Grooves on the cortex of the Epigravettian lithic industry in the broader context

Rillen auf der Kortex von Steinartefakten des Epigravettien im weiteren Kontext

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Abstract - The southern part of the Brno urban agglomeration (Czech Republic) is a crucial region for understanding the Late Upper Palaeolithic (Epigravettian) occupation in Central Europe. Despite limited archaeological research in the urban area, the newly uncovered Brno-Štýřice IIIb site has provided additional information about the character of the Palaeolithic occupation, the hunted fauna, and climate. Our information about the Late Palaeolithic has been increased by recent finds. In this article we present two unique finds, both lithic chipped pieces with grooves on the cortex, found in a well-dated stratigraphic context at the recently excavated area. The different kinds of grooves on the cortex of the chipped stone artefacts can be understood as an example of possible intentional modification of the subjects. We will try to resolve the question of whether these pieces can be understood as non-utilitarian pieces, decorations, symbols (which are rare in the Epigravettian), or if the pieces represent the results of everyday Palaeolithic life.


Keywords - Czech Republic, Epigravettian, grooves on the cortex, analyses

Tschechische Republik, Epigravettien, Rillen auf der Kortex, Analysen

Introduction

Different types of non-utilitarian (artistic) finds are common in the Palaeolithic. A huge number of these pieces are particularly connected with the Upper Palaeolithic and Mesolithic. Pieces are also abundant during the typical Gravettian (Pavlovian) phase, as well as during the late phase of the Gravettian (called Willendorf – Kostienki ca 29.5-24 ky). After the late phase of the Gravettian, before the Magdalenian culture, artistic and non-utilitarian finds in central Europe are rare. Only sporadic pieces at randomly found sites have been noticed from the period of the Epiaurignacian and Epigravettian (ca 23-15 ky), (Bánesz 1996; Cârciumaru & Nițu 2018; Nițu et al. 2023; Farbstein et al. 2012; Nerudová et al. 2019; Neugebauer-Maresch et al. 2008). Considering the paucity of the above-mentioned types, the different kinds of grooves on the cortex of lithic chipped pieces are in many cases of intentional origin and can be interpreted in some cases as one example of possible non-utilitarian finds.

The discussion about the origins of (Palaeolithic) art (or non-utilitarian pieces) and its definition and meaning are numerous and are usually connected with our ancestors’ development of abstract thinking and symbolic behaviour (Handwerker 1989; Wynn 2002; Wynn & Coolidge 2008). The term “art” in the

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Palaeolithic covers a wider group of different kinds of finds, including parietal representations, personal ornaments, decorated pieces or pieces of precarious use, and art mobile (Leroi-Gourhan 1984: 30). One of the numerous definitions of the word art characterises art as symbolically charged, aesthetically transformed, and often decorated items of material culture found in hunter-gatherer or other non-western contexts (Conkey 2001). A modern definition of the word art is that art is serves non-useful, nonpractical purposes (Haviland 2000). In other words, the term art can be understood as something non-utilitarian.

According to the Merriam-Webster Dictionary definition (https://www.merriam-webster.com/dictionary/nonutilitarian), non-utilitarian means not utilitarian, particularly (something) which is “characterized by or aiming at beauty or ornament rather than utility”. This group of non-utilitarian objects does not include only physical (portable or non-portable) objects but also perceptions and feelings. Many of the finds combine both utilitarian and non-utilitarian functions. This means, there is a fine line between utilitarian and non-utilitarian and their function can overlap. This is probably the reason archaeologists usually describe everything as art, non-utilitarian or symbolic when they do not understand an object’s purpose or function. For this reason, we must be careful with regard to the differentiation between our current thinking and past meaning when interpreting examples of non-utilitarian or symbolic pieces (Hodder 2012; Braun 2015). Whereas a non-utilitarian piece is rather some kind of specific artefact (e.g. perforated beads, ornaments, manuports, see below), a symbolic piece (artefact) is characterised as (Palaeolithic) artefacts which have no obvious utility or model in the natural world (Haviland 2000: 219; Marshack 1976). Symbolic pieces (artefacts) may have evidence of long-term repeated utilisation and “any image could be used in a number of different ways and context... They are viable only within “artificial” or cultural contexts” (Marshack 1976). In this way, the term symbolic can be represented, for example, by shape, colour, atypical dimensions, specific technology or an unexpected type of raw material used for items. To summarise, a non-utilitarian artefact is made in a certain way, and serves no other purpose. It is the final artefact.

