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QUERNS FROM THE STROKED POTTERY CULTURE AT THE MŠENO SITE (CENTRAL BOHEMIA)

ABSTRACT: From the site of the Stroked Pottery culture settlement at Mšeno, querns (grinding stones), amongst other items, have been found. These are two-part grinding stones consisting of an upper and a lower stone. In terms of their form, according to morphological attributes, there are three basic types (plate-shaped, plano-convex and irregular in shape) and one pseudotype in a saddle shape. Several of them appeared to have symbolic significance. These grinding stones came from various feature types. At the same time, there was no causal link found between the function of the feature from which the quern came and the quern itself. Grinding tools were made of several types of rocks, but mainly of palaeorhyolite, outcrops of which are located at a distance of about 40 km. Various methods and forms of transport of the raw materials are discussed (transport along the River Elbe and then by land, whether the items were obtained by barter or theft, or by some cooperative mission to the sources), the possibility of the back side of the plano-convex querns being used for specific purposes is also discussed.

KEY WORDS: Neolithic – Stroked Pottery culture – Double querns – Typology – Mšeno site – Central Bohemia

INTRODUCTION

The long-term archaeological excavation on the southern edge of the town of Mšeno in Central Bohemia has revealed the remains of settlements from various periods of prehistory, but especially from the period of the Stroked Pottery culture (SPC). The above-mentioned settlements represent a larger section of the development of the Stroked Pottery culture, namely the later phase of the early stage and the late stage, which is characterized by evidence of settlement activity and to a lesser extent burial activity. These have already been covered in detail elsewhere (especially Lička 2016, 2019a, 2019b).

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Macrolithic objects, of which in Mšeno there are querns, hammer stones/percussors, stone platforms, smoothing tools, whetstones, axes and axe-like tools (traditionally called polished stone industry), knives and artifacts of an unknown function, have only recently been addressed. In summary, this means that all the artifacts we are dealing with are stone artifacts, with the exception of the stone chipped industry (Adams *et al.* 2009). Some of these were also or mainly used for the production of other tools and equipment (whetstones, hammer stones/percussors), others mainly for food preparation (especially querns), others mainly for wood processing (axe tools), the rest for other activities. Many of them are more and others less inclined to multifunctional use. In the following text, we will focus almost exclusively on querns from the SPC period, unless otherwise stated. For all artifacts, the rocks from which they were made have been identified. At the same time, the nearest deposits were sought for the raw material resources.

QUERNS, SEMI-FINISHED PRODUCTS AND RAW MATERIALS FOR THEIR PRODUCTION

The study of querns, which is based on a broad find base and often involves the determination of raw materials and knowledge from other disciplines, has gained momentum in recent decades (eg Zimmermann 1989, Hamon 2006, Ramminger 2007, Graefe 2009, Lenneis 2010). In our country, the first works of this level arose as part of the elaboration of a large-scale Neolithic agglomeration in Bylany near Kutná Hora (Pavlů, Rulf 1991, Pavlů 2000). These were followed by other works (eg Řídký, Biçakçi 2011, Lička *et al.* 2014, Řídký *et al.* 2014). From a methodological point of view, P. Šída (2007b) demonstrated a comprehensive approach to the matter, when he processed all stone artifacts, chipped and macrolithic, in a broader chronological scope in the defined area.

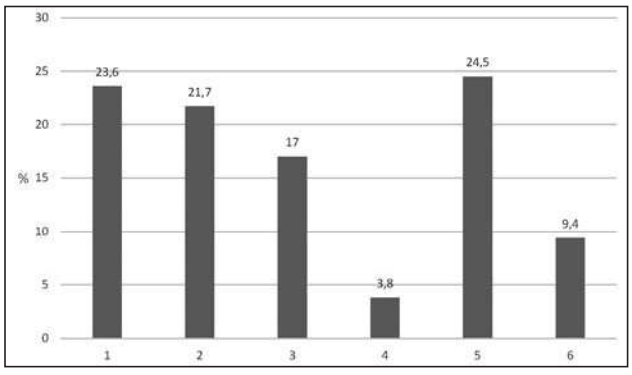
General characteristics of artifacts

The overall characteristics of the artifacts are based on the evaluation of selected diagnostic attributes, which we used for the first time in the processing of querns and other macrolithic artifacts from the settlement of the Linear Pottery culture (LPC) in Kosoř near Prague (Lička *et al.* 2014). At this point, given the limited scope of the article, we will focus on just a few of them.

Querns and stone raw material numbering 159 pieces (excluding three unique finds) come from a total of 52 features, which, in addition to one (generally prehistoric), belong to the Stroked Pottery culture. Two thirds (67.3%) of them are finished products and their fragments (in terms of weight about 96%), one third (32.7%) corresponds mostly to the potential raw material for their production, including any fragments and flakes without working surfaces and possibly unrecognized semi-finished products and their fragments (in terms of weight about 4%). The difference between the category of simple quantities and the category of weight is so huge (see below for an interpretation of this phenomenon).

Within the preservation rate of finished products (106 pieces from 38 features), 23.6% are relatively small fragments without further specification, 21.7% are small marginal fragments, 17% are larger marginal fragments, 3.8% are smaller marginal fragments (in connection with authentic edges), 24.5% are larger central parts (again in connection with authentic edges) and finally 9.4% are whole or partly whole pieces, preserved with at least 90% of their original size (*Graph 1*). The high fragmentariness of finished tools indicates that these tools were used until the moment they became completely unusable and fell to pieces. (As is known, this situation also occurred with other Neolithic consumer settlements.) The total *weight of finished querns of the SPC* (105 pcs) is 76,388 g (excluding the specimen from feature 20).

From *a chronological point of view*, according to the weight attribute, 24.6% are objects from the later phase of the early stage (hereinafter only the early stage), 74.5% correspond to the late stage of the Stroked

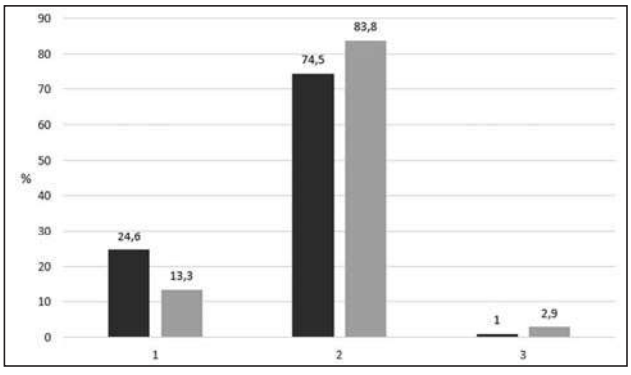


GRAPH 1: Mšeno, district Mělník. Degree of preservation of grinding stones. 1, small fragments; 2, small edge fragments; 3, larger edge fragments; 4, smaller center fragments with a border; 5, larger center fragments with a border; 6, whole (preserved at least 90%).

Pottery culture and the rest (1%) to the SPC in general. A larger difference between the two stages is seen using a simple number criterion: 13.3% are from the early stage, 83.8% from the late stage, and 2.9% from the SPC in general (*Graph 2*). At the same time, the different results obtained with the two attributes within one stage show that in the early stage, in contrast to the late stage, the degree of tool integrity is relatively higher (whether it is whole tools or the size of fragments).

For *comparison with other nearby sites*, querns in a relatively large collection of the SPC, originating from the locality of Vchynice, in the region of Litoměřice (only a few kilometers from the preferred raw material outcrops), includes 62 items (Řídký *et al.* 2014, 279, tab. 2), of which 51.61% belong to finished used products and their fragments, 14.52 % correspond to semi-finished products and their fragments, and the remainder, which represents general flakes, flakes with the remains of a worked tool body and flakes with the remains of a working surface, make up 33.87%. At the same time, within the finished products, only two are complete specimens, and among the semi-finished products, only one piece is complete (Řídký *et al.* 2014, 284).

There is a similar situation by another river at the LPC settlement at Žebrák. There was evidence of production stages at this site and there were raw materials for the production in the vicinity (Stolz *et al.* 2006, 81). For the latter locality, it is indirectly known (*Řídký et al. 2014*, 285) that 71.02% corresponds to production waste, 23.75% to fragments of finished tools and 5.23% to semi-finished products. Whole tools are therefore absent.



GRAPH 2: Mšeno, district Mělník. Representation of finished SPC grinding stones over time and according to weight criterion and number of individuals. 1, early stage; 2, late stage; 3, no distinction between stages. The left column indicates the weight, the right column the number of individuals.

At the LPC settlement in Kosoř, also situated near the Berounka River, but this time a few hours' walk from the raw material source, across the river, the proportion of all tools is around half (42.9%). We see the explanation for the last-mentioned locality, among other things, in the fact that this site was not only a consumer, but perhaps also a producer settlement (originally, we emphasized the production component at the expense of the consumer component, Lička *et al.* 2014: 72).

In contrast, in the LPC settlement agglomeration in Bylany, almost the same ratio was found between whole finished instruments and their fragments as in Mšeno (Pavlů, Rulf 1991: 339).

The shape in the ground-plan (94 pcs.), if it could be determined or estimated at all, falls between a rectangle in the broadest sense (13.8%) and an oval (33%). More than half could not be identified at all due to the number of fragmentary finds (53.2%).

The upper working surface of the querns is almost always concavely shaped in the longitudinal direction (90.2%), but in a few cases appears to be straight and probably only slightly worn. The same transverse working side (50 specimens) largely exhibits a convex shape (68%), to a small extent a straight shape (16%) or concave (14%). One piece could not be determined precisely.

The shape of the occipe (base) part of the querns and the method of working the surface of its top sometimes give the impression that these may have been used for some kind of *working activity*, namely the first stage of grinding, eg for rough crushing of the processed substance. A possible interpretation in this direction can be considered for up to 42% of the upper stones of the querns of this kind. (The reasons for creating a certain shape of the back and the specific working of its surface would therefore not necessarily be sought only in terms of a better grip of the upper stone in the hands during work but could be for it to simply look good.)

