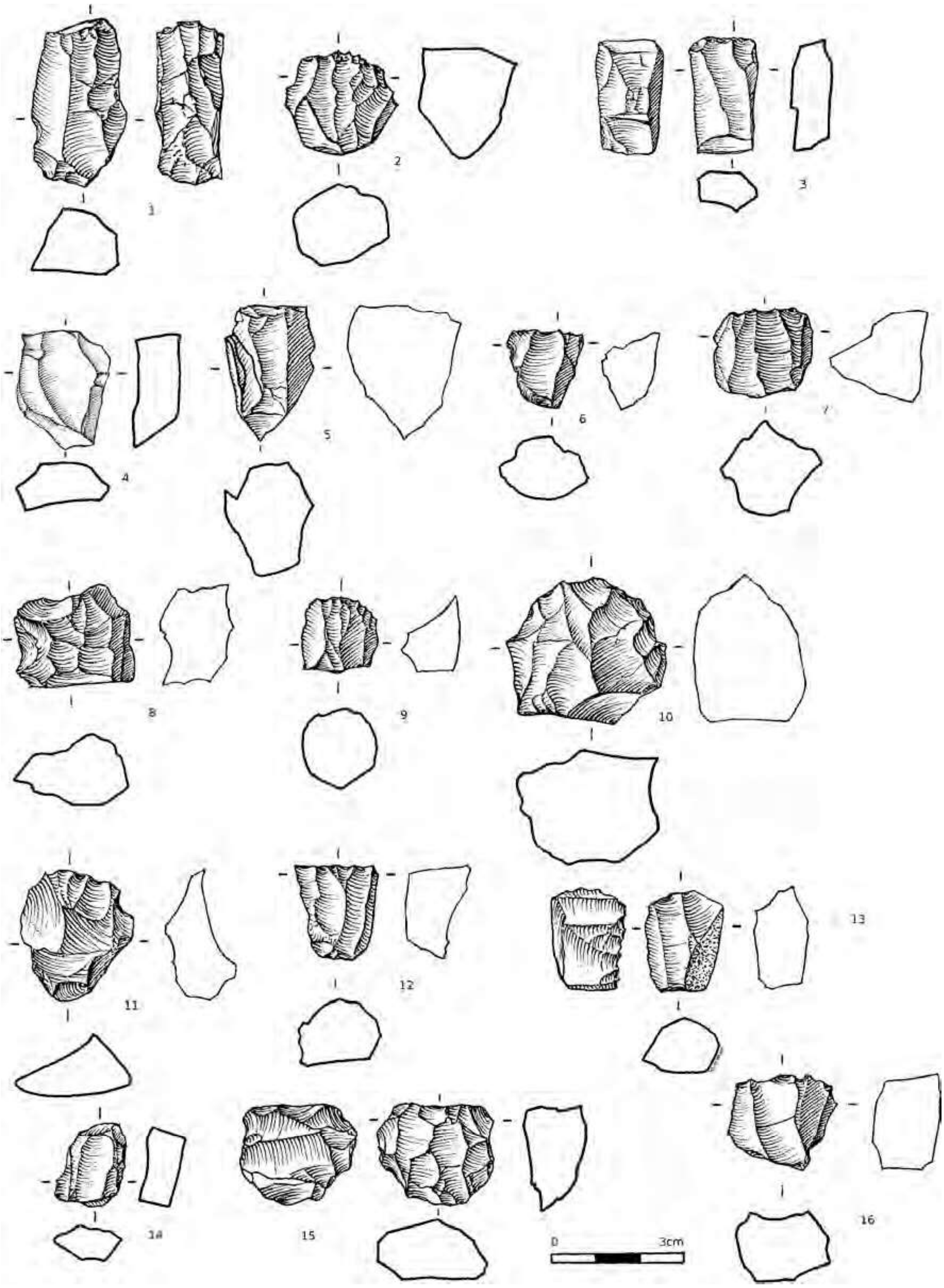


FIGURE 21: Městec/Ostrov. Selected artefacts. 1–16: Cores. 1–16: Original size (1:1). 1–5, 7–9, 12, 13, 15, 16: Spongolite, 6, 11: Jasper, 10: Radiolarian chert, 14: Erratic silicite. Drawings by L. Dvořáková, processed by O. Mlejnek.

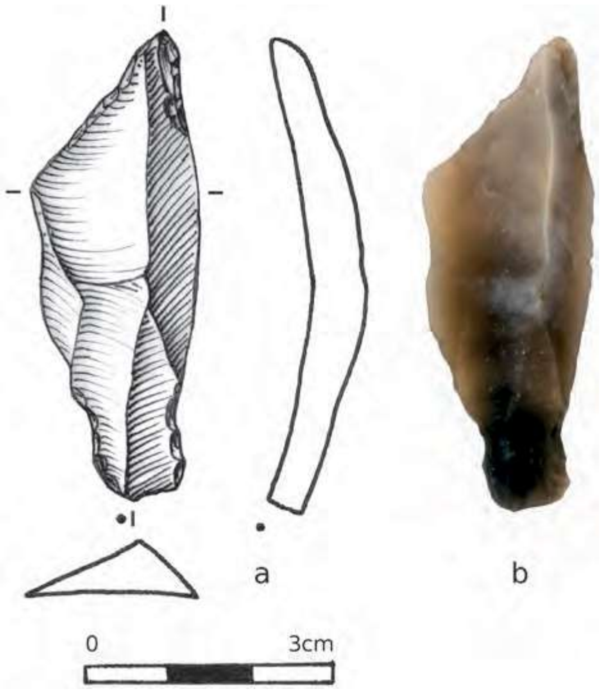


FIGURE 22: Městec/Ostrov. A drawing (a) and a photograph (b) of a tanged tool (artefact number 116). Drawing by L. Dvořáková, photograph by L. Vojtěchovský, processed by O. Mlejnek. Adopted from Mlejnek and Štefanisko 2022: 65.

discussed comprehensively in Mlejnek and Štefanisko (2022: 66–68). Given its dimensions and techno-typological characteristics, this artefact does not appear to fit the microlithic collection and its interpretation remains unclear (Mlejnek, Štefanisko 2022: 71–72).