In contrast to symbolic and non-utilitarian artefacts, utilitarian artefacts primarily have a practical use (chipped stone industry, retouchers, hammerstones). Utilitarian artefacts can be unique as well as common, numerous or replicable. Depending on their function they can be single-purpose or multi-purpose. On the other hand, utilitarian objects can take on symbolic meaning under certain circumstances.

Non-utilitarian objects contain a large group of natural products represented by fossils, rock crystals and other unusual crystals, stones with cupules, objects with an anthropomorphic shape, pigments, bones, stones, and fossilized organic matter (Moncel et al. 2012). All these mentioned materials were collected by humans and modified by them. Apart from knapping, one of the most typical modifications is engraving. Both figurines and common Palaeolithic lithic objects were frequently decorated with grooves, incisions, or pigments. The decoration of lithic objects did not always look regular and cannot be interpreted always as art or non-utilitarian. Sometimes, there are irregular and rather unsystematic grooves present as well as incisions that look random. In this article, we focus on the grooves found on the cortical surfaces of chipped stone artefacts. These types of pieces are still very poorly documented and published.

History of the area
The urban cadastre of Brno-Štýřice is situated in the southern part of Brno (Czech Republic). Over time, several sites have been uncovered there. These sites probably represent multiple occupations of the area (Skutil 1932; see Fig. 1: B n°5; Valoch 1975; Nerudová 2016; see Fig. 1: B n°2). Environmental analyses, as well as radiocarbon dating, confirm the Last Glacial Maximum/Last Glacial Termination (LGM/LGT) dating of all the finds (Nerudová et al. 2016). The recently excavated site has been designated Brno-Štýřice III (Vidoňská).

In 2021, a small archaeological rescue excavation conducted a short distance from the first site uncovered the same stratigraphic sequence with collections of lithic artefacts and animal bones. It must be emphasized that similar settlement structures have been discovered at several other places nearby (Fig. 1: B n°1 & 2) – particularly the closest Trench II by Karel Valoch and later the area of Squares 8, 9, 10 – P, Q, R on the opposite side of Vidoňská Street (the site Brno-Štýřice III; Nerudová 2016: 19, 24, Figs. 5 & 10). For this reason, the new second site can be associated with the previous one at its eastern part/border (Nerudová et al. 2022). The last excavated site is Vidoňská 11 (Brno-Štýřice IIIb).

Site description and stratigraphy
At Vidoňská 11 (Brno-Štýřice IIIb) we uncovered and documented a smaller portion of a Palaeolithic settlement area (Nerudová et al. 2022). The site is situated on the eastern side of the street, south of Milosrdných bratří Hospital (Brothers of Charity Hospital) and only 40 metres from the well-known site Brno-Štýřice III (Figs. 1 & 2). The geomorphological position of the Vidoňská 11 site is the same as in the case of site Brno-Štýřice III. The excavated site Brno-Štýřice IIIb (49.1843825; 16.5955283; WGS-84) is located in the south-western part of Brno, approximately 300 m to the south of the current south bank of the river Svratka, at an elevation of 208 m above sea level. The Quaternary cover of the region is formed by an accumulation of eolian (loesses) and colluvial sediments deposited on a terrace consisting of clay...
fluvial gravels and sandy gravels of Quaternary age that were detected at a depth of 202-204 m a.s.l. Generally, due to the intensive urban area, the Holocene soil inclusive of the A and B horizons is not preserved; only a relic of the B-horizon remains. This is the reason the B-horizon settled immediately upon the Pleistocene sediments. The chipped stone artefacts, fragments of animal bones, and a skull of a woolly rhino were found on one horizon in the middle part of the orange loess-like sediment of the Vichselian age (Fig. 3).

**Dating**

According to the identical stratigraphy and the same character of the lithics industry, all the above-mentioned sites fall into the Late Upper Paleolithic and are associated with the Epigravettian. This was confirmed also by $^{14}$C data (Table 1).

**Material**

The archaeological material from Brno-Štýřice IIIb comprises lithic industry and animal bones from a well-defined stratigraphy, documented in three absolute coordinates with unstratified items found as intrusions in the pits of the post-Palaeolithic age. Stratified finds were situated in the upper part of the Last Weichselian loess-like sediment just under the Holocene B-horizon (Fig. 3). Between the non-numerous stratified lithic assemblages, there are equally frequent final blanks without cortex, as well as different blanks with a complete or partial cortex (Tab. 2).