In particular, we mean grinding stones, which have the lower surface in the transverse direction continuously convexly rounded and, in the case of the central part, a little rounded to partly straight in the longitudinal direction. At the same time, its surface is more or less carefully worked by a fine-pecking or even a polishing/grinding technique (in this case, we leave aside grinding stones of a large plate-type type, for which, provided the corresponding working scars are

preserved, the oppositional flat surface can clearly be the other working party – Zimmermann 1998, 737, Ramminger 2011, 132, in Mšeno, such a working pair occurred only exceptionally – for the object from feature 195). Crushing into smaller fractions and grinding down the processed substance could thus be done by means of the lower convex side of the upper stone by rolling and fluctuating sideways and forwards/backwards (*Figure 1*, Lička *et al.* 2014: 30, Fig. 5b). However, the opinion that this could have happened is quite rare (Connoly 1994, 27, 29). Relevant indications to support the above hypothesis, although extremely rare, can be found rather in a vibrant culture in the field of ethnology, as can be seen from one photograph showing the crushing of beans (Baudais, Lundström-Baudais 2002: 168, Fig. 14). However, it is not clear whether other millers from Congura, Ethiopia, would also perform the same working movement during the grinding of millet (De Beaune 2000: 93, Fig. 31).

FIGURE 1: Schematic drawing showing the crushing and grinding of material using the convex (back) side of the plano-convex grinding tool, through its rolling and cradle-like movement.

Working traces on the upper surface of the millstones (105 pieces) take the form of grinding/polishing, smoothing, burnishing, scratches, grooves, and small cavities where small mineral grains have fallen out.

Of the recessed tracks on the upper working surface of the stones (49 pieces), working traces perpendicular to the longer tool axis predominate (71.4%), while tracks parallel to the longer tool axis occur only in a small number (10.2%). Leaving aside specimens in which the direction of the working tracks relative to the longitudinal axis is not detectable (16.3%), grinding stones rarely occur, on the working surfaces of which there are working traces that point in both directions (feature 7, 8, *Figure 3: 1*, feature 23).

Some working traces on the surface of the millstones can be qualified as traces of *intentional roughening* by a fine-pecking technique. In the collection from Mšeno, only 24 specimens could be recognized. They occur on the work surface mostly occasionally, less often at its edge or over the entire surface.

Residues of treated organic material on the surface of the grinding stones cannot be detected in the usual way, in contrast to inorganic materials, especially coloured ones. In Mšeno, traces of red dyestuff appeared on three stones (see the paragraph on symbolism below).

The assessment of the grinding stones as upper and lower (102 pieces), whole and fragments, showed that the first category (34.3%) is almost double the second category (18.6%), but with a high number of undeterminable stones (44.1%).

Recognition *of the upper stones*, in contrast to the lower stones, which have been preserved mainly in fragments, is far more reliable, as is usual in other Neolithic localities. Therefore, we can pay more attention to them. *The length* of the measurable upper stones (7 pieces) ranges from 22.5 cm to 36 cm (usually between 23 and 26 cm) and its weighted arithmetic diameter is 26.1 cm. Their width (of 30 measurable pieces) varies between 9 and 18.8 cm and its weighted arithmetic diameter is 13.9 cm (thus representing almost exactly half the average length).

For metric comparisons of the upper stones from Mšeno with finds from other Stroked Pottery culture localities, we can use the collection of artifacts from Vchynice, near Litoměřice, mainly for their width dimension, which ranges between 11.6 cm and 17.9 cm, with an average value of 15.6 cm (Řídký *et al.* 2014: 297). The mentioned range fully coincides with the range for the findings from Mšeno, it is only slightly narrower, in contrast to the average value, which is slightly higher. Not surprisingly, the measurements of 7 measurable pieces from Roztoky near Prague (including finds from the late Lengyel horizon) ranging from 8.5 cm to 14 cm (with one exception ranging from 10 cm to 14 cm) fit into this scheme, with negligible deviations, although the weighted arithmetic diameter of 11.6 cm is relatively low (Pavlů 1991: 249–253, Table 3). A similar situation can be observed in localities with less numerous occurrences of measurable pieces, such as in Černý Vůl (width 11.9–22.9 cm – Řídký 2014: 297).

Upper stones from selected Neolithic localities of the LPC in our territory and in general Neolithic

localities west of our territory show a similar range in the width of the upper stones (examples Lička *et al.* 2014: 23). Most recently for the Neolithic upper stones from Mohelnice, a length between 106 and 344 mm, a width from 66 to 188 mm (Pavlů 2020: 186–187, Fig. 20) are mentioned (including reconstructed dimensions).

All the upper stones listed here from Mšeno, if they could be determined in this way, are two-handed stones (34 pieces). To better grip them during work, the shape of its narrower ends are in the form *of the handle* or *of a bevel* (a total of 11 pieces, *Figure 3: 6*). At the same time, the narrowing in connection with the heavy

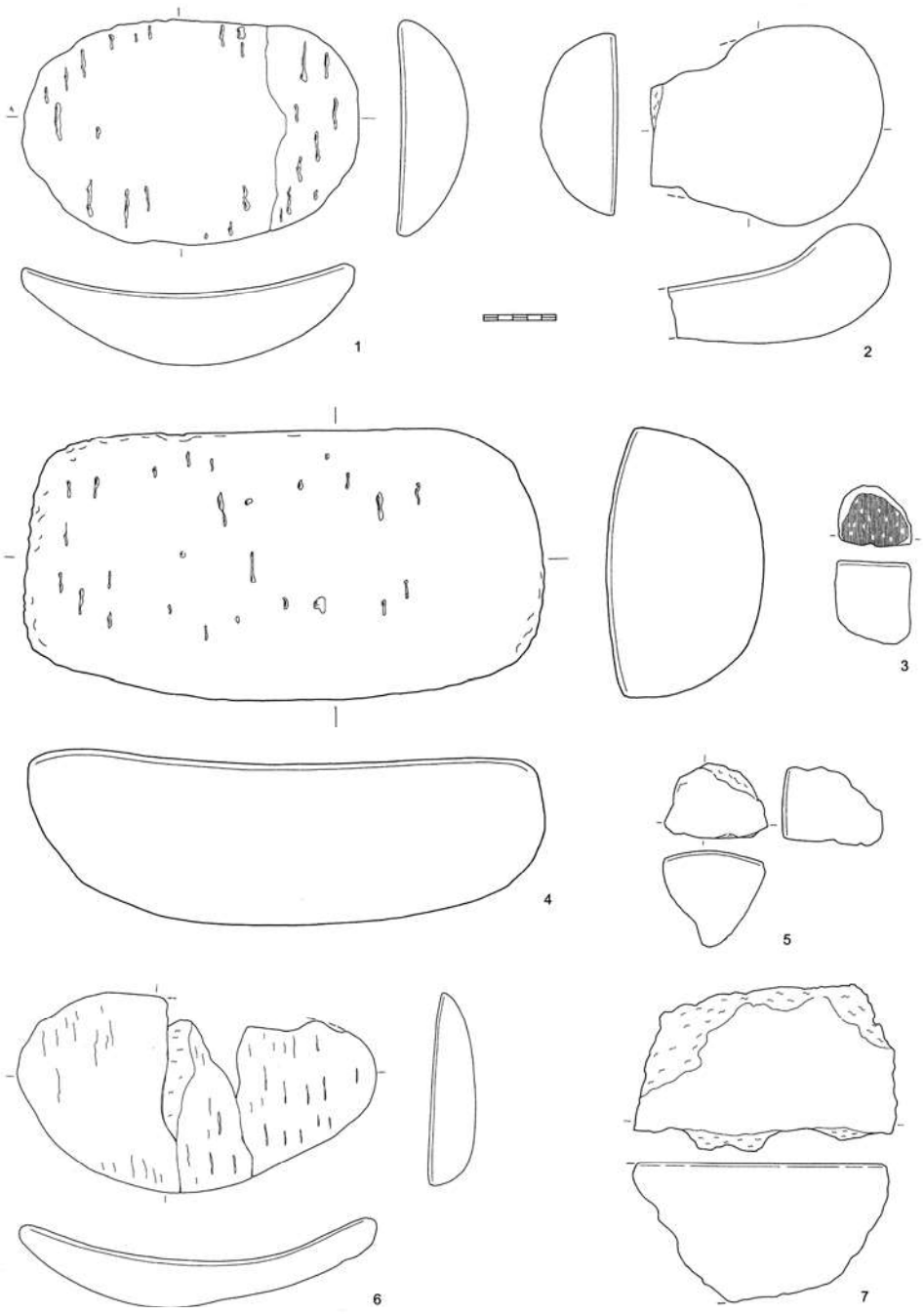


FIGURE 2: Mšeno, district Mělník. Shape spectrum of most grinding tools – selection.

working wear, which manifested itself in the thinning of the tool, was also a weak point in terms of its strength.

Shapes and classification of querns

The overall shape of the querns is based on the purpose for which they were intended and only to a lesser extent on the raw material from which they were made. In the case of finds from Mšeno, an elongated oval to rectangular shape predominates, recognizable especially on the upper stones, which have most often been preserved in sufficient integrity. They can be assessed from two or three basic criteria. According to formal or functional features, or according to features from both approaches together (cf. eg classifications published previously: Zimmermann 1988, Pavlů, Rulf 1991, Lička *et al.* 2014, Řídký *et al.* 2014). Through them, it is possible to characterize the object in its state before use, or in a state deformed after use/wear. From a methodological point of view, these are different categories. Mixing the original shape with the shape deformed by use probably best demonstrates the saddle-shaped pseudotype, although there are other, less pronounced cases (eg a change in the shape of the central part, i.e. in the place where the tool is most worn, see for example the finds from Vchynice, district Litoměřice – Řídký *et al.* 2014: Fig. 2: 2; 15: 5, or from Mšeno the piece from feature 23).

In our area, detailed classifications of artifacts are known mainly from the Neolithic sites at Bylany and Vchynice. The most complete structured scheme, which is based on the functional distinction between upper and lower stones is at Bylany (Pavlů, Rulf 1991: 338–341, Fig. 31). In Vchynice, which are in a way more interesting for us, as they relate to the Stroked Pottery culture, in addition to a similar effort as above, the processing of querns facilitates a more detailed and somewhat differently arranged code system for shapes, details or attributes, accompanied by instructive graphic symbols (Řídký *et al.* 2014: 300–301, Fig. 6–7).

For Mšeno, similarly to Kosoř (Lička *et al.* 2014), we use, among other things due to the smaller number and nature of the finds, a simplification. (However, from a factual point of view, this largely agrees with the situation in Bylany, based on a much larger number of finds – Pavlů, Rulf 1991: 338–341.) We divide the grinding stones into three basic types and one pseudotype according to morphological features. We start from the condition of the millstones before their use, i.e. without deformations caused by wear.

