New observations concerning the Szeletian in Moravia

Neue Beobachtungen zum Szeletien in Mähren

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Abstract - The Szeletian site Želešice-Hoynerhügel, located within Bobrava River valley on the southwestern outskirts of the city of Brno, has been known as a surface site since the 1950s. Intensive georeferenced surveys conducted over the last several years identified artifacts within intact sediments in some areas of the site. Subsequently a limited scale excavation was conducted, which yields three important contributions: a collection of lithics made from a variety of siliceous rocks, Jerzmanowice-type points, and a series of AMS dates that extend the known Szeletian occupation in Moravia to GI 12.

Zusammenfassung - *Die Szeletien-Fundstelle Želešice-Hoynerhügel, im Bobravatal am südwestlichen Rand der Stadt Brno (Brünn) gelegen, ist schon seit 1950 als Oberflächenfundplatz bekannt. In den letzten Jahren wurden ausgedehnte, georeferenzierte Erkundungen mit dem Ziel vorgenommen, Artefakte in ungestörtem Sediment aufzufinden. 629 nicht-stratifizierte Artefakte wurden an der Oberfläche gefunden und ihre Lage wurde mittels GPS bestimmt; GIS Software diente zur Analyse ihrer räumlichen Verteilung. Testschnitte wurden an Positionen durchgeführt, an denen ein hohes Potential für die Auffindung von Artefakten in ungestörtem Sediment postuliert wurde. Die Testschnitte waren erfolgreich und eine begrenzte Grabung von 15 m² Fläche wurde in den Jahren 2010-2013 durchgeführt. Dabei wurden insgesamt 415 Artefakte dreidimensional eingemessen und durch 1092 ausgeschlämmte Artefakte (aus 0,5 x 0,5 m Quadraten) ergänzt.*

Rohstoffe der geborgenen Artefakte können in vier Gruppen geteilt werden. Die erste Gruppe bezieht lokale Rohstoffe ein, die in Schottern auf der Fundstelle oder in ihrer nächsten Umgebung gesammelt worden sein können (46 %). In diese Gruppe gehört die Hornsteinvariante Kromauer Wald, die auf der Fundstelle überwiegt, und vereinzelt kommen Quarz und Kreidespongolith-hornstein vor. Die zweite Gruppe bilden die aus der Entfernung von 10-30 km importierten Rohstoffe (22 %) – Hornstein des Typs Olomučany, Hornstein des Typs Stránská skála, Hornstein des Typs Rudice und kieselige Verwitterungen. Die dritte Gruppe besteht aus den aus der Entfernung von mehr als 50 km importierten Rohstoffen (12 %) und bezieht Radiolarit aus den Weißen Karpaten, erratischen Hornstein aus Nordmähren oder Südpolen und Hornstein des Typs Troubky/Zdislavice aus dem Litenčicer Gebirge ein. Die letzte Gruppe (20 %) bilden durchbrannte und nicht identifizierbare Artefakte. Aus dem technologischen Gesichtspunkt bilden Abschläge mehr als die Hälfte der Kollektion. Kerne sind meistens nur durch unregelmäßige Stücke vertreten. Vollständige Klingen sind selten, häufiger kommen gebrochene Klingen vor. Mikroklingen sind nur durch Einzelstücke vertreten. Auf einigen Artefakten ist das Facettieren der Schlagfläche sichtbar, aber im Vergleich mit dem Bohunicien ist das Facettieren gröber und bildet keinen charakteristischen Ausläufer. Die Gestaltung der Abschlagsfläche ist eher unidirektional und zentripetal als bidirektional oder in Gegenrichtung. Anhand der oben erwähnten Angaben ist festzustellen, dass obwohl in der Kollektion Artefakte mit facettiertem Fuß vertreten sind, ihr Charakter doch anders ist als im Bohunicien. In der Kollektion von Werkzeugen, die insgesamt 10 % des Materials darstellen, überwiegen Kratzer, die oft steil retuschiert und auf massiven Halbprodukten angebracht sind; es handelt sich jedoch nicht um die für das Aurignacien typischen Hochkratzer. Bemerkenswert ist die Gruppe von Spitzen, die zwei Fragmente von Jerzmanowicer Spitzen, zwei Bruchstücke unifacieller Blattspitzen mit ventroterminaler Retusche, ein Fragment der konvergent retuschierten Spitze und ein Fragment der konvergent retuschierten Klingenspitze einbezieht. Durch ein paar weitere Stücke sind Schaber, Stichel, ausgesplitterte Stücke und Fragmente retuschierter Geräte vertreten. Als Einzelstücke kommen eine Zinke, ein Stück mit Kerben und Endretusche, eine retuschierte Klinge und das Fragment einer retuschierten Klinge vor.