Retouched tools are rare (Fig. 4). With regard to raw materials, erratic flint significantly prevails (88.8%). This is supplemented by sporadic pieces of Olomučany type chert (2.0%), cretaceous chert (spongolite; 8.0%), and Moravian Jurassic chert (1.0%). Apart from the last type of raw material, all the mentioned raw materials must have been imported to the site from a minimum distance of approximately 35-40 km away. The primary sources of cretaceous chert are situated in the region of Boskovická brázd; the northern outcrops are close to the town Letovice (approx. 40 km north of Brno). Spongolites were secondarily transported to the south, however, by the Svitava river, and may consequently be found in Pleistocene sandy gravel terraces in Brno, or even further away, for example, as far as below the Pavlov Hills (Přichystal 2013). Macroscopically, the spongolite has a yellow-brown honey colour. The transparent material is formed by chalcedony with typical sponge spicules (Přichystal 2013).

The Olomučany chert originated from the Moravian Karst (NNE of Brno) area, a minimum distance of about 20 km from the site, where the primary sources are located. Outcrops are located in a relic of Jurassic sediments in the vicinity of Olomučany village. The chert has a dark grey colour and, microscopically, is formed by microfossils and opaque material partly of organic origin. The opaque material is coloured rusty-brown due to the presence of iron oxides. Sponge spicules and bryozoans dominate the microfossils. The transparent material is formed by chalcedony and scarce crystals of macro quartz. The coarser grain size is typical for Olomučany chert, which helps to macroscopically distinguish it from erratic flints encountered in the Silesian and North-Moravian territory.

The most frequently used sources of erratic flint are of secondary origin (sediments transported...
during the Saale glaciation) and are situated at a distance of at least 90-100 km from Brno. The majority of these sources are in North Moravia, close to the border of the Czech Republic and Poland, and continue into Poland. Macroscopic observation shows milky-white, yellow, brown, reddish-brown, or grey colours with a glossy lustre.

Moravian Jurassic cherts are cherts of the Jurassic Age which occur in the Brno area and which are usually impossible to distinguish in detail from known raw material sources in Brno. Moravian Jurassic cherts are represented by slightly rounded pebbles which are possible to find in secondary positions (Přichystal 2013).

All the mentioned types of raw materials are typical in Moravian Upper Palaeolithic assemblages.

We would like to emphasise that an almost identical spectrum of raw materials has also been noted at the nearby site Brno-Štýřice III.

The lithic industry is patinated with white patina. Almost all the pieces were covered by a thick layer of calcium carbonate (CaCO₃). As a result, they were inappropriate for ultrasonic cleaning. To clean the lithics, all the pieces covered by CaCO₃ had to be cleaned in a low concentration of hydrochloric acid (HCl) and immediately neutralized in freshwater. Cleaning was carried out by rubbing between fingers. No abrasive materials were used. No additional chemical analyses were undertaken except for the above-mentioned cleaning. A detailed laboratory protocol has been published (Nerudová et al. 2022).
During the technological analyses of the lithic industry, we distinguished the two specific pieces which are the subject of this study.

**Description of the analysed pieces**

Sample 1 (evidence number 136907) represents a small fragment of flake with a cortex (terminal part of a flake; Fig. 5: a – left piece). Its dimensions are 22 × 13 × 4 mm, and it weighs 1.2 g. Erratic flint was used as a raw material. The cortex of the piece is compact and light-orange in colour. Black components/spots and a locally reddish-coloured surface are visible under a binocular microscope. At the cortex, numerous parallel, converging and crossing grooves with a different depth and thickness are evident. The grooves are partially covered (incrusted) by dark-orange-coloured sediment. The ventral surface is covered by a thin white patina (Fig. 5: a – left piece). The piece is without chemical treatment. From the archaeological point of view, this small piece does not represent (apart from the grooves) a significant piece in the collection and can be characterised as waste. There are no additional technological features, retouch or use-wear traces. The fragment cannot be refitted or conjoined with another piece.