3.5 Analysis of a spatial distribution of artefacts

The total excavated area was 343 m^2. It was subdivided into the main trench (327 m^2) and four test pits lower down the slope from the main trench, 2 × 2 m in size (*Figure 5*). Due to the secondary deposition of artefacts in the plough horizon and on the boundary between the plough horizon and the underlying sandy gravel terrace, the precise location of each particular artefact was not recorded and the analysis of the vertical distribution of artefacts was not carried out. Two principal values were analysed for horizontal distribution of artefacts. The first value was the absolute number of artefacts found in each particular square meter and the second value was a ratio of artefact numbers to depth in each individual square. Plans of artefact distributions were created using MS Excel 2010 programme (MS Office package) using the method proposed by P. Šída (2012: 76–81, 97–100). In this analysis, the primary focus was on the main trench because all four test pits were situated on the site periphery so artefacts were few in number. The main benefit of these test pits was to delimit the main artefact concentration and they served as an indication of the decrease in artefact numbers in the western direction, that is downslope.

Feature 1 can be clearly distinguished in *Figure 23* where absolute numbers of artefacts are displayed. Given that it was infilled recently (probably during major agricultural works in the 1950s), the infill consists of surrounding soil material containing lithics. The lower part of this depression feature was not disturbed by recent ploughing and the number of artefacts per square meter is higher than elsewhere. Another artefact concentration is also clearly distinguishable to the east of the Feature 1. This second concentration is situated in the AZ 12 sector and nearby surroundings. No depression was observed here during the excavation that could explain this concentration. Therefore, it can reasonably be assumed that the original centre of the site (or perhaps a zone of activities connected with the manufacturing and utilization of lithics) was probably situated easterly of the excavated area.

This hypothesis is also supported by the plan of horizontal distributions of artefacts depicting the ratio of the absolute number of artefacts to excavation depth (*Figure 24*). Compared to the first plan, the concentration in the area of Feature 1 more or less disappears and blends in with surrounding sectors. Therefore, it seems appropriate to consider sectors AX–AZ 12–9 as representing the area closest to the original centre of the site, or perhaps as an area of specialized activities subsequently disturbed by ploughing.

In contrast, Feature 2, which is probably contemporaneous with at least some of the excavated lithics (based on radiocarbon dating results), did not appear on the horizontal distribution plan of artefacts. The filling of this feature did not contain lithics. It is possible that ploughing changed aspects of the horizontal distribution of artefacts and features originally possibly surrounding this pit are no longer visible.

Unfortunately, our excavation impacted just the periphery of the site and the site centre is probably situated in an easterly direction from the highway alignment. From the second plan (*Figure 24*) it is obvious that the number of artefacts decreases with depth downslope in a westerly direction and only isolated

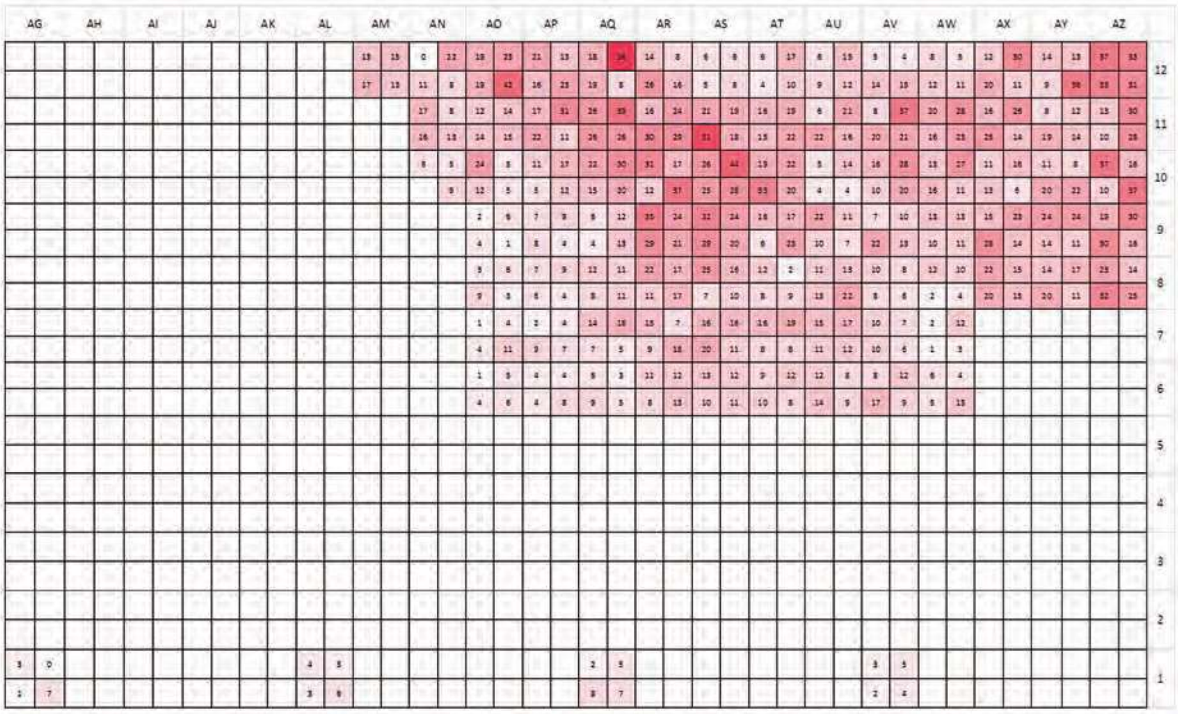


FIGURE 23: Městec/Ostrov. Plan of the horizontal distribution of artefacts based on the absolute number of lithics found in a particular square. Author: V. Záhorák.