Die stratifizierte Kollektion wird durch die Kollektion von Lesefunden erweitert, die 629 Artefakte zählt. Die Oberflächenfunde weisen - im Vergleich mit den stratifizierten - ein leicht unterschiedliches Spektrum verwendeter Rohstoffe auf (besonders ist der niedrigere Anteil von Radiolarit und Rohstoffen aus dem Mährischen Karst zu beobachten) und dagegen kommen auch Blatt-spitzen vor, die in der stratifizierten Kollektionen bisher fehlen. Auch die Levallois-Artefakte weisen in der Oberflächenkollektion längere Formen auf.

Diese Arbeiten liefern drei wichtige Beiträge: Zum einen die Kollektion von Steinartefakten aus unterschiedlichen kieseligen Gesteinen und zum anderen die Auffindung und Identifizierung von Jerzmanowicer Spitzen, die chronometrisch früher als die der

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namengebenden Fundstelle in Polen zu stellen sind. Eine kleine Serie von AMS-Radiokohlenstoffdaten belegt die Szeletien-Besiedlung in Mähren bis in das GI 12, in eine Zeit, als bereits ein anderer früh-jungpaläolithischer Technokomplex – das Bohunicien – präsent war.

Keywords - Moravia, Szeletian, Jerzmanowice-type points, GPS aided survey, GI 12, geoarchaeology
Mähren, Szeletien, Jerzmanowice-Spitzen, Oberflächenbegehung mit GPS, GI 12, Geoarchäologie

Introduction

The Szeletian technology (named after the type site of Szeleta Cave in Hungary) is based on flake and blade production by non-Levallois methods of reduction (Svoboda 1993). It is characterized by large numbers of end- and side scrapers, and a low number of burins (Oliva 1991). Middle Palaeolithic tool types (e.g. denticulates, notches, side scrapers) occur frequently, but are in fact rare in the Szeleta Cave assemblage (Adams 1998). Bifacial retouch on different implements is common. A type artifact of the Szeletian industry is the fully bifacially retouched implement called leafpoint. However, leafpoints also occur at Bohunice (the type site of the Bohunician industry), and probably some Aurignacian (Oliva 1990) and late Gravettian assemblages (Svoboda 2007) in southern Moravia. They also occur in some of the Micoquian layers in Kůlna Cave (Valoch 1988). There are approximately 100 Szeletian sites known in Moravia (Oliva 1991). All except Vedrovice V (Valoch 1984, 1993) and Moravský Krumlov IV (Neruda & Nerudová eds. 2009) are surface sites (Fig. 1).

Several authors (e.g. Allsworth-Jones 1986, 1990; Oliva 1991; Valoch 2000; Svoboda 2005) propose that the Szeletian is the product of an acculturation process between the local Middle Palaeolithic population and the incoming groups of Anatomically