Sample 2 (evidence number 136919) represents a large flake with a cortex. Its dimensions are 61 × 40 × 14 mm, and it weighs 27.7 g (Fig. 5: a – right piece). This piece is also made on erratic flint. One line with a V-shape profile crosses the middle part of the piece. At the extremity, there is one large double groove-like line, probably of recent origin (Fig. 5: b & c); at the opposite extremity, there are three short converging grooves. As with the previous piece, the grooves are partially filled by dark-orange-coloured sediment. The ventral surface is partially covered by a thick layer of white patina (Fig. 5: a – right piece). This piece had to be chemically treated. Archaeologically, this piece is also incomplete and represents the initial stage of raw material or core preparation at the site. Unfortunately, the piece is relatively large and thick and cannot be refitted or conjoined with another piece. There are no additional technological features, retouch or use-wear trace.

**Description of the reference sample**

As a reference sample, we used a piece with cortex from the same raw material (e.g. erratic flint), and originating from the same collection as both of the analysed samples. Erratic flint is a fine-grained raw material from the...
Tab. 1. Overview of 14C data from Epigravettian sites in the Czech Republic. Calibration was performed according to curve IntCal 20 using the online OxCal Calibration programme (https://c14.arch.ox.ac.uk/oxcal/OxCal.html#; accessed 14.02.2023).

<table>
<thead>
<tr>
<th>Site</th>
<th>Lab-N°</th>
<th>Dating (uncalBP)</th>
<th>Dating calBP (95.4%)</th>
<th>Reference</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bratčice</td>
<td>OxA-33454</td>
<td>14,395 ± 70</td>
<td>15,869-15,393</td>
<td>Nerudová et al. 2019</td>
</tr>
<tr>
<td>Brno-Štýřice III</td>
<td>GrN-9350</td>
<td>14,450 ± 90</td>
<td>15,974-15,403</td>
<td>Valoch 1996</td>
</tr>
<tr>
<td>Brno-Štýřice III</td>
<td>GrA-20002</td>
<td>14,820 ± 120</td>
<td>16,566-15,852</td>
<td>Verpoorte 2004</td>
</tr>
<tr>
<td>Brno-Štýřice III</td>
<td>OxA-26961</td>
<td>15,625 ± 75</td>
<td>17,116-16,831</td>
<td>Nerudová &amp; Neruda 2015</td>
</tr>
<tr>
<td>Brno-Štýřice IIIb</td>
<td>Poz-137944</td>
<td>15,560 ± 80</td>
<td>17,046-16,759</td>
<td>Nerudová et al. 2022</td>
</tr>
<tr>
<td>Brno-Štýřice, Hospital</td>
<td>GdA-459</td>
<td>15,650 ± 70</td>
<td>17,126-16,856</td>
<td>Škrdla et al. 2005</td>
</tr>
<tr>
<td>Brno - Stránská skála IV</td>
<td>GrN-13954</td>
<td>18,220 ± 120</td>
<td>20,461-19,939</td>
<td>Svobodová 1991</td>
</tr>
<tr>
<td>Brno - Stránská skála IV</td>
<td>GrN-14351</td>
<td>17,740 ± 90</td>
<td>19,943-19,195</td>
<td>Svobodová 1991</td>
</tr>
<tr>
<td>Brno - Stránská skála IV</td>
<td>Poz-101463</td>
<td>18,670 ± 110</td>
<td>20,962-20,437</td>
<td>Svobodová et al. 2020</td>
</tr>
<tr>
<td>Mohelno-Plevovce KSA</td>
<td>Poz-57891</td>
<td>16,280 ± 80</td>
<td>17,930-17,531</td>
<td>Škrdla et al. 2015</td>
</tr>
<tr>
<td>Mohelno-Plevovce KSA</td>
<td>Poz-76195</td>
<td>18,970 ± 110</td>
<td>21,137-20,592</td>
<td>Demidenko et al. 2018</td>
</tr>
<tr>
<td>Mohelno-Plevovce KSB</td>
<td>Poz-76196</td>
<td>19,100 ± 110</td>
<td>23,737-20,783</td>
<td>Demidenko et al. 2018</td>
</tr>
<tr>
<td>Jaroslavice</td>
<td>GrA-7574</td>
<td>19,340 ± 100</td>
<td>21,790-21,060</td>
<td>Škrdla 1999</td>
</tr>
<tr>
<td>Stadice I</td>
<td>OxA-42443</td>
<td>14,121 ± 83</td>
<td>15,437-15,057</td>
<td>Oliva 2023</td>
</tr>
</tbody>
</table>

Tab. 2. Brno-Štýřice IIIb. Overview of the chipped stone industry sorted according to stages of production.