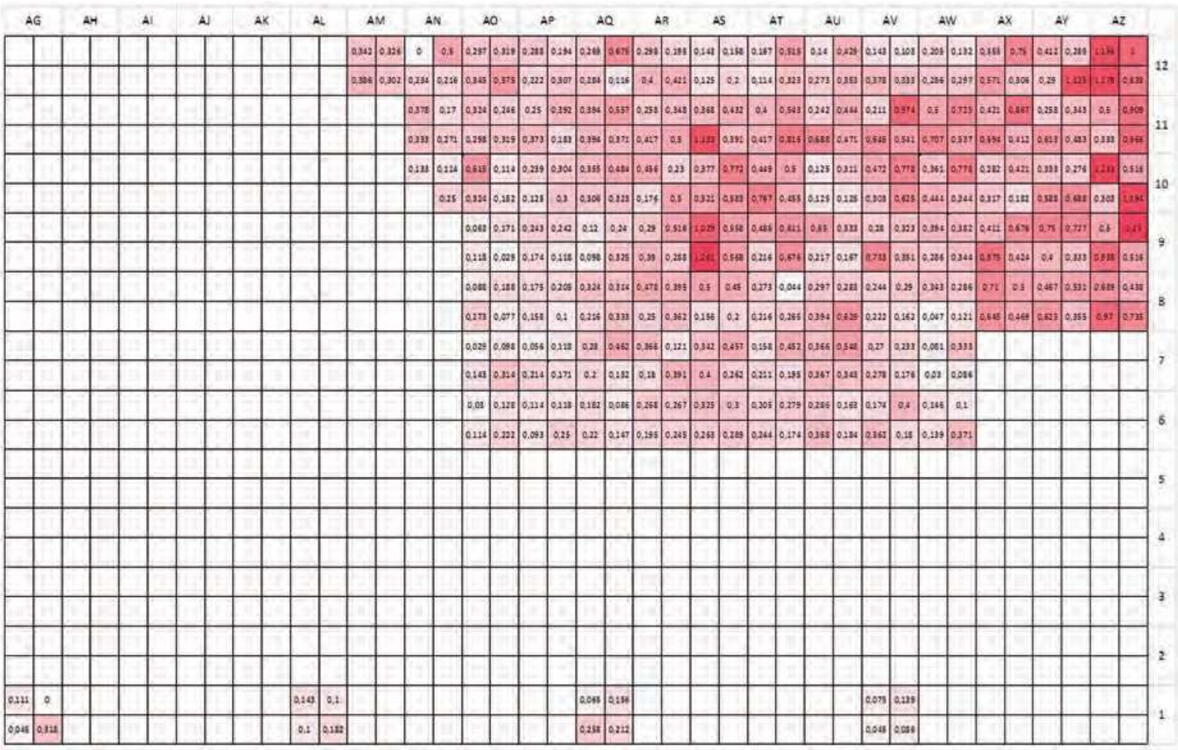


FIGURE 24: Městec/Ostrov. Plan of the horizontal distribution of artefacts based on the ratio of the number of excavated lithics to excavation depth in a particular square. Author: V. Záhorák.

lithics were recovered from the four test pits in row 1. The absolute number of artefacts also declines in the westerly direction (*Figure 23*), although the decrease is less well visible on this plan due to the presence of Feature 1. The only part of the excavated area, where the density of artefacts is possibly comparable to the density of artefacts on the field in the east direction from the excavation, are sectors AX–AZ 12–9. In this part of the excavated area, we did not see any decrease in the number of recovered artefacts in the direction to the boundary of the excavation. Unfortunately, it was not possible to extend the excavated area in this direction due to time limits.

A detailed analysis of the horizontal distribution of artefacts according to individual raw materials was also performed. The main aim of the analysis was to find out if there were any differences in the spatial distribution of specific raw materials, where the evidence could be argued to indicate specific events such as multiple occupations of the site. The spatial analyses were especially focused on the distribution of spongolite of the Ústí nad Orlicí type, which was commonly used in this region during the Mesolithic period. This can be compared to the distribution of silicites from glacial sediments, which are the most abundant raw material at eastern Bohemian Late Palaeolithic sites. However, no significant patterning in the horizontal distribution of specific raw materials was observed.