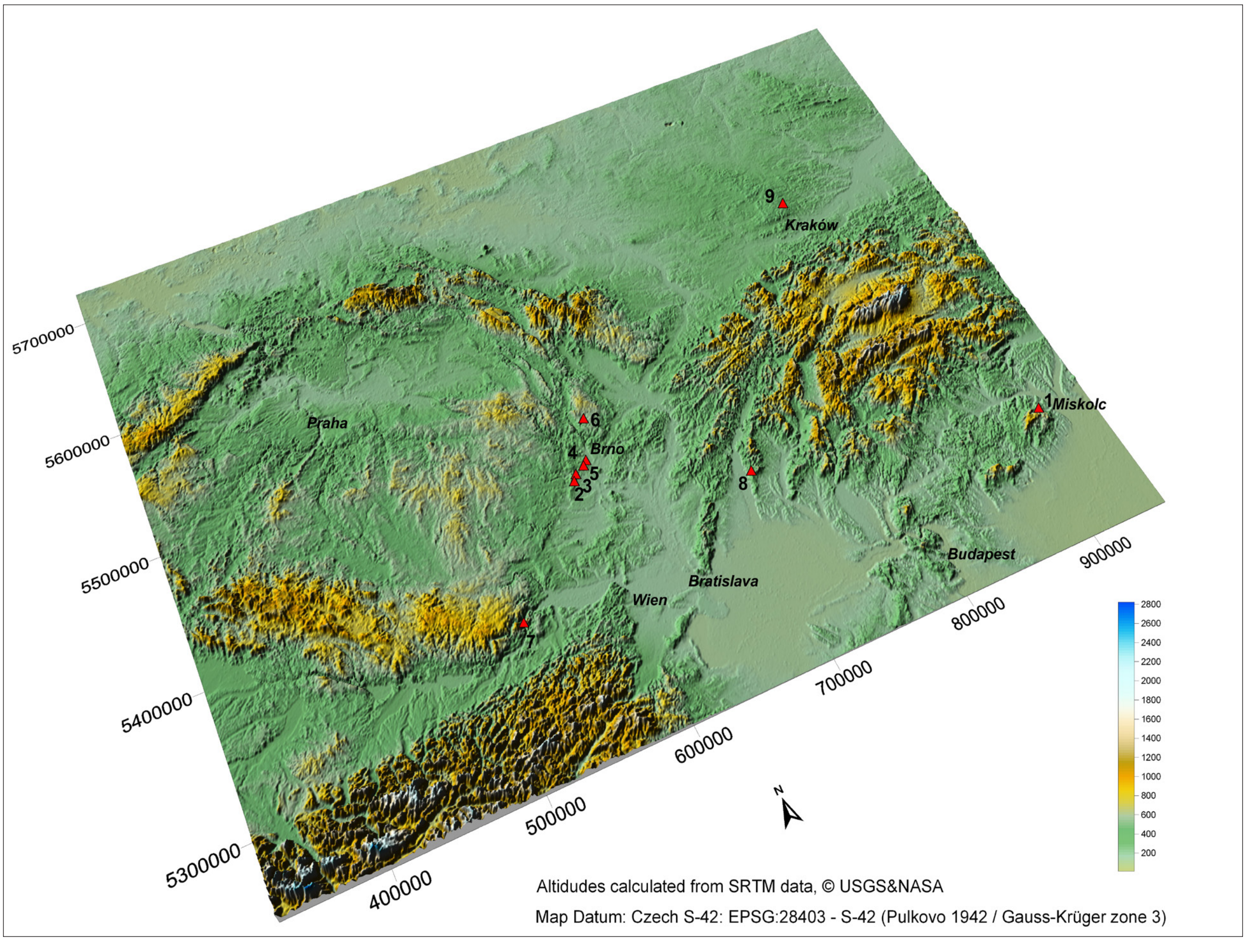

Fig. 1. Location of key Szeletian sites in the area of the Middle Danube (1: Szeleta Cave, 2: Vedrovice V, 3: Moravský Krumlov IV, 4: Želešice III, 5: Bratčice I, 6: Pod hradem Cave, 7: Willendorf II, 8: Moravany-Dlhá) and Nietopierzowa Cave (9).

Abb. 1. *Karte der Szeletien Fundstellen im Bereich der mittleren Donau (1: Szelata Höhle, 2: Vedrovice V, 3: Moravský Krumlov IV, 4: Želešice III, 5: Bratčice I, 6: Pod hradem Höhle, 7: Willendorf II, 8: Moravany-Dlhá) und Nietopierzowa Höhle (9).*

Modern Humans who brought the Aurignacian industry, and was probably manufactured by the Neanderthals. Although the dating uncertainties for sites of this period are large, most Szeletian assemblages do date to the Early Upper Palaeolithic (EUP) period. On the other hand, Adams (1998) argues that the Szeletian is not a transitional industry. He argues instead that it is a facies of the Aurignacian industry (with which it appears to chronologically overlap) and the lithic differences are due to differing site activities.