<table>
<thead>
<tr>
<th>Character of lithic pieces</th>
<th>Stratified artefacts</th>
<th>Unstratified artefacts</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cortical blank</td>
<td>5</td>
<td>6.8</td>
</tr>
<tr>
<td>Crested blank with 1 core side</td>
<td>1</td>
<td>1.4</td>
</tr>
<tr>
<td>Trimming flake</td>
<td>5</td>
<td>6.8</td>
</tr>
<tr>
<td>Blank with lateral cortex</td>
<td>9</td>
<td>12.3</td>
</tr>
<tr>
<td>Final blank without cortex</td>
<td>25</td>
<td>34.2</td>
</tr>
<tr>
<td>Flake rejuvenated striking platform</td>
<td>3</td>
<td>4.1</td>
</tr>
<tr>
<td>Blank with lateral part of core</td>
<td>-</td>
<td>2.6</td>
</tr>
<tr>
<td>Reduced blade core</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Flake rejuvenated striking platform</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Blank rejuvenated exploited surface</td>
<td>2</td>
<td>2.7</td>
</tr>
<tr>
<td>Reparation of crested blade</td>
<td>1</td>
<td>1.4</td>
</tr>
<tr>
<td>Blank with plunging termination (outrepassé)</td>
<td>1</td>
<td>1.4</td>
</tr>
<tr>
<td>Fragment</td>
<td>9</td>
<td>12.3</td>
</tr>
<tr>
<td>Burin blow</td>
<td>8</td>
<td>10.9</td>
</tr>
<tr>
<td>Splinter (&lt; 0,5 cm)</td>
<td>3</td>
<td>4.1</td>
</tr>
<tr>
<td>Core rest</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Fragment of a retouched tool</td>
<td>1</td>
<td>1.4</td>
</tr>
<tr>
<td>Total</td>
<td>73</td>
<td>100</td>
</tr>
</tbody>
</table>

Tab. 2. Brno-Štýřice IIIb. Übersicht der Steinartefakte, nach Produktionsstadien sortiert.
Fig. 4. Brno-Štýřice IIb (Vídeňská 11). Selection of chipped stone industry from the stratified context (1-7, 9-13): 1-3, 6, 7, 12 – unretouched blades, 4, 13 – burins, 5 – flake with edge damage, 9 – massive blade, 10 – crested blade, 11 – trimming flake. A bidirectional core (8) was found in the unstratified context in the Neolithic Age pit. All pieces are made from erratic flint. Drawing by T. Janků.

continental glaciation of northern Moravia and Silesia or more northerly territories, which occurred at least twice during the Middle Pleistocene (Tyráček 2011). Erratic flint can be divided into Cretaceous (Maastrichtian) and Tertiary (Danian) types, based on their colour (Maastrichtian flints are dark, Danian flints are bright); chemical composition and present microfossils are the same for both types (Ličmanová et al. 2018).

The reference sample is represented by a medial fragment of the blade with a lateral cortex (Fig. 6: a).

The cortex is light orange and compact; under the binocular microscope, it is porous, and some spots are coloured by a black pigment (ink) of post-extraction origin. Except for the cortex, all surfaces are patinated by intensive white patina. In the middle part of the piece is a visible short unintentional (natural) groove, which is parallel to the central ridge. No additional intentional modifications of the surfaces are evident except for one piece of damage originating from the excavation origin and irregular edge damage which

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**Fig. 5.** The pieces under study. The rectangle shows the position of the detailed analyses (a). Photo: P. Neruda. The dashed oval shows a double groove-like line, probably of recent origin (c). Black lines indicate V-shape grooves, orange lines indicate U-shape grooves, and the dotted line indicates a double groove-like line. Drawing T. Janků, graphic Z. Nerudová.

is probably associated with soil movements (Stapert 1976; Keeley 1980).

The reference sample was not used for further analyses; it served as a comparison of the character of the cortex, and the unintentional groove character (see chapter Method).

**Method**

The striations on the artefacts were recognized macroscopically and first studied by binocular microscope to exclude an unintentional origin. In the studied samples, two types of grooves were recognised where the grooves were filled by some kind of incrustation (sediment). These were exclusively present in Sample 1 (Fig. 5). One very distinct fresh groove with clear margins and without any incrustation was present in Sample 2 (Fig. 5: Sample 2 – dashed oval), as were grooves with incrustation (Fig. 5: Sample 2 – black and dotted line). We did not experiment with this sample because, with this kind of raw material, it is obvious how different original and fresh grooves are on the analysed samples (comp. Fig. 5: Sample 2 and Fig. 6). Because the grooves are mostly parallel and do not show any motif, it was not necessary to follow the order of the grooves (Fritz 1999). We focused on the striations filled by incrustation. For detailed analyses, we used an Olympus LEXT OLS4100 confocal laser scanning microscope equipped with 10× and 20× magnification lenses. The confocal principle together with point-by-point laser scanning is capable of producing 3D images of the surface, while subsequent full-colour confocal snapshots added the true-colour information. All these processes were compiled automatically by the Olympus LEXT OEM software.