Plate type (1) is characterized (originally) by two straight opposite sides. There are only a small number of these in our collection. Most often, particularly with thicker forms, these are lower stones, which have a lower side that is either broken or only roughly worked.

For the *plano-convex type (2)*, it is characterized by (originally) a straight upper working surface and occipital (rear) convex, always artificially formed. It can be divided into two variants, with a high or low rear, while it is generally not certain whether the low height is the original or only the result of wear of the originally high variant (eg feature 3, *Figure 2: 4*; features 3 + 11, *Figure 2: 6*). For a variant with a high, regularly shaped back side, the term "loaf" is sometimes used. Artifacts of this type usually correspond to the upper grinding stones.

The third *type (3)*, defined somewhat non-systemically, have *an irregular shape*, sometimes accompanied by considerable weight (feature 99, *Figure 3: 2*).

The saddle-shaped pseudotype stands out as being completely outside the system because it differs from the other types mainly in the specific deformation of the working surface caused by long-term work activity (a noticeable concave curvature while maintaining the original surface at the narrower ends). In fact, it is originally a plano-convex, plate-shaped or other shape. (In those cases, if the described deformation was the result of the production process, we would evaluate the situation differently.) In Mšeno, we recorded at least five cases, in weak and in significant forms (eg feature 10, *Figure 2: 2*).

In terms of quantity (87 pieces) more than half belong to plano-convex stones, about a quarter to slabs and one, massive, irregular shape, the rest could not be combined with any of the previous ones. Within them, five can be classified as saddle pseudotype and at least five have a slightly cup-shaped working side, of which the last curves are so gentle that the term mortar-shaped cannot be applied to this. (From this point of view, we could look at those with a cup-shaped side as a subtype.)

Data of an ethnological nature, for example, can suggest a lot about the manufacture of a cup-shaped working side. Grinding equipment (possibly substituted by tools such as a whetstone and stone platform), with the resulting usually smaller cup-shaped depression, deliberately created and completed by a vertical and circular movement of a small crusher/pestle (Hamon, Le Gall 2013: 113), could be used for finer crushing and grinding delicate

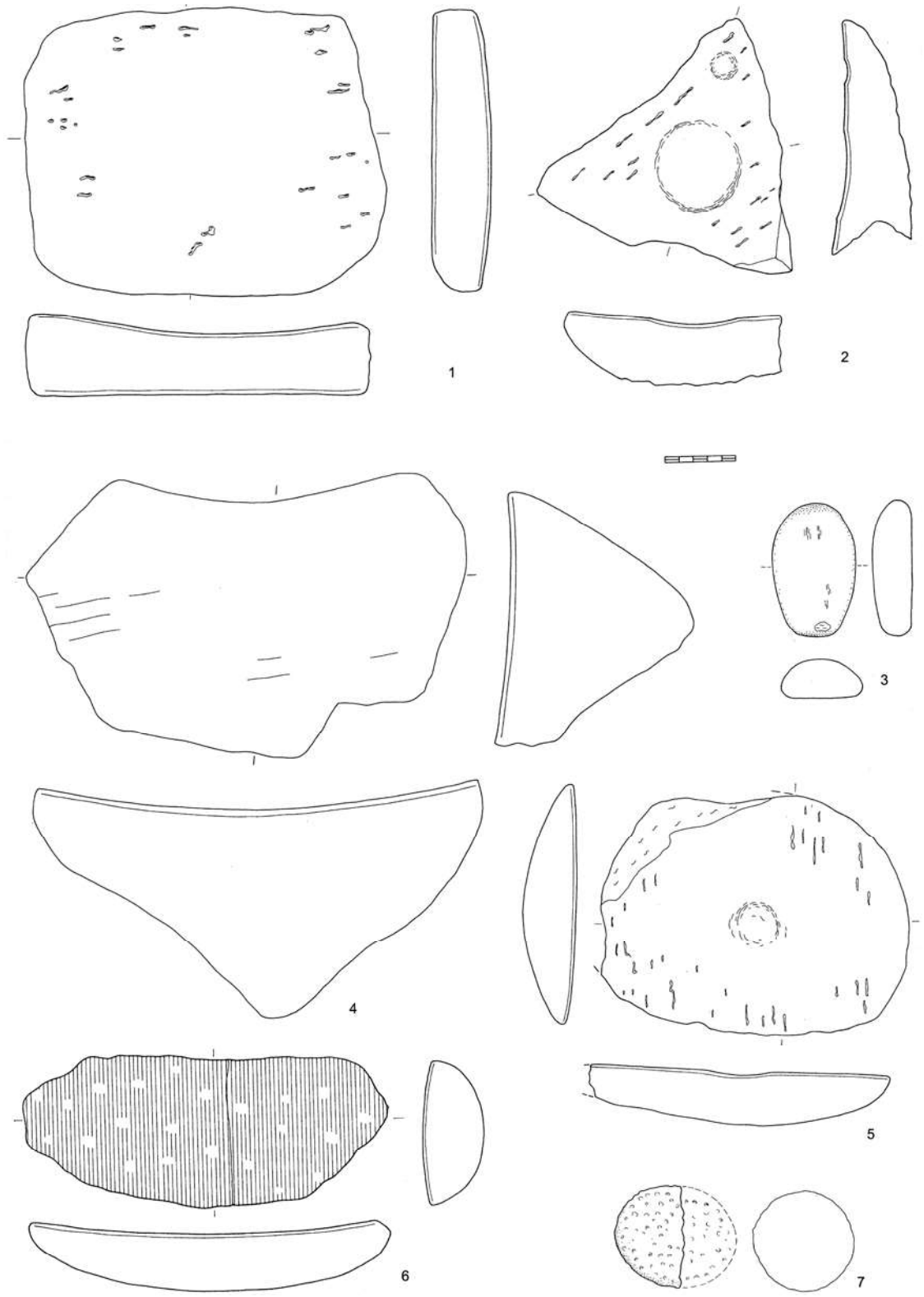


FIGURE 3: Mšeno, district Mělník. Shape spectrum of most grinding tools – selection.

substances, such as spices, etc., in principle in small quantities, for which, for practical and economic reasons, the use of larger equipment did not appear suitable (eg Baudais, Lundström-Baudais 2002: 170, Fig. 17–18).

None of the parts of the querns could be determined as explicitly unused, new (for an almost unused piece from feature 3, see below).

According to another criterion, the top view shape, we distinguish between rectangular (I) and elliptical (II) grinding stones, while the boundary between the two is blurred. Within the rectangular ones, a relatively narrow variant (Ia, *Figure 2: 4*) and a wide one (Ib, *Figure 3: 1*) can be recognized, and similarly within elliptical specimens there is a narrow variant (IIa, eg *Figure 2: 6*) and a broad one (IIb, *Figure 2: 1, 3: 5*). There are indications for a more detailed division (analogously Řídký *et al.* 2014: 286, Fig. 6), as shown by oval shapes narrowed in the middle (eg feature 28), with a predominantly wavy edge (feature 7), with one longer side convex and the other gently concave, resp. narrowed in the middle (feature 8), with one longer straight side, the other convex (*Figure 3: 6*) and with one half wide and the other half narrow (*Figure 2: 6*). At the same time, due to the strong fragmentation of the artifacts and the partial shape changes that occurred due to the wear of the work surfaces, too detailed a sorting does not seem to be sufficiently expedient.

A number of the tools characterized above offer, in terms of functional use in the narrower sense, *a variant solution*. This applies for various reasons (see in particular the sandstone material used, the overall shape of the tool from the top view and side view, the absence of working traces or the presence of specific working traces) in at least 15 specimens, which could be used exclusively or as whetstones (eg *Figure 2: 5*), exceptionally also as small grinders (eg *Figure 2: 3*). In addition to size and some shape elements, the presence or absence of fine-pecking on their working surfaces can also help to distinguish querns from whetstones if they were made of sandstone. If traces of it were preserved, the object was probably used as a mill (*Zimmermann 1998:* 730). Otherwise, the interpretation is directed more towards the function of a whetstone, but not unconditionally. In addition, if the properties of readily available sandstone allowed, the type that was best suited for a possible mill was probably mined (*Table 1* – for example, the specimen from feature 181 represents a quartzed medium-grained sandstone, another piece from the foundation trench of house VII fine-grained to coarse-grained sandstone).

Small tools

As well as the rather large upper and lower grinding stones, small stones exist, one-handed stones, which for formal reasons we usually classify as hammer stones and similar artifacts. Some of them were formed from fragments of larger grinding stones. We preliminarily state that the most distinctive of them have a square or spherical shape. Quadratic ones, which seem to have arisen from fragments of plate-shaped querns (features 10, 145, 188), exceptionally also served to prepare a red powder paint (*Figure 2: 3*). Their working surface is straight to slightly convex. Spherical hand stones/crushers, treated with a dense fine-pecking, are relatively rare, in contrast to hammer stones of a similar shape made of hard and tough raw materials, on a surface without traces of fine-pecking (eg Bartík 2013: 136, fig. 19: 1–6, 12). Similar shapes have been recorded in the Paleolithic (Brézillon 1968: 363-364, Šída 2007b: 22). In Mšeno, two to three pieces can be assigned to them (eg *Figure 3: 7*). These formations most likely correspond to small crushers, which did not necessarily serve to crush or grind cereals and similar products. However, because they were made of palaeorhyolite, from which querns were mostly made, the connection to some specific method of crushing substances still seems quite probable. From the SPC environment in Bohemia, one analogous whole piece and one fragment from Jaroměř (Náchod district) and one whole piece from Kolín are presented (Burgert 2019: 209–210, Fig. 73, 256: 2–3).

Querns in relation to individual features and structures

Finished grinding stones, whole or their fragments from a total of 38 features, were found numbering from 1 to 16 pieces per feature (from 0.9% to 15.1%) and in weight from 6 g to 9,522 g. They mostly took the form of settlement waste. Fragments from the same individual were found in only one feature. With one exception, which is the whole worn-out quern, one part of which was discovered in one construction pit (No. 3) and the other part in the opposite construction pit (No. 11) of the same house I, at a distance of at least 11 m. (In Bylany, two fragments of the same quernstone come from two buildings even about 50 m apart – Pavlů, Rulf 1991: 339.)