Dating the Szeletian technocomplex is a particularly challenging problem. The record from the type site Szeleta Cave in Hungary is problematic (Lengyel & Mester 2008). The hitherto published dates for Moravian sites Vedrovice V and Moravský Krumlov IV (Davies & Nerudová 2009; Neruda & Nerudová 2013 with references) overlap with the GI 11 peak on the delta ^{18}O curve (GISP2, Grootes et al. 1993). Recently published dates from Willendorf II, level 2, which is assigned to the Szeletian, conform to the GI 12 peak (Nigst 2012).

Surface artifacts have been known from Želešice for a number of years. New research has been conducted at this site over the last six years. The growing number of stratified and unstratified artifacts found at this site and their technological and typological aspects have permitted its classification as Szeletian. In this article we present preliminary information pertaining to this important site and discuss its potential for solving questions concerning chronology and lithic technology of the Early Szeletian on the Middle Danube. The new dates extend the Szeletian occupation of Moravia to an earlier period (GI 12) and make it contemporaneous with the Bohunician technocomplex (cf. Richter et al. 2008, 2009).

Geography

The Želešice-Hoynerhügel site is located within the Bobrava river valley which dissects Bobrava highland along the east-west axis. The Bobrava river is a right bank tributary of the Svratka river and both valleys are clearly visible from the site. The Brno Basin is also partly visible.

The site is located on a significant elevation above the right bank of Hajany Creek, and is a part of a string of sites following Hajany Creek and Bobrava River from Ořechov to the west and Popovice to the east (cf. Valoch 1956; Škrdla et al. 2011). The site is located on the northern slope of a hummock situated between Ořechov, Syrovice and Rajhrad. Its summit has an elevation of 284.8 m asl. The elevation of the site ranges between 268–276 m. On the historical Stable Cadaster map, the site is located within field parcels "Hoynerhügel" and "Dorflüssen". On the present day map (ZM 1:10 000) the area is called "Hajanský". As Valoch (1956) used the field name Hoynerhügel for the site, we continue in using this name.

History of research

The site was first mentioned by Karel Valoch, who co-discovered it with Vilém Gebauer (Valoch 1956). It is noteworthy that the site was not mentioned at an earlier time since a Beaker Bell culture site was excavated in the same field (Schirmeisen 1934: 66). A possible reason is that the field in question was an orchard and it may not have been possible to conduct surface collections. Oliva (1989) mentions this site in his list of sites for the Brno-venkov district. This author described the stone artifacts and his interpretation concluded that the artifacts display both Szeletian and Aurignacian elements. In contrast, Valoch (1956) emphasized the presence of faceted platforms, which hints at Bohunician.

New surveys (2009–2013)

The site has been under investigation since 2009 (Škrdla et al. 2010) to the present day, with regular excavations (Škrdla et al. 2010, 2011, 2012). Coordinates for 700 artifacts have been recorded (Fig. 2), eighty of which are of post-Palaeolithic age. The surveys were conducted at 2–3 metre intervals in the direction of ploughing. This method allows control of orientation without setting up a grid. Systematic survey was combined with random exploration. The team consisted of 2–4 people. Initially we used two basic GPS units while later surveys employed up to four units. The site was investigated systematically in this way over several years.

Palaeolithic artifacts are distributed over an area of 450 x 400 m. The main cluster covers an area of 120 x 130 m (301 artifacts – 65.3 %). Seventy-six percent of the post-Palaeolithic artifacts were found away from the Palaeolithic finds to the south of the main cluster. Given that the ploughing activities in this area disturb the underlying layer without revealing Palaeolithic artifacts, further investigations in this area are not warranted as the extent of the Palaeolithic concentration does not reach this area based on the described distribution. The possibility of Palaeolithic artifacts being present in deeper layers under the more recent archaeological features cannot be excluded (cf. Schirmeisen 1934). A high proportion of artifacts on the sloping ground near the chapel were covered by a $CaCO_3$ crust (Fig. 2); artifacts further up the slope lacked this crust. A total of 61 % artifacts possessed this crust (Škrdla et al. 2010: 302). This indication was used to predict the presence of intact sediments. The $CaCO_3$ crust forms on artifact surfaces when $CaCO_3$ percolates down from the overlying calcareous loess (cf. Flint 1949).