We analysed some spots on the surface of the piece (Sample 1) in detail. To exclude a natural origin of the grooves we compared the surface of the cortex between the original artefacts and a reference sample. The selected Sample 1 was measured in two steps. The first measurement was done with a 10× magnification lens, merging 3 × 3 individual images and the second measurement with a 20× magnification lens, merging 2 × 2 individual images. Merging was performed with a motorized microscope stage using the built-in stitching function in the OEM software. The striation depth and width were obtained from several randomly selected height profiles. The profile positions are visualized in figure 7, and the individual profiles with highlighted groove marks are plotted in figure 9. The distance between the grooves was determined from the local minima of the two neighbouring profiles.

**Results**

**Microanalysis of the original sample**

The individual diagrams show the analysed profiles 1-8 (Figs. 7-9). In detail, we focused on one groove (Fig. 7: c, d & e) and we measured three different cross-sections perpendicular to this longitudinal groove (profiles 1-3; Fig. 7: a & b). To analyse the distance between the individual grooves, we enlarged profiles 2 and 3 to neighbouring parallel grooves (Fig. 7: a & b). Profile 4 shows the individual cross-section of the next parallel groove and profiles 5 and 6 show the course of the third parallel groove (Fig. 7: c & d). The final profiles, 6 and 7, are crossing the two parallel grooves (Figs. 7: c & 9), and probably cross the third parallel groove above profile 4. There is significant
differentiation between the profiles. The value of measurements ranges from very shallow/flat profiles (profiles 1, 2 and 4), over deep U-shape profiles (profiles 3, 7 and 8) to sharp V-profile (profiles 5 and 6). The depth and breadth of the profiles also vary significantly. The minimum depth of the grooves is around 100 μm (well visible on profiles 1, 3, 5 and 8), and the maximum depth is around 120-150 μm (profiles 5, 6 and 8). The breadth of the grooves is up to several hundreds of microns (Fig. 7: c & d; Fig. 9: profile 5).

We suppose the variability of the shapes is influenced by the intensive filling of the bases of grooves (well visible in figure 8: c & d and figure 9). Together, the same intensive character of incrustation of all grooves and depressions on the surface of the sample illustrates that the age of the grooves is rather of the Palaeolithic period than of recent origin.

Discussion and conclusion

Are the grooves intentional or not? How can we interpret the findings from Brno-Štýřice IIIB Firstly, we can exclude a recent origin for the grooves because patina and incrustation covered them. Moreover, one piece (Sample 2) was covered by a thick layer of calcium carbonate, and this covered the grooves. From the character of the grooves, we can exclude the possibility of the grooves being made by an iron tool during excavation. Additionally, the intentional origin of the grooves is the repetition of similar findings from both well-stratified and unstratified collections in the Czech Republic as well as abroad.

In Moravia (Czech Republic), such pieces were occasionally published decades ago. This type of piece was probably published for the first time by Bohuslav Klima. He documented a unique piece from the Gravettian site in Dolní Věstonice – the terminal part of a blade with a lateral cortex with a series of crossing lines (Klima 1969: Fig. V:69). A few years later, Karel Valoch published the first stratified Late Gravettian (Epigravettian) industry known in the former Czechoslovakia with a refit of three large semi-cortical flakes (Valoch 1975). At the cortex of these pieces, two longer lines running over all three dorsal surfaces are evident, together with, probably, two short parallel lines situated just at the border between the left and middle flake (Fig. 10). Two stratified pieces from the Mohelno-Plevovec Epigravettian site were briefly published a few years ago (Škrdla et al. 2014: Fig. 4: 6 & 20). Both pieces are endscrapers made from erratic flint.
Unfortunately, most of the lithics with grooves are known from unstratified surface collections. Martin Oliva summarised all Aurignacian chipped stone artefacts on which he observed grooves at the cortex. According to the character and orientation of the grooves, he divided the grooves on the cortex of lithic tools into several groups – a) grooves without any system (represented by the pieces from the Nová Dědina I, Kvasice I, Žlutava II sites), b) parallel grooves with pieces from the Slatinice I and Nová Dědina III sites, c) converging type of grooves (a piece from the Kvasice I site), d) intersecting grooves (pieces from the Nová Dědina I, Žlutava I and Napajedla sites), e) several intersecting grooves (pieces from the Otaslavice I and Slatinice sites), and f) rows of incisions represented by a piece from the Lhotka site (Oliva 1982; Fig. 11).