The features themselves, from which the above-mentioned querns and their fragments come, are more or less likely to represent construction pits (features 3,

11, 24), silos (features 120, 145, 164 with a mass burial, 184), double pits and complexes of pits (features 7, 8, 10, 28, 32, 75, 96, 97, 100, 106, 137, 172, 181), smaller pits without further function (features 4, 8, 20, 23, 31, 99, 124, "141", 188, 189, 195), the foundation trench (House VII) and the pit, which was created after the tree was uprooted (feature 88). Practically, from a functional point of view, these are all types of features.

As for *whole pieces* (total 10, *Table 1*), they occurred in two opposite construction pits of the house I (one whole in pit 3 [*Figure 2: 4*], the other in two fractions [*Figure 2: 6*], found in pit 3 and pit 11). Another piece comes from feature 181, which according to its location is perhaps also in a positive relationship with house I or (rather) house II (but it is relatively far from them), while both building structures belong to the early stage SPC. From the same chronological degree comes the grinding stone from the small feature 189 (*Figure 3: 6*), which cannot be connected with any building structure. Other whole querns, all from the *late stage of the SPC*, were obtained from sunken features, the connection of which to the houses can only be speculated. At that time, construction pits, as we know them from earlier times, were replaced by complexes pits (clay pits), apparently used by residents of more than one house, except for smaller, indeterminate pits. However, if we accept that the closest features of this type in specific building structures indicate that they were (also?) connected with these structures, then the following connections are possible. Multiple pits 8 (with lower stone, *Figure 3: 1*) could be in a positive relation to house XII, multiple pits 10 (with upper stone, *Figure 3: 5*) to ground plans house V with house IV, or with house VI, and house VII with house VIII. The grinding stone (or whetstone) seems to have a direct connection to house VII, as it comes from its foundation trench (*Figure 3: 4*). For other features (7, 23, 141) with whole quernstones (eg *Figure 2: 1*) it is not possible to prove that it belongs to any building structure (see section area of excavation with features, *Figure 4*).

Small shallow holes on the working surface of standard querns

On the working, grinding surface of two standard grinding stones, one obviously upper and the other lower, there are small extremely shallow hollows. The first represents the edge of the palaeorhyolite quern, with the upper working surface slightly concave in all directions, with one larger (ø 60 mm, depth 4 mm) and the second smaller (ø 16 mm, depth 2 mm) shallow cavity (feature 99, *Figure 3: 2*). A similar small shallow depression is located in the middle of the working surface of another, this time larger upper flat stone of the plano-convex type (ø 45 mm, depth 4 mm, feature 10, *Figure 3: 5*). It is possible that the above-mentioned additionally ground small cavities served, for example, to grind a small amount of a rather rare mass, such as spices, etc., by means of a small one-handed tool of the pestle/crusher type, probably in a circular motion.

TABLE 1: Mšeno, district Mělník. Selection of data on whole finished grinding tools (preserved at least 90 %).

Feature	Function	Shape	Lower / upper	Wear	Rock	Dimensions in mm lenght/width/height	Weight in g	Dating – SPC	Figure	Note
3	construction pit	plano-convex	upper	small	palaeorhyolite	360 × 184 × 107	9,522	early	2: 4	
3 + 11	construction pit	plano-convex	upper	extremely small	palaeorhyolite	248 × 132 × 33	1,092	early	2: 6	parts come from both pits
7	loam pit	plano-convex	upper?	large	palaeorhyolite	260 × 145 × 44	1,838	late		
8	loam pit	plate-shaped	lower	large	palaeorhyolite	240 × 195 × 55	3,744	late	3: 1	upper and lower surface working
10	loam pit	plano-convex	upper	small	palaeorhyolite	215 × 165 × 37	1,514	late	3: 5	
23	pit	plano-convex	upper	small	palaeorhyolite	225 × 150 × 48	2,054	late		
141	pit	plano-convex	upper	large	palaeorhyolite	230 × 150 × 45	1,820	late		
181	loam pit	plate-shaped	upper / lower?	extremely large	sandstone	139 × 102 × 29/24	512	early		slightly cup-shaped working surface
189	pit	plano-convex	upper	small	sandstone	250 × 98 × 40	1,282	early	3: 6	red dye on the working surface
house VII	foundation trench	irregular	lower	large	sandstone	180 × 293 × 130	5,860	late	3: 4	or a large whetstone

(Similar depressions, central, on the upper, or simultaneously on the upper and lower side of the stones, absent in Bylany, are shown on a schematic typological table within the branch of mortar devices - Pavlů, Rulf 1991: 339–340, Fig. 31.)

Possible symbolic value of querns

The possible symbolic value of the querns, original or subsequently obtained, is of at least two kinds. It can either be derived directly from the object (1), or from its relation to other objects and finding structures (2).

The first type (1) includes querns with traces of their intentional breakage (1/1) or with traces of an atypical material, usually red matter, adhered to their working surface (1/2).

The instrument was intentionally broken (1/1) in Mšeno in at least two cases. Evidence of such behaviour has been preserved in the form of an impact hole during a fracture on the surface of a preserved half of a slab-type lower stone from feature 182, dating only to an early period of prehistory. Another case is more complicated. It represents a flat upper stone probably of a plate-like type with an oval shape, from which a marginal fraction and 25 small and very small fragments have been preserved (feature 172). However, it is not clear from them whether the tool was broken and devalued intentionally or spontaneously during work. At the same time, it is clear that small fragments could not have been created in any other way than by deliberately hammering part of the tool. There could have been an intention to make something useful from stone waste, such as an admixture in ceramic dough. From the above-mentioned, partly contradictory observations, we cannot therefore exclude or confirm that the symbolic and utilitarian meanings of the mentioned instrument manifested themselves here in some way together, simultaneously or with a time lag, or only one of them was applied.

The red colour, which may have a purely utilitarian or symbolic meaning (eg Pavlů 2000: 91, Lička 2016: 18–20, Meller *et al.* 2013, where further literature is given), has been preserved on the work surfaces of three querns (1/2): on a larger fraction of an oval upper stone of the plano-convex type with little wear on the work surface (feature 10), on a small fraction of a quern or a massive whetstone, later it was probably used as a crusher/pestle (feature 60, *Figure 2: 3*) and on a complete upper stone of the plano-convex type (preserved in two fractions, feature 189, *Figure 3: 6*). These millstones, which were found in the usual context of the settlement, were inadvertently made especially in red without necessarily acquiring a symbolic meaning. Perhaps except for the latter piece. The red dye is found on its entire working surface, as if deliberately carefully spread out rather than just inadvertently preserved due to the simple crushing of coloured rock.

As far as finds outside the settlement are concerned, grave assemblages from the environment of the Stroked Pottery culture in Bohemia have little to suggest, as querns, except for three specimens (in all cases without traces of colour), are completely absent (Zápotocká 1998: 200). On the other hand, in the early period (LPC) they are represented, sometimes with traces of red dye, eg in Vedrovice (Ondruš 2002: 36, 42, 65, 94), similarly in graves from the Austrian locality Kleinhadersdorf (Neugebauer, Lenneis 2015, 128) and other localities (eg Jeunesse 1997: 80, Farkaš 2000).

Another kind of symbolic value of millstones (2) and other finds derives its legitimacy from a specific finding situation. Only a small part of such an idea corresponds to the upper stone of the plano-convex type from feature 3 (*Figure 2: 4*). It is found in the infill of the construction pit of house I, it is whole, carefully shaped, only slightly worn, unusually heavy (9,522 g; for comparison, the heaviest whole upper stone in the site of Langweiler 8 weighs 6,650 g – Zimmermann 1988: 735, in Bylany for upper stones, the largest weight is given in the range of 2,000–4,000 g – Pavlů 2000: 93). It is conceivable that it belonged to the household equipment of the mentioned house. But why did such a vital and certainly valued, undamaged and relatively new part of the quern end up in the construction pit of the respective dwelling? Does it have anything to do with the end of the existence of one family and possibly the whole house? In an emergency, in the event of sudden danger associated with the rapid abandonment of the dwelling, was the artifact buried and thus hidden in an already partially or completely clay-filled pit? Or were there purely symbolic reasons associated with the house during some moment of its existence or even its demise?

Some examples from other areas could point to a symbolic interpretation. Eg, in this way it is possible to look at the solitary millstone in a pit in the settlement of Irchonwelz (Hainaut), but in connection with other querns as part of deposits of several pieces at this and other deposits in southwest France and Belgium. They occurred in isolated pits, in pits inside houses and in the construction pits lining houses, so that their importance in connection with construction