Surface collection

The 2009–2013 surface survey of this site has yielded a collection of 629 Paleolithic artifacts. Six- hundred

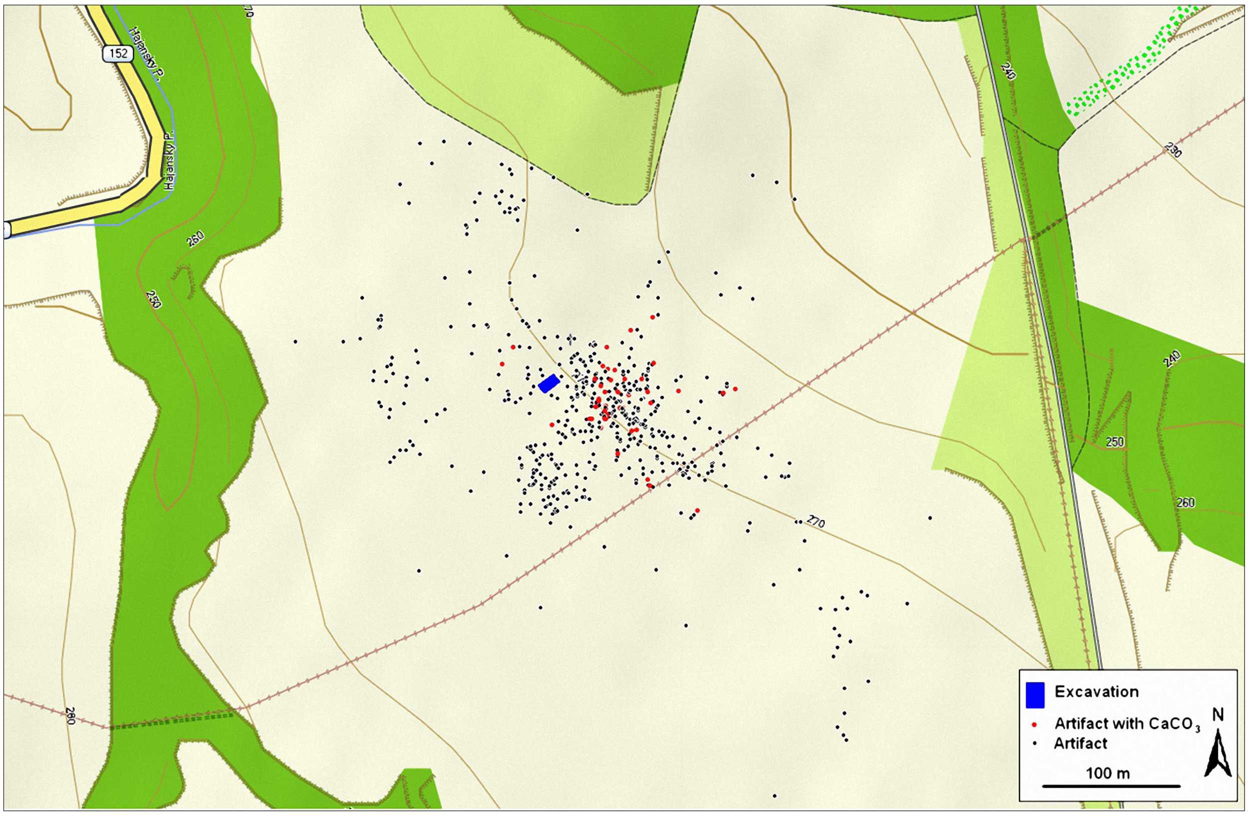

Fig. 2. Spatial distribution of surface finds and location of the excavation.
Abb. 3. *Verteilung der Oberflächenfunde und Lage der Grabung.*

and twenty of these artifacts were recorded using a hand-held GPS. Prevailing raw material is Krumlovský les-type (KL) chert (82 %), supplemented by Stránská skála-type chert (7 %), Cretaceous spongolite chert (6 %) and erratic flint (3 %). A small number of artifacts were produced from radiolarite (6 items) and Olomučany-type chert (8 items).