Unfortunately, at the time of writing, none of the above-mentioned artefacts has been studied in detail regarding the character and origin of the grooves.

Other examples are known from collections outside the Czech Republic. In the past, many pieces have been studied in detail in order to resolve their intentional or unintentional origin. In Italy, relatively frequent grooves at the cortex of the chipped stone industry in the abri Riparo Tagliente (Leonardi 1976; 1988) from both the Mousterian and Epigravettian layers were reported (Fig. 12: 2-5 & 9-11). Individual findings were published from the Mousterian layer in the abri Solinas near Fumane Cave (Fig. 12: 1), the Mousterian (?) layer in the Quinzano Cave (Fig. 12: 6), and the Epigravettian layer from Piancavallo (Fig. 12: 12; Leonardi 1988). Some pieces are known also from the Mousterian context in Grotta Maggiore di San Bernardino (Pereiani et al. 2014).

If we are looking only at the grooves of the cortex of the chipped stone industry, we can mention the piece from Temnata Cave layer VI, on the surface of which are located twenty engraved lines (Crémades et al. 1995). A unique piece is from the Qafzech Cave in Israel. A series of parallel lines on the cortex of the Levallois core suggests the lines were intentionally engraved and the piece is probably of a non-utilitarian character (Hovers et al. 1997). A Middle Palaeolithic object with semi-circle lines incised at the cortex has been described from the Quneitra site in the Golan Heights (Marshack 1996; d’Errico et al. 2003). Recently published are the grooves on the cortex of a block of tested raw material from the Aurignacian site Barbas III (Ortega et al. 2022). Grooves found on the fragment of a flake at the Aurignacian site Canta-louette II and interpreted as a bird, are associated with mobile art (Ortega et al. 2015).
The number of items has been increased by the discovery at a rescue archaeological excavation at a new site situated in the cadastre of Brno-Štířice (Czech Republic), where two pieces of chipped stone with grooves at their cortex were uncovered. With regard to a similar finding – refits of three cortical flakes with grooves on the surface – discovered earlier at a short distance from this new site (Valoch 1975), we analysed both newly discovered pieces with a focus on confirming or disproving the intentional origin of the grooves.

Although the analysed lithic industry was deposited in the LGM/LGT periglacial loess-like sediment, we can...
Fig. 10. Refit of three semi-cortical flakes with easily visible grooves. The pieces were found in 1972 during the first excavation of the Epigravettian site later named Brno-Štýřice III. According to (Valoch 1975), photo Z. Nerudová.


exclude natural origins like cryoturbation and gelifluction as a result of grooves on the pieces. According to Keeley, striation originating from soil movement is up to 60 μm wide, as deep as 50 μm and has a U-shape cross-section (Keeley 1980). The grooves at Sample 1 are relatively deep, easily visible macroscopically and are situated only on the cortex surface of the pieces. No additional grooves were found on the rest of the items. Patina and incrustation covered the grooves. We noticed the depth and breadth of the grooves vary significantly, which is probably the result of different intensities of movement. No shiny patina, patches, or lines of bright friction polish as a product of freeze-thaw cycles in sediment were found (Michel et al. 2019).

Fig. 11. Selected artefacts with grooves from Moravian (Czech Republic) sites. 1 – Otaslavice I, 2, 4-6 – Nová Dědina I, 3 – Nová Dědina III, 5 – Mladeč Cave, 7 – Lhotka, 8 – Žlutava I, 9 – Slatinice I (according to Oliva 1982).

Secondly, on the surface of the artefact, we identified two types of profiles: U-shaped and V-shaped (Fig. 7: c). Although U-shape profiles are the results of post-depositional processes (d’Errico & Villa 1997; d’Errico 1998; Zilhão & d’Errico 2003), in this case, we can suppose that the U-shaped profiles are incomplete because they are partially filled by carbonised sediment (Fig. 7). We cannot exclude the intentional origin of U-shaped profiles, but mechanical removal of the filling could damage the surface of the artefact. The V-shaped cross-section resulting from the use of a stone edge is undoubtedly of an intentional origin (Brumm et al. 2020).