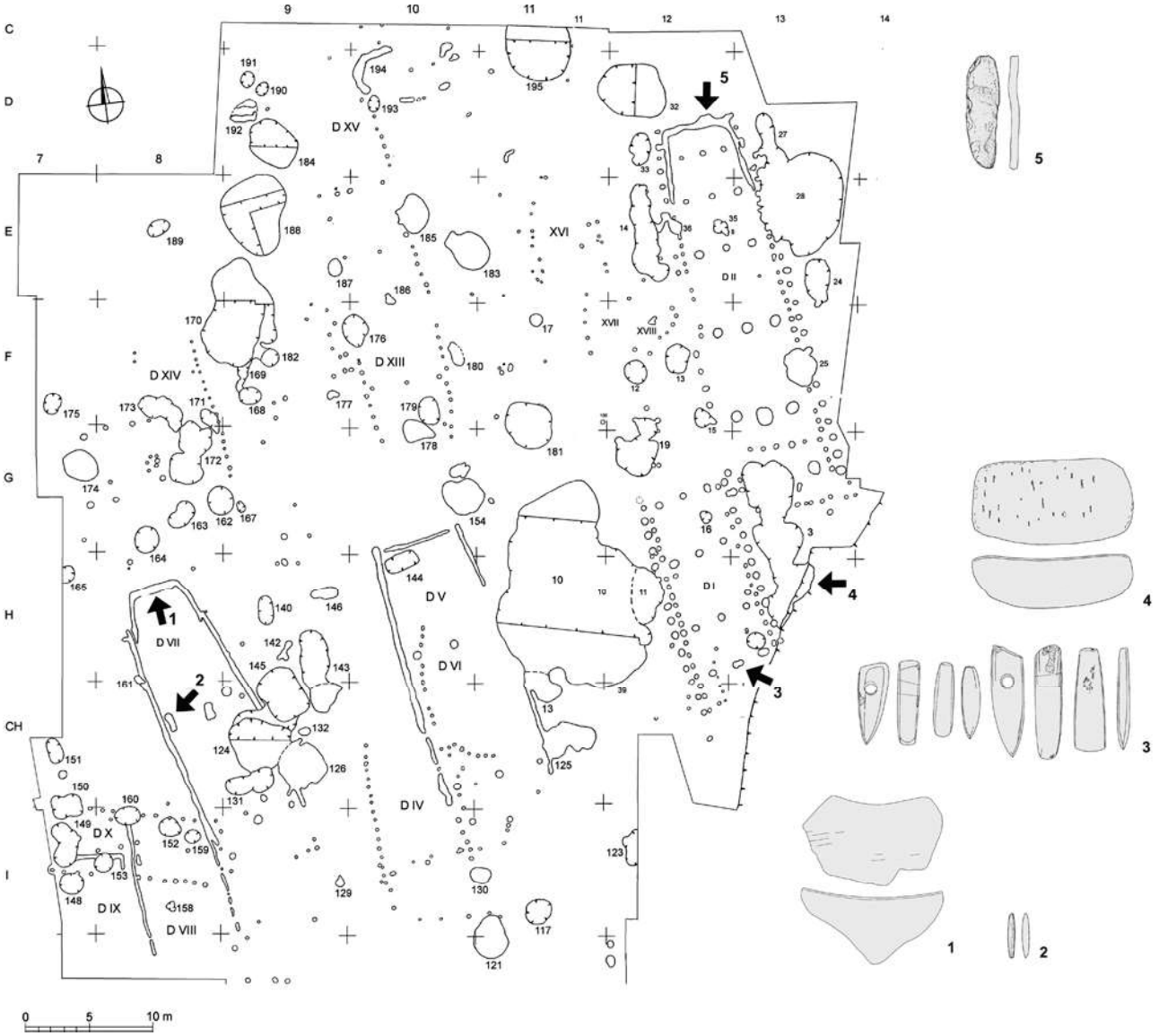


FIGURE 4: Mšeno, district Mělník. Section of the examined area with indication of the position of macrolithic artifacts with possible symbolic meaning.

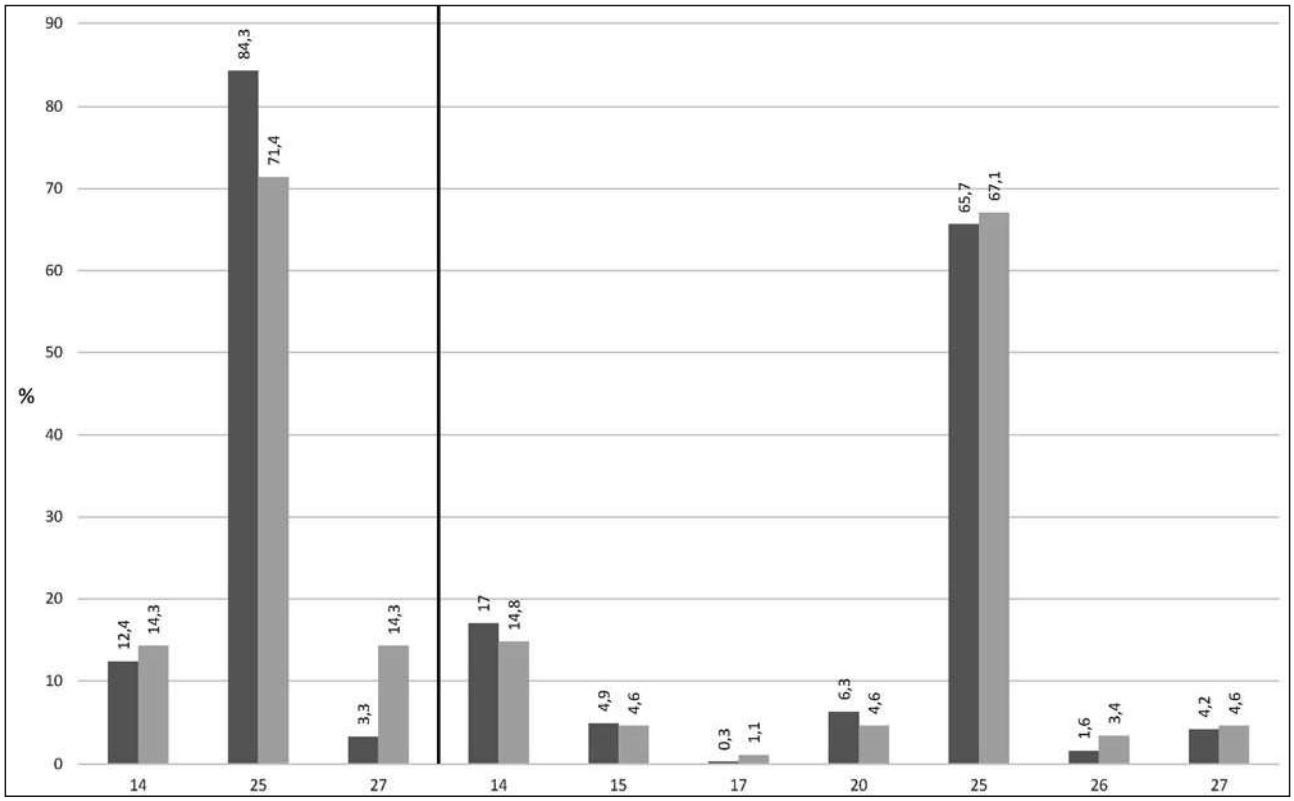
sacrifices or in connection with the extinction of the settlement is not unlikely (Hamon 2006: 148–157, Fig. 89–93).

It is clearer from the point of view of interpretation with the lower stone (or immobile sandstone), discovered in the infilling of the northern part of the foundation trench of house VII (*Figure 4, 3: 4,* Lička 2019b: 106, 132, fig. 38, 51: 5). This could represent a so-called construction or foundation sacrifice. In this respect, a more easily interpretable hoard of the polish industry, connected with house I, also leads to this (*Figure 4*, Lička 1981, 2019b: 130). On the other hand, the unsuccessful semi-finished polish product, three smaller torsos of vessels and a few other finds from the infilling of the noticeably widened northern part of the foundation trench of house II do not preclude an interpretation towards a symbolic significance, although it may also be accidentally generated settlement waste (*Figure 4*, Lička 2019b: 99–101, 132, Fig. 50). Finally, the smallest symbolic force is a small

shoe-last adze, found in one of the inner postholes of the already mentioned house VII (*Figure 4*, Lička 2019b: fig. 50: 8). Several fragments of pottery and possibly other types of finds from postholes and foundation trenches from the same or other houses with symbolism do not seem to have anything in common (Lička 2019b: 118–133, fig. 50: 9–12).

As for other sites, the accumulation of 35 stone mills and their fragments, which extends inside the house and outside it, in the settlement of Hrdlovka in north-west Bohemia (among others with fragments of pottery from a late stage of the SPC), is perceived by the author of the excavation to be more as a construction sacrifice of house 8 (Beneš *et al.* 2015: 162, Fig. 3–4, Beneš *et al.* 2019: 170, Tab. 2.7.), than as a foundation layer of stones of the oven bottom or material for fixing the column of the house, which was located in this area (Bláhová-Sklenářová 2012: 23). Very weak symbolism seems to hide the accumulation of querns and their fragments, including other types of settlement finds, located in two levels in the surface layer of the western wing of the ditch at the southern entrance of the circular enclosure of culture with Moravian Painted Pottery Ia in Vedrovice by Znojmo, when it is carefully characterized as "a simple cult place", based on the so-called sacred locality soon after the end of the function of the rondel (Humpolová, Ondruš 1999: 177–178, Fig. 19).

In other sites, to give an example, the isolated querns, which were found inside the house in the pit probably from the SPC, tend to emphasize their utilitarian significance (locality Goseck, Burgenlandkreis; Bertemes, Northe 2011: 26, Abb. 17, 22), other occasions – when two grinding stones were found together with an oval percussor in the posthole of the foundation trench of the Rössen house I in Deiringen / Ruploh, Kreis Soest (Günther 1976: 16–17, 60, 62, Fig. 9, Table 17, 18: 5) or two massive lower stones in a pit inside the ground plan of house II in a settlement of the same culture in Dortmund-Oespel / Marten



GRAPH 3: Mšeno, district Mělník. Representation of individual types of rocks in the early (left part of the graph) and late stages of the SPC (right part of the graph). The left parts of the double columns indicate the weight, the right the number of individuals. Rock number: 14, sandstone; 15, sandstone with Fe sealant; 17, conglomerate; 20, quartzite; 25, palaeorhyolite; 26, palaeorhyolite tuff; 27, palaeorhyolite breccia.

(Graefe 2009: 50, 52, Taf. 2, 5–6) – they are given symbolic significance in the form of a building sacrifice.

The findings of the querns in the graves, as mentioned above, carry specific symbolism. Especially when nine instruments of this kind formed the lining of children's burial No. 5 from the early stage of the SPC, embedded in a settlement pit of the same culture in Těšetice Kyjovice, in the region of Znojmo (Kazdová, Lorencová 1985: 13–14). At the same time, this accumulation of querns is in a way close to the hoard of the stone industry in general.

THE ROCK OF THE QUERNS

Almost the entire collection of stone artifacts from the Mšeno locality has been studied before by M. Bukovanská and D. Březinová (1988). Their results are followed by current studies, similar to the results of processing a collection of Neolithic stone tools from the Kosoř settlement (Lička *et al.* 2014: 54–70) and a set of stone artifacts from feature 164 in Mšeno (Šreinová, Šrein 2016: 40–46), which is also included in this work.

The stone artifacts were examined macroscopically and, if necessary, under a stereo microscope. On all samples, the magnetic susceptibility was measured with a field capameter KT-5 and photo documentation of selected objects was taken. Rock excavations of relevant stone artifacts were collected and processed in the past. The sections were examined in a polarizing microscope and the findings were compared with the already completed descriptions in older works and, if necessary, modified or supplemented.

Petrography of the quern rock

The grinding stones of the Stroked Pottery culture in Mšeno were made of several types of rocks, but above all of palaeorhyolite.

In the early stage of the SPC, the raw material is limited to only three types. The above-mentioned palaeorhyolite in terms of weight criterion makes up 84.3%, sandstone 12.4% and palaeorhyolite tuff 3.3% (*Graph 3*).