Debitage is the most common technological element – poor quality nodules with many inhomogeneities were frequently knapped, which explains the increased presence of precores, irregular cores, core fragments, massive flakes and fragments (a high proportion of the fragments result from frost and ploughing). Tools represent ca. 5 % of the surface assemblage. Recent plough damage to artifacts can be visually distinguished by the freshness of the breaks. Frost damage has characteristic appearance also unlike other types of damage.

Technologically significant finds include a core with a faceted striking platform, supplemented by two other bidirectionally reduced cores. Several artifacts have a faceted striking platform (Fig. 3: 10-13) and parallel dorsal scars. They include an elongated Levallois blade with a faceted striking platform and opposed directional dorsal scars (Fig. 3: 11), a proximal fragment of an artifact with a faceted striking platform (Fig. 3: 13), one artifact resembling a proximal fragment of a Levallois blade/point (Fig. 3: 12) and a flake with multidirectional dorsal scars (Fig. 3: 10).

In contrast to the stratified collection, the surface collection is characterized by leaf point fragments (Fig. 4: 1, 15, 16, 19) all of which are made from KL chert. Two of them are relatively massive. The characteristic leaf points are supplemented by points possessing partial flat retouch located at distal or proximal ends and the ventral surface strongly resembling Jerzmanowice-type points (see Chmielewski 1962: 59-61). This category includes a unifacially flat retouched point with additional ventral retouch (Fig. 4: 2), a distal fragment of a blade point is partially retouched on both the dorsal and ventral surfaces (Fig. 4: 3), and three bilaterally retouched points are partially retouched on their ventral surface (Fig. 4: 5-7). The most numerous tool type (8 items) is the end scraper, with several different types identified (Fig. 4: 4, 9-14). One of them is flat retouched on its dorsal surface (Fig. 4: 9) and another is laterally retouched (Fig. 4: 13). Although many items are steeply retouched, none of them represent a characteristic Aurignacian carinated scraper. The collection of tools also includes four splintered pieces (Fig. 3: 15-17), two skewed scrapers (Fig. 4: 18, 20), a retouched blade (Fig. 4: 21), a bilaterally retouched blade fragment (Fig. 4: 8), a unilaterally retouched blade fragment, a retouched flake, and three fragments of a retouched tool (Fig. 4: 17).