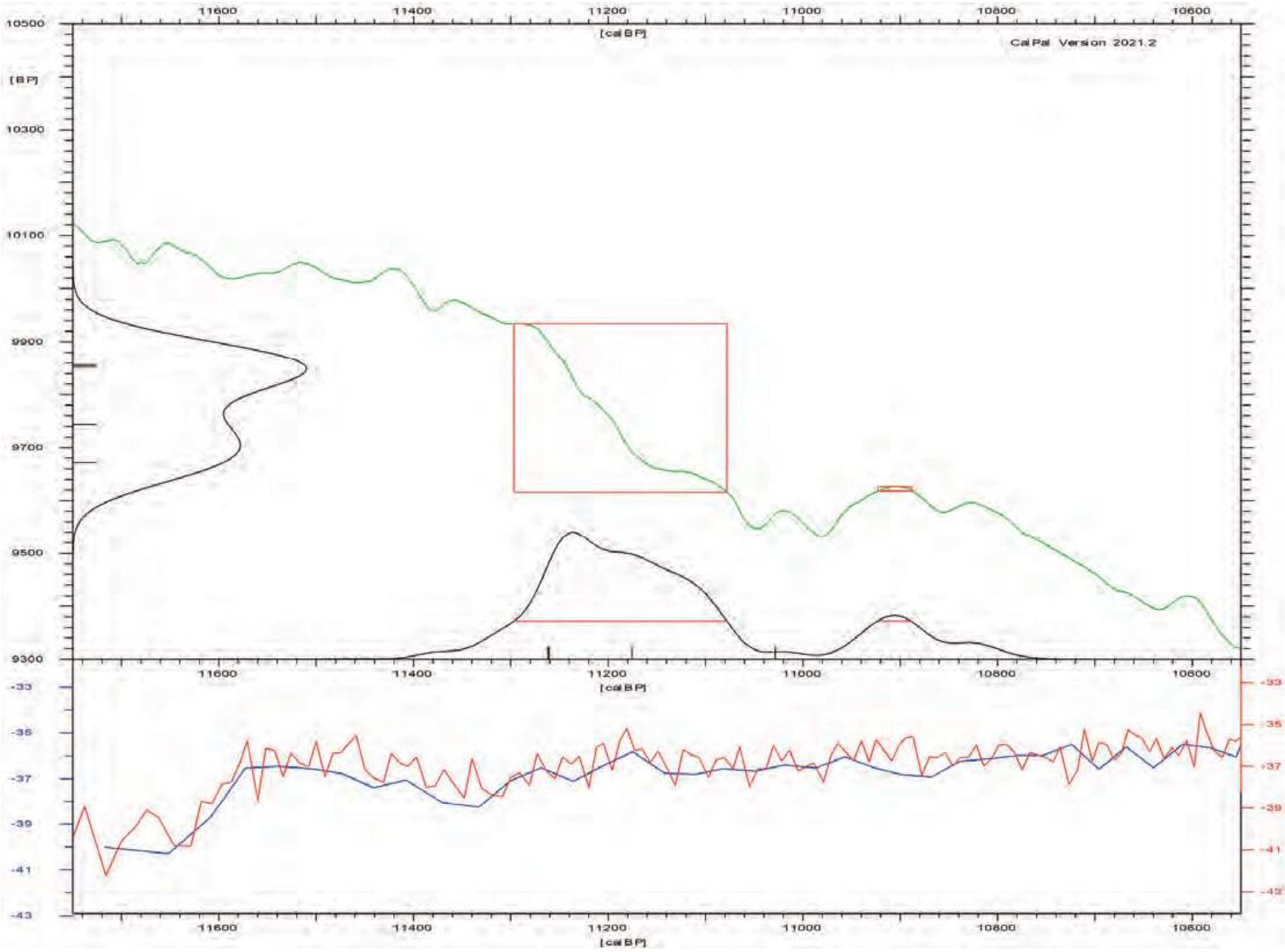
3.6 Radiocarbon dating

Several samples of charcoal collected during the excavation were submitted for radiocarbon dating. Two charcoal pieces from Feature 1 (a depression probably filled with recent material during agricultural activities) were determined by R. Kočárová as plum tree (*Prunus* sp.), which eliminated the possibility of a prehistoric age, so they were not sent for radiocarbon analysis. Another seven charcoal samples were collected from Feature 2 (smaller pit filled with sandy sediment containing charcoal). Determinations by R. Kočárová assigned all of these charcoal pieces to pine (*Pinus silvestris*). Based on this information, four of these samples were submitted to Debrecen (Hungary) AMS radiocarbon laboratory for analysis. The results are presented in *Table 18*.

Resulting ages, calibrated in the CalPal programme, version 2021.2 (Weninger 1986, Weninger, Jöris 2008), significantly overlap. In combination with the uniform species determination of the charcoal samples, it is probable that they come from the same hearth. *Graph 1* depicts a calibration of all four radiocarbon dates calculated using IntCal20 calibration set (2-sigma confidence, Reimer *et al.* 2020) compared to the climatic curves GISP2 $^{18}O/^{16}O$ (Grootes, Stuiver 1997) and GRIP-SS09 $^{18}O/^{16}O$ (Vinther *et al.* 2006). Based on this calibration curve, it appears that the dates form two groups with peaks around 9250 BC cal and 8900 BC cal. However, the younger peak is apparently merely a result of a large standard deviation in the youngest date (9360–8800 BC cal), which is caused by the irregularity of the calibration curve due to the radiocarbon plateau at around 9000 BC cal. Since all the outstanding dates belong to the older peak, we favour the interpretation that all four charcoal pieces are from wood of approximately the same age – pine trees that died circa in 9250 BC. Therefore, it was possible to determine the dating of the excavated feature with good accuracy as belonging to the first half of the Preboreal period, beginning with a distinct warming at the boundary between the Pleistocene and the Holocene periods (cf. *Graph 1*). Based on the radiocarbon dating of this feature, at least some of the excavated lithic collection would be expected to be of Early Mesolithic (Preboreal) age.

Excavated sites absolutely dated to the Early Mesolithic of the Preboreal age are not common in the Bohemian archaeological record and moreover, most of them date to the second half of the Preboreal period (*Table 19*). Recent excavations conducted by a team lead by J. Svoboda in Northern Bohemian sandstone rock shelters delivered a group of Preboreal dates documenting an Early Mesolithic settlement horizon in the Bohemian Switzerland National Park and in the Česká Lípa Region. A radiocarbon date from Nízká Lešnice in the Polomené hory Mountains near Česká Lípa (10710–9110 BC cal; Svoboda ed. 2003) possibly belongs to the end of the Late Palaeolithic (Younger Dryas). However, the large standard deviation of this date does not exclude an Early Preboreal age. Another Late Preboreal date from the Česká Lípa Region comes from the Údolí samoty rock shelter (8770–8490 BC cal, Svoboda ed. 2017: 75). In the Bohemian Switzerland, Preboreal radiocarbon dates come from rock shelters Smolný kámen, Kostelní rokle 2, Janova zátoka, Dvě věže and Okrouhlík 1 (see *Table 19*).

Most recently an Early Mesolithic settlement was recorded also in the Bohemian Paradise from excavations lead by P. Šída (Šída, Pokorný eds. 2020). Preboreal radiocarbon dates were obtained from excavations in the Valečov I and Velký Mamuťák rock shelters. Two more Preboreal dates were obtained from drill cores from the Duhová brána and Východní Vránovy rock shelters (*Table 19*).