In the later stage of the SPC, the spectrum of rocks is much more varied. According to the same criterion, the dominant palaeorhyolite makes up 65.7%, sandstone 17%, quartzite 6.3%, sandstone with Fe sealant 4.9%, palaeorhyolite tuff 4.2%, palaeorhyolite breccia 1.6% and conglomerate 0.3% (*Graph 3*). If we take into account the criterion of a simple quantity of items for comparison, the percentage of the above-mentioned rock types in the set will not change much, except for the item palaeorhyolite tuff (27), which is significantly higher (*Graph 3*).

The ratio of all rocks of distant provenance (as the crow flies over 25 km) and local or near provenance (up to 25 km as the crow flies) on the one hand, and the time criterion on the other, shows that a smaller volume of imported materials in the late stage of the SPC (71.5% versus 87.6% in the early stage) may indicate both the undesirable slightly worse availability of the most suitable raw material (without fatal consequences) and possibly the desired greater diversification of the raw material base due to the requirements for specific function tools.

Palaeorhyolite

Palaeorhyolite is a volcanic rock of Permocarbon age (older name – quartz porphyry). But in a couple of recent years, it has been emphasized that the majority of our Permo-Carboniferous rhyolites are in fact rhyolitic ignimbrites, which originated from the deposition of partly molten pyroclastic material. Thus, they are sintered tuffs, characterised by the presence of corroded quartz crystals and fluidal texture (e.g. Přichystal 2013: 251–252). With respect to general awareness, the presented treatise uses an old name of the rock – palaeorhyolite, which is also in accordance with legends of available geological maps (*Figure 5*) where the rock is referred to as rhyolite.

Macroscopically it is a palaeorhyolite characterized by a strong porosity and the presence of sharp-edged corroded dark quartz outgrowths. The colour of the rock is gray to gray-yellow, sometimes orange to reddish, or dark red-brown. Shades of reddish to brownish colour depend on the amount of iron oxides and hydroxides. Palaeorhyolite is usually fresh, but also weathered depending on the position in the original rock outcrop or in a secondary deposit in the form of waste in pits in the settlement. Magnetic susceptibility usually ranges from 0.01 to 0.50 · 10^{-3} (SI) depending on the size of the artifacts, if it contains darker grains, or has an increased Fe content, or is slightly affected by fire, the value of magnetic susceptibility reaches up to 2 · 10^{-3} (SI), occasionally the value 10.7 · 10^{-3} (SI) was measured for porous darker rock probably heavily influenced by fire.

Microscopically in the rock are visible mainly quartz growths (markedly magmatically corroded hexagonal dipyramides of quartz) up to about 5 mm in size,

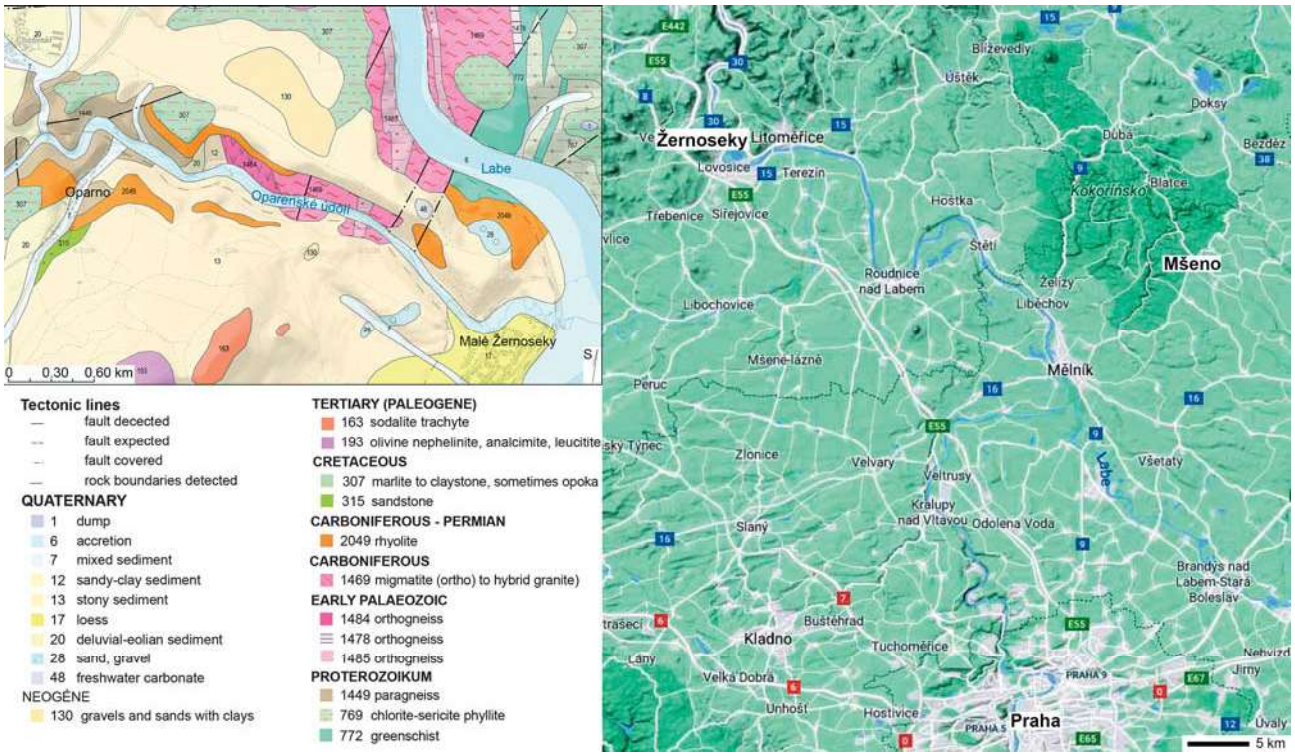


FIGURE 5: Left, Section from the geological map with the source area of palaeorhyolite (2049 rhyolite) near Žernoseky (Oparno Valley). Right, A section of the map indicating the localities of Žernoseky and Mšeno (sandstones from the vicinity of Mšeno are marked in a darker green colour). The map is modified according to https://www.google.com/maps/, the geological map of the Oparno Valley according to https://mapy.geology.cz/geocr50/

represented by about 15–30 volume percent. To a lesser extent, grains (growths) of feldspar (sanidine) are represented, which is usually almost completely transformed (max. up to 10 volume percent). The matrix consists of devitrified glass, which sometimes contains very small grains of magnetite and a brownish to reddish pigment (iron oxides and hydroxides). The rock texture is omnidirectional, sometimes fluid (highlighted by the presence of Fe pigment), the structure is porphyric with a hemicrystalline felsitic matrix (*Figure 6a, b*).

The palaeorhyolite of the grinding stones with its composition corresponds to the palaeorhyolite from the area of the Oparno Valley north of Lovosice, west of Malé and Velké Žernoseky (*Figure 5, 6c, d*). The use of this rock for the production of grinding stones by the ancient Celts is known from the literature (eg Fröhlich, Waldhauser 1989, Waldhauser 1981, Danielisová *et al.* 2011). More recently, the use of palaeorhyolite was confirmed in the period of the Linear Pottery culture and subsequently also of the Stroked Pottery culture (*Šreinová et al.* 2013, Řídký *et al.* 2014) (microphoto, *Figure 6e, f*), when in the region of the village of Vchynice during the construction of a motorway in the years 2008–2009, a Neolithic settlement and rondel were uncovered. Due to the abundant representation of palaeorhyolitic grinding stones in the collection of stone artifacts and the very close source of these rocks, this settlement could have played an important commercial role.

Palaeorhyolithic breccia

The permocarbon palaeorhyolite breccia is macroscopically slightly porous, formed by sharp-edged fragments of tectonically affected palaeorhyolite and cemented mainly by quartz, opal and plus or minus oxides and hydroxides of Fe. The colour changes from lighter gray to yellow-gray to deep rusty reddish. The magnetic susceptibility of the breccia does not exceed $0.07 \cdot 10^{-3}$ (SI).

Microscopically breccias contain sharp-edged strongly tectonically affected quartz grains, among