Fig. 12. Selected examples of pieces with grooves on the cortex: 1 – Abri Solinas, Mousterian, probably intentional grooves; 2-5 – Abri Riparo Tagliente, Mousterian, intentional grooves; 6 – Quinzano Cave, Mousterian (?), incisions; 7-8 – Abri Tagliente, Mousterian, probably intentional incisions; 9-11 – Abri Riparo Tagliente, Epigravettian, linear and geometrical engraving; 12 – Piancavallo, Epigravettian, rectilinear subparallel incisions. Images are in scale down and to different scales (according to Leonardi 1988).

We can mention some analogies which interpret simple types of grooves at the cortex, as we present here on pieces from the Brno-Štýrlíce Illb site. The analogies differ according to the character of the lines (grooves) and the number of grooves on one surface. A large number of grooves on the cortex obtained by repeated movements, which are subparallel and have variable depth, is interpreted as the result of cleaning of the cortex, or as an intervention to reduce the thickness of the cortex. The cleaning (scrapping) of the cortex confirmed the origin of groove analyses of pieces from Riparo Tagliamento, Grotta Fumane and Grotta di San Bernardino (Peresani et al. 2014). Unfortunately, we have no other piece with similar traces. The grooves on the analysed smaller Sample 1 are numerous and can be characterised as recurrent and parallel. Due to the small dimensions and fragmentation of analysed Sample 1, we cannot interpret this piece as a kind of non-utilitarian piece. Due to the fragmentation of this piece, the interpretation of the grooves is rather uncertain.

Our pieces usually have one or more grooves. These types of striations are the result of a single movement and repeated gestures. The interpretation of such intentional grooves varies between utilitarian and non-utilitarian depending on the number and arrangement of the incisions (Peng et al. 2012; Peresani et al. 2014; Brumm et al. 2020; Ortega et al. 2022). If we disregard the non-utilitarian meaning of the grooves, we can look for a practical explanation. One interesting interpretation of such grooves is that the cortical flake served as a support for cutting actions associated with household activities (Lorblanchet 1999). This is evidenced by the occasional presence of grooves only on some surfaces and the irregular character of the striations (Peresani et al. 2014). For this purpose, an implement like a tool of a burin character could have been used (d’Errico 1988).

The grooves found on the largest piece (Sample 2) look unsystematic and random and are similar to the first pieces found at the site in 1972 (Fig. 10).

Generally, we suppose, the grooves presented by our study do not represent decoration, symbol, or mobile art, known from many Palaeolithic sites. The interpretation of grooves on the cortical pieces as a result of cutting actions in which the cortical pieces were used as support is acceptable. Our counter-arguments are mostly the small dimensions of the cortical artefacts, the unsuitable (convex) shape, and an uneven or irregular surface. Lastly, the grooves are on different types of blanks, retouched tools, cores, and pebbles. We suppose the striation found on the two pieces from the Videaňská 11 site can be interpreted as the result of knapping processing, more precisely as a result of testing the homogeneity of the nodule (Inizan et al. 1999) and testing the thickness (and quality) of the cortex. The different shape profiles, depth and breadth of grooves correspond to this observation. The result of rubbing the Upper Cretaceous flint with a stone hammer is striations (linear polishes; Sano 2012: Fig. 37:b), using sandstone for the preparation of the ridge results in linear polishes (Sano 2012: Fig. 45) and contacts from other flints bring a short, stripe-like appearance and non-oriented appearance (Sano 2012: Fig. 85: c). Similar striation, which is the result of friction or percussion stone on stone has also been described by Semenov (Semenov 1957) as an example of late Palaeolithic chipped stone industry.

Although we cannot directly associate the grooves at the cortex of the chipped stone industry found at Brno-Štýrlíce Illb with artistic Palaeolithic pieces sensu stricto, we can understand these types of pieces as a kind of evidence of infrequent “insights into technology” or “know-how” of Palaeolithic peoples. These (incised) pieces are occasionally published from both well-stratified as well as unstratified contexts mentioned from a relatively wider area (Italy, Czech Republic, France, North America, Southwest Asia) and documented from different periods (Mousterian, Aurignacian, Gravettian, Epigravettian, Late Palaeolithic, Neolithic (Brumm et al. 2020 with further references).

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