GRAPH 1: Radiocarbon dates from Městec/Ostrov calibrated using the CalPal programme, version 2021.2 (Weninger 1986, Weninger, Jöris 2008) and calibration dataset IntCal20 (Reimer *et al.* 2020). In the lower part of the graph the climatic curves GISP2 $^{18}O/^{16}O$ (blue curve, Grootes, Stuiver 1997) and GRIP-SS09 $^{18}O/^{16}O$ (red curve, Vinther *et al.* 2006) are depicted. Distinct warming at the Pleistocene/Holocene boundary is well visible on both climatic curves at around 9600 BC cal (11600 BP cal).

TABLE 18: Radiocarbon dates from the Městec/Ostrov site calibrated using the CalPal programme, version 2021.2 (Weninger 1986, Weninger, Jöris 2008) and calibration dataset IntCal20 (Reimer *et al.* 2020).

ID	Site	Dated material	Lab number	Uncalib. date BP	Deviation	Age BC cal, 2σ
M/O02	Městec/Ostrov	Pine charcoal fragment from pit number 2	DeA-25068	9856	38	9390–9230
M/O03	Městec/Ostrov	Pine charcoal fragment from pit number 2	DeA-25069	9744	43	9330–9130
M/O04	Městec/Ostrov	Pine charcoal fragment from pit number 2	DeA-25070	9672	39	9360–8800
M/O07	Městec/Ostrov	Pine charcoal fragment from pit number 2	DeA-25071	9852	41	9390–9230

TABLE 19: Radiocarbon dates from Bohemian Early Mesolithic (Preboreal) sites calibrated using the CalPal programme, version 2021.2 (Weninger 1986, Weninger, Jöris 2008) and calibration dataset IntCal20 (Reimer *et al.* 2020). Uncalibrated dates are based on table by P. Šída (Šída, undated: 23) and other publications cited directly in the table.

Site	Cadastral territory	Region	Dated material	Lab number	Uncalib. date BP	Deviation	Age BC cal, 2σ	References
Nízká Lešnice	Zátyní	Česká Lípa Region	Charcoal concentration, 120 cm deep	GrN-24210	10 160	190	10710–9110	Svoboda (Ed.) 2003: 81
Švarcenberk 11	Ponědrážka	Třeboň Region	Wooden artefact in lake sediments	Crl-6093	9639	112	9380–8660	Pokorný *et al.* 2010: 23
Kostelní rokle 2	Jetřichovice	Bohemian Switzerland	Charcoal, 185–200 cm deep	Poz-73457	9580	50	9240–8720	Svoboda (Ed.) 2017: 75
Smolný kámen	Vysoká Lípa	Bohemian Switzerland	Charcoal, 80–90 cm deep	Poz-73454	9580	60	9260–8700	Svoboda (Ed.) 2017: 75
Smolný kámen	Vysoká Lípa	Bohemian Switzerland	Mollusc shell, 90–100 cm deep	Poz-78122	9580	50	9240–8720	Svoboda (Ed.) 2017: 75
Švarcenberk 11	Vysoká Lípa	Třeboň Region	Burnt pine wood in lake sediments	Poz-16752	9500	50	9220–8580	Pokorný *et al.* 2010: 23
Bacín	Vinařice	Bohemian Karst	Human bones in a rock fissure	OxA-9271	9490	65	9220–8540	Matoušek 2000: 20
Valečov 1	Boseň	Bohemian Paradise	Charcoal, 220 cm deep, drill core	Poz-83380	9490	50	9200–8560	Šída, Pokorný (Eds.) 2020: 224
Smolný kámen	Vysoká Lípa	Bohemian Switzerland	Mollusc shell, 80–90 cm deep	Poz-78121	9480	70	9230–8510	Svoboda (Ed.) 2017: 75
Velký Mamuťák	Branžež	Bohemian Paradise	Pine needle, 244–251 cm deep	Beta-473739	9450	30	8840–8600	Šída, Pokorný (Eds.) 2020: 267
Údolí samoty	Radvanec	Česká Lípa Region	Charcoal, 180 cm deep	Poz-43849	9360	50	8770–8490	Svoboda (Ed.) 2017: 75
Švarcenberk 11	Ponědrážka	Třeboň Region	Burnt hazel nut in lake sediments	Poz-16753	9280	50	8680–8320	Pokorný *et al.* 2010: 23
Valečov 1	Boseň	Bohemian Paradise	Pine cone, 140–145 cm deep	Poz-83379	9250	60	8660–8260	Šída, Pokorný (Eds.) 2020: 224
Janova zátoka	Jetřichovice	Bohemian Switzerland	Charcoal, 25 cm deep	Poz-23176	9250	60	8660–8260	Svoboda (Ed.) 2017: 75
Smolný kámen	Vysoká Lípa	Bohemian Switzerland	Charcoal, 100–110 cm deep	Poz-73455	9250	50	8640–8280	Svoboda (Ed.) 2017: 75
Smolný kámen	Vysoká Lípa	Bohemian Switzerland	Charcoal, 60–70 cm deep	Poz-73453	9240	50	8630–8270	Svoboda (Ed.) 2017: 75
Valečov 1	Boseň	Bohemian Paradise	Pine cone, 120–125 cm deep	Poz-83377	9240	50	8630-8270	Šída, Pokorný (Eds.) 2020: 224
Dvě věže	Jetřichovice	Bohemian Switzerland	Charcoal, 60–70 cm deep	Poz-73460	9220	50	8610–8250	Svoboda (Ed.) 2017: 75
Dvě věže	Jetřichovice	Bohemian Switzerland	Charcoal, 50–60 cm deep	Poz-73458	9220	50	8610–8250	Svoboda (Ed.) 2017: 75
Okrouhlík 1	Růžová	Bohemian Switzerland	Charcoal fragment from a pit number 6	GrA-19163	9170	70	8590–8230	Svoboda (Ed.) 2003: 81
Východní Vránovy	Branžež	Bohemian Paradise	Hazel nut shell, 80–110 cm deep, drill core	CRL 19_087	9143	33	8480–8240	Šída, Pokorný (Eds.) 2020: 510
Duhová Brána	Branžež	Bohemian Paradise	Charcoal, 135–165 cm deep, drill core	CRL 19_074	9135	28	8440–8240	Šída, Pokorný (Eds.) 2020: 498

Three Preboreal dates were also obtained from the Švancenberk 11 site near Třeboň in southern Bohemia (see *Table 19*). During the Mesolithic period, there was a lake in this area with people living around the edges (currently a dam; Pokorný *et al.* 2010: 23).