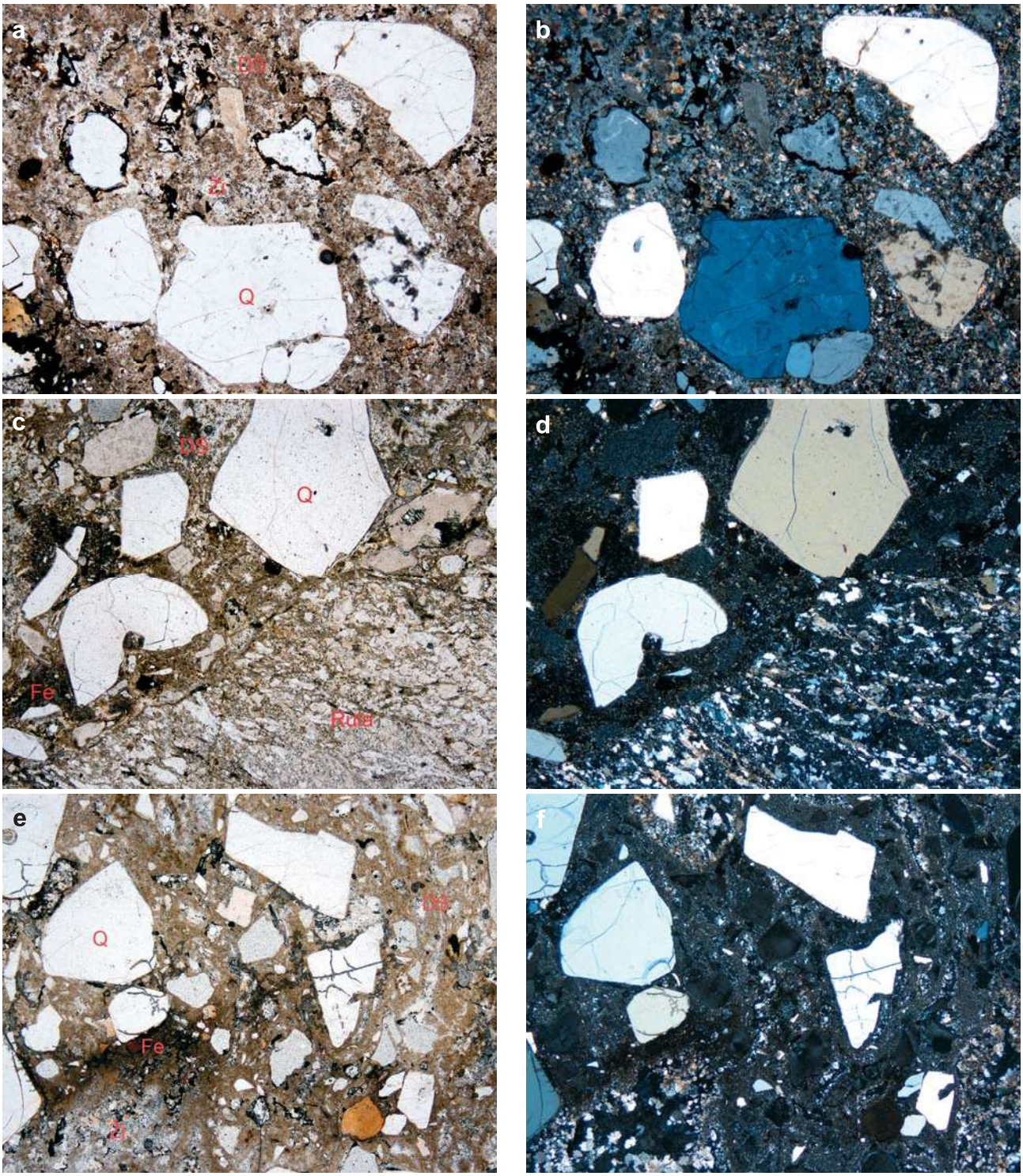


FIGURE 6: Microphotographs of palaeorhyolite from various sources. 10a, b – artifact Inv. No. 363304, feature 28, Mšeno; 10c, d – mouth of the Oparno Valley, outcrop (Šreinová *et al.* 2013); 10e, f – fragment of a stone mill, Vchynice (Šreinová *et al.* 2013). The microphotographs show the similarity of all documented rocks – dominant, magmatically corroded quartz (Q) growths and small, partially to completely transformed growths of the original feldspar (sanidine – Ži) are present. The matrix is made of devitrified glass (DS), while the fluid texture of the rock is enhanced by the accumulation of pigment formed by various forms of iron oxides and hydroxides (Fe). The images on the left (a, c, e) are captured in transmitted polarized light, images on the right (b, d, f) show the same shot with crossed nicols, the long side is 5.9 mm. Photo B. Šreinová.

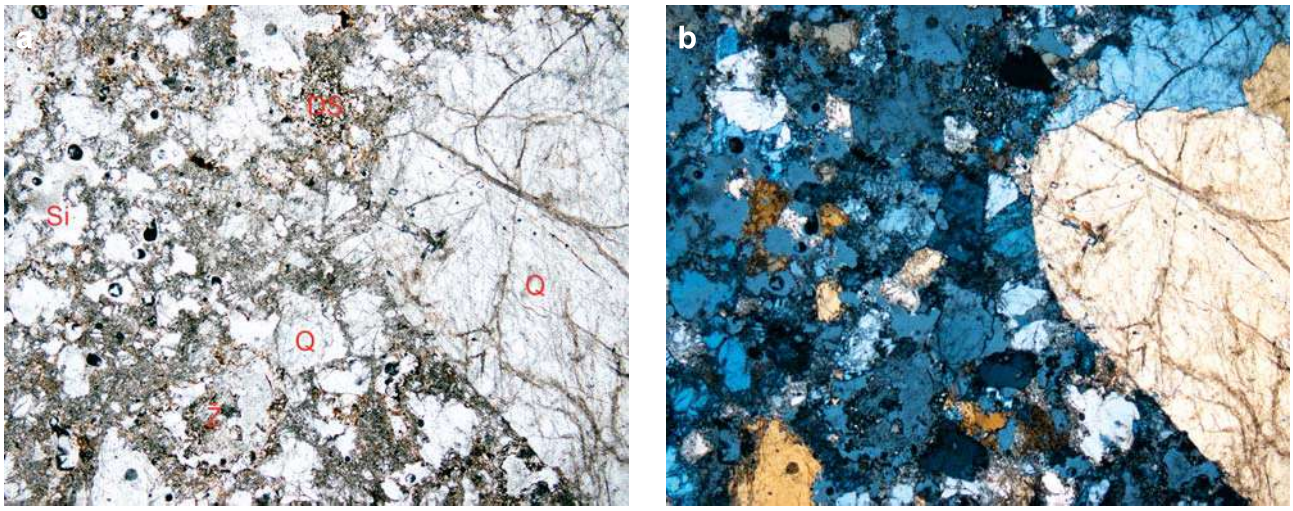


FIGURE 7: Microphotographs of palaeorhyolithic breccia (Inv. No. 360754, feature 60, Mšeno). The rock contains sharp-edged strongly tectonic quartz grains (Q), rarealmost completely transformed feldspar grains (Z), pieces of devitrified glass (DS) and a quartz mass (Si) in the base mass (rock silicification). The image on the left is captured in transmitted polarized light, image on the right shows the same shot with crossed nicols, the long side is 5.9 mm. Photo B. Šreinová.

them is a glassy fine-grained matrix, while the original glass is completely devitrified. Feldspar (sanidine) grains occur sporadically and are significantly transformed. The rock shows strong tectonic damage and significant silicification. The texture is omnidirectional, the structure brecciate. The rock is strongly altered – silicified (*Figure 7a, b*).

The source rock occurs together with the palaeorhyolite in the area of the Oparno Valley (*Figure 5*).

Palaeorhyolite tuff

Palaeorhyolite tuff is a strongly porous extrusive rock, sometimes with very fine to solid positions of black colour – quartzite, sometimes saturated with opal. A very thin boundary exists here between the rock which is mentioned above as palaeorhyolite (rhyolitic ignimbrite) and palaeorhyolitic tuff; palaeorhyolite is a macroscopically more compact rock. The magnetic susceptibility of the breccia does not exceed $0.07 \cdot 10^{-3}$ (SI). The source provenance is together with the Palaeorhyolite in the Oparno Valley (*Figure 5*).

At this point, it is necessary to mention that there are transient rock types between palaeorhyolite, palaeorhyolitic breccia and palaeorhyolite tuff. Macroscopic determination of individual rock types is relatively subjective and ultimately not important for use in querns, as all these rocks have suitable properties for use in querns, in the proportion in which they occur in the settlement (*Graph 3*).

Sandstone

Several types of sandstone are represented in the set of grinding stones. The most abundant is quartz sandstone, both medium-grained and coarse-grained to conglomerate *of the Cretaceous age*. The colour is gray to occasionally orange, if the sandstone was near the fireplace, it is usually dark gray to blackish on one side. Magnetic susceptibility is usually $0.02 - 0.16 \cdot 10^{-3}$ (SI), in the case of fire exposure even higher, up to $1.66 \cdot 10^{-3}$ (SI). The provenance of quartz sandstones is local, they occur in the northwestern vicinity of the village Mšeno (*Figure 5*).

Medium-grained to sporadically fine-grained fine mica quartz sandstone likewise of the Cretaceous age is predominantly beige in colour. Magnetic susceptibility is very low and ranges from $0.01 - 0.04 \cdot 10^{-3}$ (SI). The provenance of mica quartz sandstones is local, they occur in the northwestern vicinity of the village Mšeno (*Figure 5*).

Arkose sandstone is individually represented. It is medium-grained, poorly sorted, gray. Magnetic susceptibility is low in the range $0.01 - 0.07 \cdot 10^{-3}$ (SI). It is probably sandstone of the Permocarbon (carbon) age, which could be transported to the site from the Podkrkonoší area or from the area northwest to west of Kralupy nad Vltavou.

The rusty red-brownish quartzite medium to coarse-grained Permocarbon sandstone is also individually represented. Magnetic susceptibility is 0.07 – 0.14 · 10^{-3} (SI). Perhaps the provenance is the same as the previous rock.

Sandstone with Fe sealant

This sandstone of the Cretaceous age falls into essentially the same group as the previous quartz sandstones or quartz sandstones with a proportion of fine mica. Medium-grained to coarse-grained rocks of reddish to deep reddish-brown colour predominate according to the amount of oxides and hydroxides of iron contained in the matrix. Magnetic susceptibility does not differ from ordinary sandstones and is in the order of 0.0X · 10^{-3} (SI), while the higher levels were measured only in rocks where fire is evident. The provenance of sandstone with Fe sealant is local, they occur in the northwestern vicinity of the village Mšeno (*Figure 5*).

Conglomerate

Quartz conglomerate of the Cretaceous age with a whitish to gray quartz sealant with sub-oval quartz grains up to 5 mm in size. The provenance of the