Finally, one more Preboreal radiocarbon date (9220–8540 BC cal) was obtained from Bacín Hill in the Bohemian Karst in central Bohemia, where human bones deposited in a rock fissure were found (Matoušek 2000: 20). It is the only evidence of possible funerary practices in the Bohemian Mesolithic.

4. DISCUSSION

4.1 Dating of the lithic assemblage

In this section we would like to address the dating of the lithic industry and the question of its homogeneity/heterogeneity.

In considering the age of the Městec/Ostrov collection we can begin with the radiocarbon dating results of the pine wood charcoal from the Feature 2, which falls into the Preboreal period (around 9250 cal BC). Comparing the raw material composition and the results of the technological and typological analyses to other dated assemblages in the region (Čuláková 2010, 2015, Vencl 1991), or from other parts of Bohemia (Vencl 2007b, Svoboda ed. 2003, 2017, Šída, Prostředník 2007, Šída, Pokorný eds. 2020, Kapustka *et al.* 2020) and from neighbouring countries (e. g. Svoboda 2008), can also provide clues to its antiquity.

We are primarily interested in comparing the Městec/Ostrov assemblage with other Mesolithic assemblages from the eastern part of Bohemia, which were described by K. Čuláková in her dissertation (2015). Unfortunately, most of the collections from this region are small and undated surface collections. The Hřibojedy site, near Dvůr Králové nad Labem, produced a relatively rich collection (1429 lithics), but it is also undated (Vencl 1991). Radiocarbon dates are available mainly from the Bohemian Paradise Region (Šída, Prostředník 2007, Šída, Pokorný eds. 2020) and from the Česká Lípa Region and Bohemian Switzerland National Park (Svoboda ed. 2003, 2017). Southern and south-western Bohemia are also regions rich in Late Palaeolithic and Mesolithic sites (Vencl *et al.* 2006, Kapustka *et al.* 2020).

Numerous rock shelters with documented Mesolithic occupation have been excavated in northern and north-eastern Bohemian sandstone formations. These sites were excavated by research teams led by Jiří Svoboda (Česká Lípa Region and Bohemian Switzerland National Park) and Petr Šída (Bohemian Paradise Region). Based on the excavation results from the Northern Bohemian rock shelters, Jiří Svoboda recently reworked a chronological scheme for the Bohemian Mesolithic (Svoboda ed. 2017: 14–15, 26–30). He linked the Early Mesolithic with the Preboreal climatic stage (ca 9700–8200 BC cal), the Middle Mesolithic with Boreal climatic stage (ca 8200–6000 BC cal) and Upper Mesolithic with the beginning of the Atlantic climatic stage (ca 6000–5500 BC cal). According to the interdisciplinary research in the Bohemian Paradise, Petr Šída (Šída, Pokorný eds 2020: 585–586) added the Late Mesolithic stage (5500–4000 BC cal), which should be contemporary with Neolithic in the Bohemian lowlands.

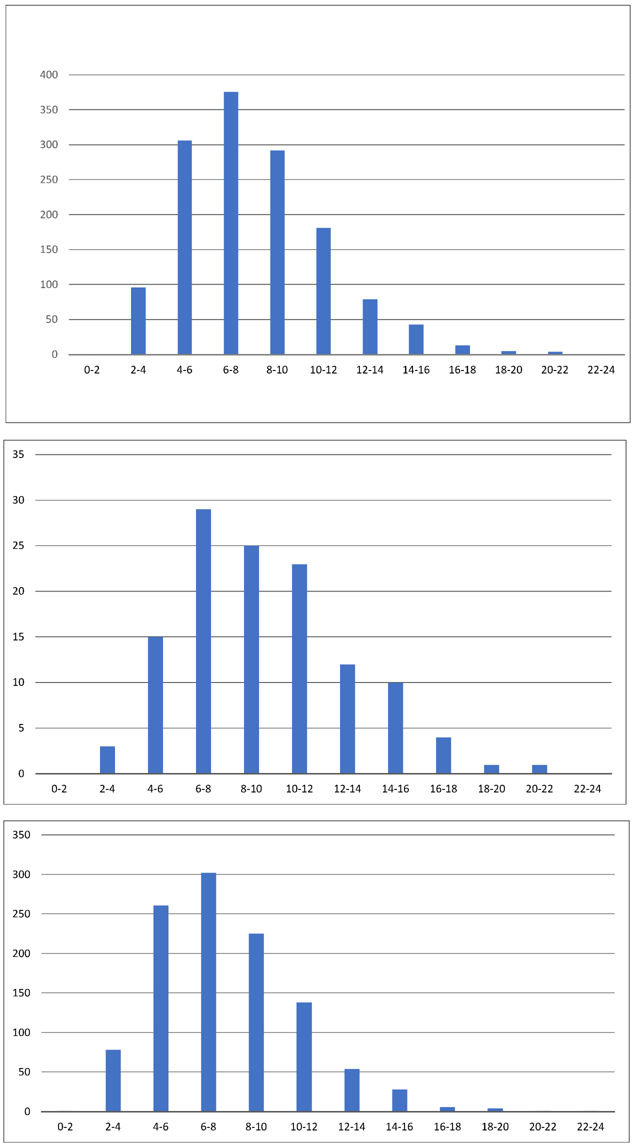
Given the dominance of the eastern Bohemian spongolite of the Ústí nad Orlicí type, the presence of highly exhausted cores and typical microliths, we assume that a substantial part of the assemblage belongs to the Early and Middle Mesolithic. More accurate relative dating is possible due to the presence of a relatively large number of triangles, including elongated pieces, which are typical for the Bohemian Middle Mesolithic of Boreal age (cf. Svoboda 2008: 227, Svoboda ed. 2003: 82–83, Svoboda ed. 2017: 78–79). Presence of obliquely retouched points of the Zonhoven type (cf. Vermeersch 2013), backed bladelets and points suggests Early Mesolithic Preboreal antiquity of at least a part of the assemblage (cf. Svoboda ed. 2017: 74–77). This is also strongly supported by the absolute radiocarbon dating of charcoal from Feature 2. Since the abundance of microlithic triangles is typical at other Central European sites for the late Preboreal and Boreal dating, we are inclined to interpret the excavated site as a repeatedly visited settlement periodically settled by Early and Middle Mesolithic foragers during the Preboreal period through to the subsequent Boreal period, i. e., circa from 9700 to 6000 BC. A unique finding of a tanged tool could suggest occupation of this site as early as at the end of the Late Palaeolithic (Younger Dryas). However, it could also be interpreted as a Mesolithic survival of a tool type that is typically associated with the Late Palaeolithic. It is also plausible that this artefact was found by Mesolithic foragers at an older (Late Palaeolithic) site. A large number of findings (almost 5000 lithics found just in the excavated smaller part of the settlement) and a large area of the site also testify to the long-term occupation of a repeatedly visited locality.

4.2 Homogeneity/heterogeneity of the analysed lithic collection

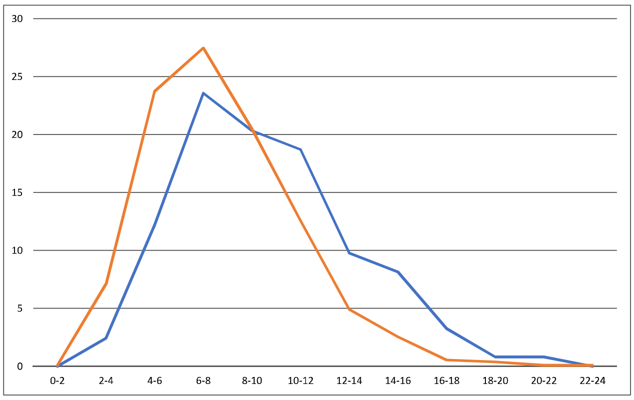
In reviewing the question of homogeneity/heterogeneity of the Městec/Ostrov collection, it is necessary to presume mixing of several settlement phases. Given the large number of artefacts, we could assume periodically repeated visits of the site by hunters, fishermen and gatherers of the Early and Middle Mesolithic and perhaps also Late Palaeolithic. The site is located in a strategic position on a sandy gravel terrace above the Loučná River which is consistent with Mesolithic settlement strategies. It is not clear if the site was settled during other periods of prehistory. An isolated white patinated blade (*Figure 16:4*) could represent possible Upper Palaeolithic admixture. There may be other Late Palaeolithic elements in this assemblage (cf. Vencl 2007a, Moník 2014). These could include several slightly patinated flint bladelets and perhaps also thumbnail end scrapers, but mainly the flint tanged tool (*Figure 19:13, Figure 22*) could be considered as representative of the Late Palaeolithic component. Chronologically, this tool could be connected with the technocomplex with tanged points (Younger Dryas Stadial, circa 10900–9600 BC cal) from the end of the Last Glacial. Typologically, however, this find does not correspond to any of the defined tanged point types (cf. Sauer, Riede 2018) and moreover a functional analysis has proven that this tool was actually used (at least at the end of its use life) for drilling and cutting rather than as a projectile (Mlejnek, Štefanisko 2022). Nevertheless, it could be interpreted as evidence of a Late Palaeolithic intrusion in the Mesolithic collection.

It is well known from other single occupation sites that during the eastern Bohemian Late Palaeolithic period, erratic silicites were the raw material of choice (Vencl 2007a: 117, Moník 2014), while during the Mesolithic period people preferred local materials (Vencl 2007b: 148). In the eastern part of eastern Bohemia, the local materials of choice were spongolites of the Ústí nad Orlicí type (Čuláková 2015). A trend towards "microlithization" (i.e., reduction in size of lithics) from the end of the Upper Palaeolithic to the Mesolithic can be observed. The Late Palaeolithic artefacts are thus larger (on average), than the Mesolithic artefacts. Given that there was no difference observed in the horizontal distributions of erratic silicites and spongolite artefacts (see above), we focused on the analysis of artefact dimensions (*Graph 2*). Erratic silicites are, on average, a higher quality knapping material than spongolites so it could reasonably be expected that artefacts made of erratic silicites will have smaller dimensions (or at least the same dimensions) compared to artefacts made from spongolite. The analysis of blade, bladelet and microblade widths, which were the targeted semi-products in the chaîne opératoire during the Late Palaeolithic and the Mesolithic periods, seemed the most appropriate dimension for this purpose. As visible on *Graph 3*, where erratic silicite and spongolite blade widths are compared, the average blade width of erratic silicites is greater than the blade width of spongolites. This could indicate the presence of a Late Palaeolithic component. On the other hand, K. Čuláková noticed a similar trend at other Mesolithic sites in the region, specifically at sites on the cadastral territories of Horní Sopotnice and Dolní Sopotnice (Čuláková 2010: 65). She suggests that the reason for the artefact size difference could be the cubic weathering pattern of typical spongolites of the Ústí nad Orlicí type. This property makes these spongolites particularly suitable for the production of small-sized lithics and it is almost impossible to produce larger artefacts from this raw material (*ibid*). We also favour this explanation for the demonstrated size difference.