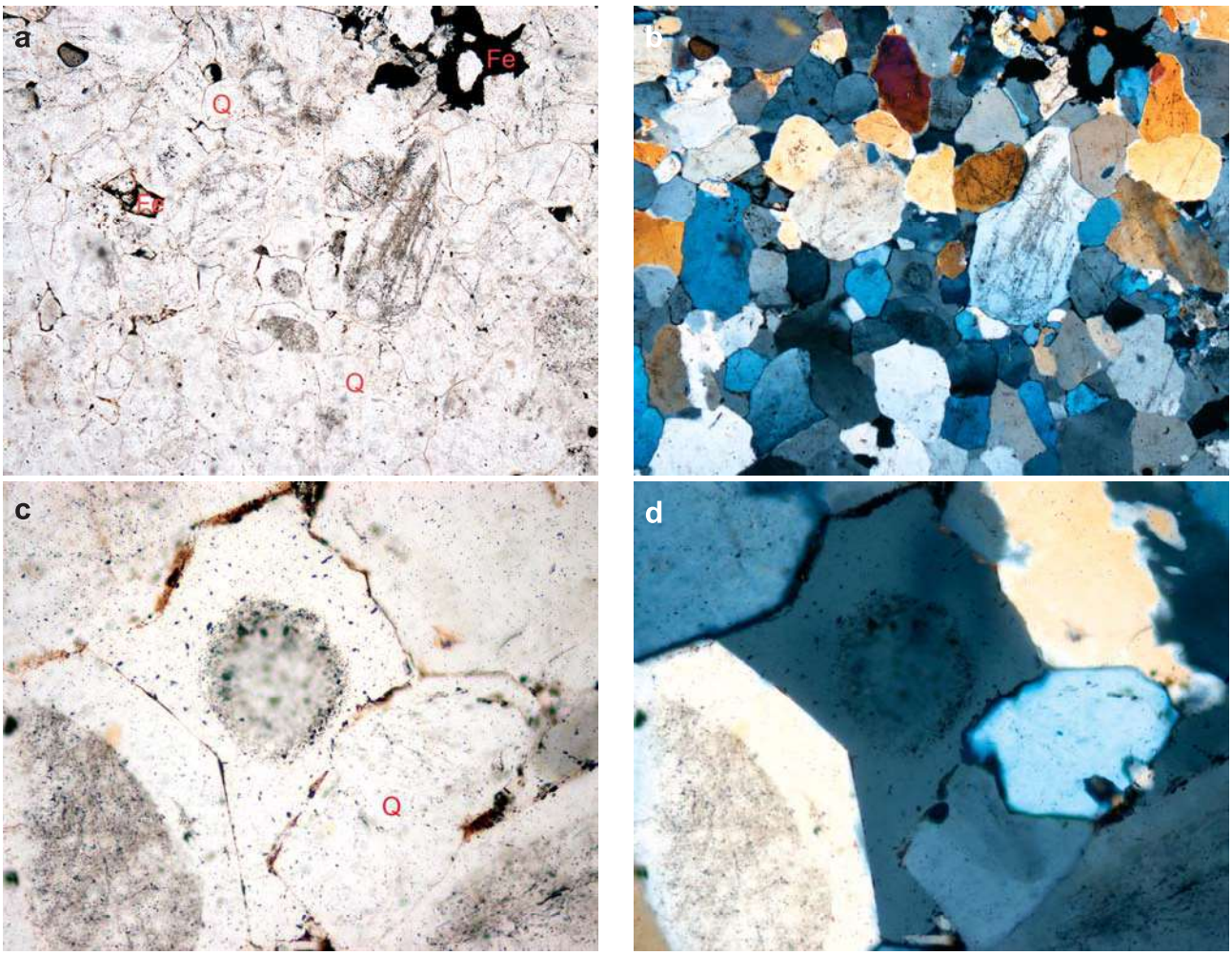


FIGURE 8: Microphotographs of quartzite (Inv. No. 365239, feature 41, Mšeno). Almost monomineral quartz rock (Q), in places with rusty spots of quartz-iron sealant (Fe). The detail (12c, d) clearly shows the growth of quartz into the gap mass. The structure of the rock is uniformly grained, the texture omnidirectional. The images on the left (a, c) are captured in transmitted polarized light, images on the right (b, d) show the same shot with crossed nicols, the long side of figure 12a, b is 2.55 mm, of 12c, d 0.59 mm. Photo B. Šreinová.

conglomerate is local, they occur in the northwestern surroundings of the village Mšeno (*Figure 5*).

Quartzite

Quartzite is a compact yellowish to whitish, occasionally with a transition from quartz sandstone - quartzite. Quartz growth is evident (*Figure 8a, b, c, d*). The magnetic susceptibility is low and does not exceed $0.05 \cdot 10^{-3}$ (SI), the susceptibility of $0.20 \cdot 10^{-3}$ (SI) was occasionally measured (fire effect). Perhaps the provenance is indeterminate, it could be from large pieces of cobble material from the terrace of the Elbe, or a unique transport, probably from the Prague area.

Another type of quartz represented in the group is a unique quartzite – strongly quartzed porphyry residue, whose magnetic susceptibility does not exceed $0.05 \cdot 10^{-3}$ (SI). The quartzite could come from the area of the Oparno Valley (*Figure 5*).

RAW MATERIALS AND THE ISSUE OF TRANSPORT OF FINISHED ARTIFACTS OR RAW MATERIALS

As mentioned above, the nearest sources of palaeorhyolite, together with very minor palaeorhyolite tuff, palaeorhyolite breccia and certain types of quartzite, are located in a single area by the Elbe River, in the Oparno Valley north of Lovosice and west of Malé and Velké Žernoseky (*Figure 5*). In contrast, sandstone rocks are of local origin, they come from the immediate vicinity of Mšeno (*Figure 5*).

This means that the inhabitants of the Neolithic settlement in Mšeno were largely dependent on the import of materials from an area about 40 km as the crow flies. At the same time, however, it turns out that the finished products, rather than the raw material for their production, were transported to the locality. We judge by the disproportion in the category of weight between finished products and their fragments on the one hand (about 96%) and potential raw material on the other hand (about 4%), as we stated above.

We lack credible indications for the milling process itself, as well as for the methods of transporting finished products rather than their semi-finished products or raw materials. Therefore, we do not know in what specific way the inhabitants of the settlement of Mšeno acquired grinders (for considerations on possible ways of distribution of finished products or raw materials, see eg Kegler-Graciewski, Zimmermann 2003, for other types of tools Pétrequin, Pétrequin 2020). Was it through one-off expeditions, when they extracted the raw material in the place of distant outcrops, made products from it (or obtained them in exchange from the locals) and artifacts relatively easy to transport first on the River Elbe in the section between today's Lovosice and Mělník and then with more effort overland to their home settlement? Or did they obtain them peacefully through exchange with closer or more distant settlements that could offer these products, or did they take them from the locals by force? The most probable seems to be barter with a settlement near the source of rocks in the Oparno Valley (Šreinová *et al.* 2013, Řídký *et al.* 2014).

As mentioned earlier, some grinding stones may have been and probably were made in relatively small numbers from local sandstone of the Cretaceous age. Purely practical reasons could lead to the use of such a raw material, in comparison with a site with a dominant and more suitable for the purpose of grinding, palaeorhyolite. While the sandstone raw material was available to the inhabitants of the Neolithic village in large numbers nearby, the palaeorhyolite, or finished products from this raw material were also not easy to obtain (see above). The situation is similar to the situation in some other settlements, with the only difference that in the available distance from them there were mainly or only sufficiently high-quality sandstone for the production of querns, such as Kleinhandersdorf (Neugebauer-Maresch, Lenneis 2015: 128), Mold bei Horn (Götzinger *et al.* 2010: 203) and many other sites from other parts of Europe. It is sometimes considered, in an environment with readily available diversified raw materials, that the first-class quality sandstones used could be used to produce grinders with a specific function, such as so-called second grinding, finer meal, as evidenced by the plano-convex stones (Pavlů, Rulf 1991: 341).

According to previous findings, it seems that any types of rocks suitable for the production of relatively heavy mills were mostly located within a distance of several tens of kilometers from the place of their discovery in Neolithic settlements (eg Kegler-Graiewski, Zimmermann 2003: 33–35), in the locality of Mšeno. Only exceptionally, outcrops at a greater distance are sought for some potential raw materials, eg about 150 km for the locality Mold bei Horn (Götzinger *et al.* 2010: 203).

CONCLUSIONS AND DISCUSSIONS

The overall characteristics of the studied artifacts are based on the evaluation of selected diagnostic features, which we have already used on another occasion (Lička *et al.* 2014). Querns and potential raw materials for their production, as part of a medium-sized collection of finds, include 159 pieces and come from 52 features dating to the period of the Stroked Pottery culture (except for one feature generally of prehistory). Of which, 106 pieces from a total of 38 features belong to finished products preserved mainly in fractions. About one tenth of them can be classified between whole and almost whole pieces (*Graph 1*). From a narrower chronological point of view, according to weight, about one quarter corresponds to the early and almost three quarters to the late stage of the SPC (*Graph 2*). From a functional point of view, we distinguish between upper and lower stones in double querns, such as the usual ones. (Whether these stones were assembled into sets at the end of production, i.e. both parts of one device were adapted mainly in terms of their size and shape of the work surface, it is not possible to determine according to the finds from Mšeno.) From a purely formal point of view, we divide these into three basic types, namely plate-like (1), plano-convex (2) and irregular in shape (3) and one pseudotype of a saddle shape. Apart from the basic system, the saddle-shaped pseudotype differs from the first two mentioned basic types only in a secondary feature, namely the specific deformation of the upper working side. According to another criterion, the shape from the top view, we distinguish between rectangular and elliptical stones and within them other variants. There are also indications for a more detailed division, which due to the strong fragmentation and shape changes that arise due to the depletion of matter as a result of the use of artifacts, we use only marginally. The lower convex side and the way it is worked are plano-convex stones, usually interpreted as upper stones, give the impression that it is also a working side. This could sometimes be used for the so-called first grinding, eg for crushing and coarse crushing of the processed substance. For some tools, due to certain properties and features, it is not certain (sandstone raw material, overall shape, absence / presence of specific working traces, etc.) whether they represent crushers or whetstones, or whether they were used alternately for both activities. Grinding stones were found only in some features, in terms of function in all types of settlement features recorded in the Mšeno locality. In addition, small shallow hollows were ground on several working sides of the grinding stones, which could be used to grind specific, perhaps rare materials. Several grinding stones can be considered to have been given a symbolic meaning: intentionally broken, with red matter carefully spread over the entire work surface, due to a special finding context (enormously heavy upper stone with only slightly worn working surface, found in the construction pit of house I, lower stone or massive whetstone, probably the so-called construction sacrifice of house VII).

The grinding stones of the Stroked Pottery culture in Mšeno were made of several types of rock, but above all of palaeorhyolite. The dominant palaeorhyolite, an extremely suitable raw material for the production of grinding stones, is 84.3% by weight in the early stage and 65.7% in the late stage of the SPC. The nearest sources of palaeorhyolite, together with a much smaller amount of palaeorhyolite tuff, palaeorhyolite breccia and certain types of quartzite, are located by the River Elbe near the villages of Velké and Malé Žernoseky (*Figure 5*), i.e. at a distance of about 40 km as the crow flies from the locality of Mšeno. At the same time, it turns out that the finished products were transported to the site rather than the raw material for their production. We can only speculate about the methods of distribution and forms of transport of the mentioned article. This could have been done through one-off expeditions first using the waterway on the River Elbe, as the most suitable for transporting heavy materials, and the remainder of the journey over land, probably by making several trips to the landing site. Other possibilities for appropriating products are also conceivable, for example, through peaceful exchange and mutual endowment in the context of affirming and consolidating mutual friendly relations between settlements, or, conversely, through violent theft. It can be assumed that relations between the inhabitants of nearby settlements were not always only peaceful, and that in the event of a general emergency they became tense and hostile, with all the consequences that followed.

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