Based on the previously presented arguments, the presence of the Late Palaeolithic component in the analysed collection seems possible. However, regarding the certain presence of the Early Mesolithic of the Preboreal age at the site, which is evidenced by the radiocarbon dating and which directly follows the Late Palaeolithic, it is also possible that the Late Palaeolithic elements in the assemblage (especially the tanged tool) represent only a Late Palaeolithic reminiscence and the site was not actually inhabited by prehistoric foragers until the Preboreal period of the Early Mesolithic.



GRAPH 2: Městec/Ostrov. Histograms of blade widths – all raw materials (upper graph), blades made from erratic silicites (middle graph) and blades made from spongolite (lower graph), in millimetres.



GRAPH 3: Městec/Ostrov. Comparison of histograms of blade widths. Blades are made from spongolite (red line) and erratic silicites (blue line). X-axis represents blade width intervals in millimetres, Y-axis represents blade percentages of particular width in the collection.

Another research problem is the likely presence of post-Mesolithic artefacts in the lithic collection. The three artefacts made of the Cracow-Czestochowa Jurassic silicites are likely to be of Neolithic age. These artefacts include a non-patinated fragment of a flake used as a core, mesial fragment of a blade and a distal fragment of a flake found on the surface. These artefacts are relatively large with surfaces appearing fresh and no other artefacts in the collection are made from this raw material – these characteristics are consistent with a Neolithic admixture. Perhaps they could be more precisely dated to the younger phase of the Linear Pottery Culture, when the import of this raw material to Bohemia, Moravia and Silesia culminates (Přichystal 2013: 103).

A Neolithic age could also be considered for the five artefacts made of radiolarite of the Szentgál type. All these finds come from the excavated collection, they are of rather small dimensions and lithics made of this raw material were also found at two other eastern Bohemian Mesolithic sites Dolní Sloupnice 2 and Kornice 1 (Čuláková 2010: 52, 2015: 149). For these reasons we favour their Mesolithic age.

5. CONCLUSIONS

As part of a salvage archaeological excavation in the proposed highway D35 alignment, a collection of 5124 lithics mostly of a Mesolithic age have been obtained from the field called "U Stříbrníku", near the railway station Uhersko, on the cadastral territories of Městec and Ostrov. A total of 4982 lithics were obtained during the actual excavation and an additional 142 artefacts were found during surface surveys in the surroundings of the excavated area. This article presents results of the excavation, radiocarbon dating and the analysis of the lithic assemblage.

The artefacts were recovered from a secondary position in the plough horizon and on the boundary of the plough horizon and underlying sandy gravel terrace, which significantly limited the possibilities of the application of scientific analyses and absolute dating. However, several indicators point to a Mesolithic age of these artefacts. One area of the site contained a pit in the terrace with *in situ* material – sandy sediment containing pine wood charcoal (*Figure 6*). Four charcoal pieces were radiocarbon-dated to the Early Mesolithic of the Preboreal age (circa 9250 BC cal). Several excavated burnt lithic artefacts could be potentially used for obtaining more absolute dates using the thermoluminescence dating method.

Spongolite of the Ústí nad Orlicí type was the prevalent raw material used at the site. The presence of Moravian spongolites with their primary outcrops in the surroundings of Bořitov, is also likely (unfortunately, it is not possible to distinguish them reliably from the weathered spongolites of the Ústí nad Orlicí type). Silicites of glacigenic or glacial sediments (erratic silicites, mainly flint), quartz, rock crystal and jasper were also ubiquitously represented. Other raw materials, such as porcellanite, radiolarite, orthoquartzites of the Skršín and Bečov types, Krumlovský les II type chert, Permian limnosilicite of the Hřibojedy type etc. were all represented by a small number of artefacts. Dominance of local or semi-local raw materials in the lithic collections is typical for Central European Mesolithic sites (cf. Vencl 2007b: 148), however a representation of various imported raw materials is evidence of distinct contacts of a local community.

The *chaîne opératoire* was centred around the production of bladelets from small prismatic cores with an average width of circa 8 millimetres, sometimes reduced to tiny, highly exhausted cores (*Figures 20 and 21*). In several cases, the core orientation changed to achieve maximum utility in core exploitation. The produced bladelets (sometimes even microblades) were subsequently broken into segments, which were afterwards either directly inserted into the armatures of composite tools, or they were retouched first and backed as formal microlithic tools, such as geometric triangles, backed points and backed bladelets. Other tools present (*Figures 14–19*) include end scrapers (flat end scrapers on flakes and blades, thumbnail and round end scrapers), burins (dihedral burins, burins on a break and on a truncation, core and polyhedral burins), splintered pieces and retouched blades, bladelets, microblades and flakes. Other formal tools which were not precisely identified include retouched tool fragments and partially retouched artefacts. A noteworthy find is a tanged tool made of erratic silicite (*Figure 19:13*, *Figure 22*). The results of functional analysis suggest that at least towards the end of its use life it was used as a domestic tool for drilling, whittling and cutting (Mlejnek, Štefanisko 2022). Perhaps the label 'tanged perforator' would be more appropriate (cf. Mateiciucová 2008: 178), given the distinct bilateral retouch on the dorsal side of its distal segment. A finding of this tool type could suggest Late Palaeolithic admixture, or a late survival of this element in an otherwise predominantly Mesolithic assemblage. It may also have been found by Mesolithic foragers at an older (Palaeolithic) site and re-used. Also, it cannot be excluded that it was from the very beginning intended and used as a domestic tool (cf. Pyżewicz 2022: 123).

This article presents basic information about the results of the excavation at Městec/Ostrov. Further publications concerning specific aspects and research questions appropriate for this site and the analysed lithic assemble age will follow. Finally, it would be appropriate to perform a thorough comparison of this lithic collection with the Mesolithic assemblages in the wider region.

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