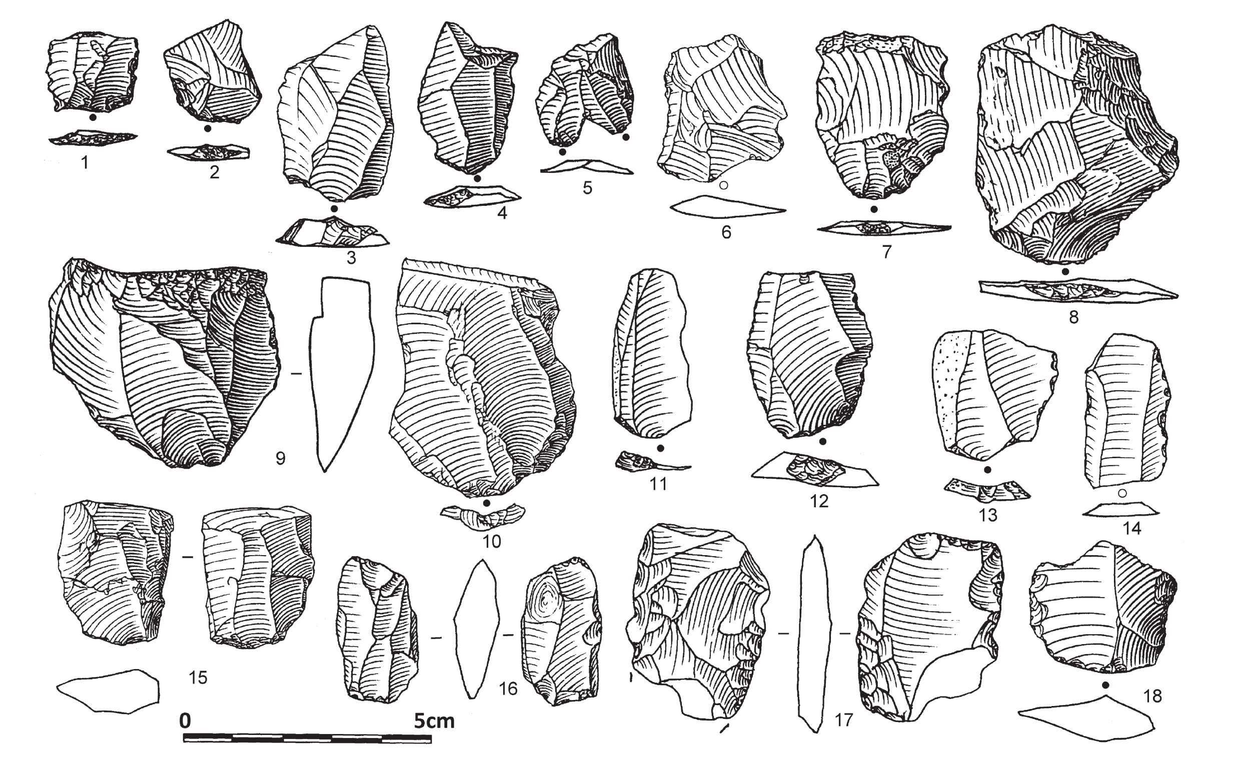

Fig. 3. Selected artifacts from stratified (1–9) and surface (10–18) collections. Raw materials: 1, 4, 6–9, 11, 12, 14–16: KL chert; 2, 5, 13, 17: erratic flint; 10: Cretaceous spongolite chert; 3: Stránská skála-type chert; 18: radiolarite. ⅔ nat. size.

Abb. 3. Auswahl stratifizierter Funde (1–9) und Oberflächenfunde (10–18). Rohmaterial: 1, 4, 6–9, 11, 12, 14–16: Krumlovský les Hornsteinvariante; 2, 5, 13, 17: erratischer Feuerstein; 10: Kreidespongolithornstein; 3: Stránská skála-typ Hornstein; 18: Radiolarit. ⅔ nat. Grösse.

Test pits (2009)

When analyzing the artifact distribution in MapSource (Fig. 2) and Google Earth, areas with no surface artifacts became apparent. We also focused on the distribution of artifacts with $CaCO_3$ crust, which were concentrated along the slope edge above the wayside shrine. We selected an area with no surface artifacts but within a short distance of artifacts possessing $CaCO_3$ crusts as a likely location to contain intact Quaternary sediments. We dug two test pits (Zel3_T01 and Zel3_T03) in this area south of the chapel, both yielding intact sediments with artifacts (Škrdla et al. 2010, Fig. 46).

Excavation (2010–2013)

In 2010 we excavated an area between test pits Zel_T01/09 and Zel_T03/09 (Škrdla et al. 2011). The following year, the excavated area was enlarged 1 metre upslope and in 2012 we continued further upslope (Fig. 5). All excavated sediments were processed using a 3 mm sieve.

Stratigraphy & Micromorphology

Sediments underlying the excavation area are Miocene sands, which have been mined for industrial purposes in the recent past. Remnants of river terrace gravels were detected in the vicinity of the locality. These gravels contain pieces of KL chert with a characteristic black cortex as well as Cretaceous spongolite chert.

Within the excavated area we documented an irregular paleosurface which, surprisingly, does not reflect the current slope gradient. The paleosurface slopes in the opposite direction to the current slope gradient, most probably into a palaeo-gully which is now filled by Quaternary deposits. As a result of this situation, the section is presented as an idealized profile depicting the general stratigraphy (Fig. 6).

The recent soil (Fig. 6: A) is ploughed and has been interpreted as a former luvic cambisol. It is composed of two distinguishable horizons. The upper (ploughed) horizon is highly illuviated and degraded. Charcoal fragments (50 µm, up to 3 %) and fragments of soil crust (up to 500 µm in size and up to 10 % in content) were also detected. Calcium carbonate is present as infillings and mainly fine-grained hypocoatings (30 %). Bone fragments were also present. The lower part of the soil horizon is stipple-speckled, occasionally displays cross striated birefringence and can be interpreted as a B horizon. Bioturbation and illuviation connected with degradation of the soil are visible.

The recent soil described above has formed on loess with intercalated redeposited loess (Fig. 6: B) and sandy loess-like sediments - a result of its location

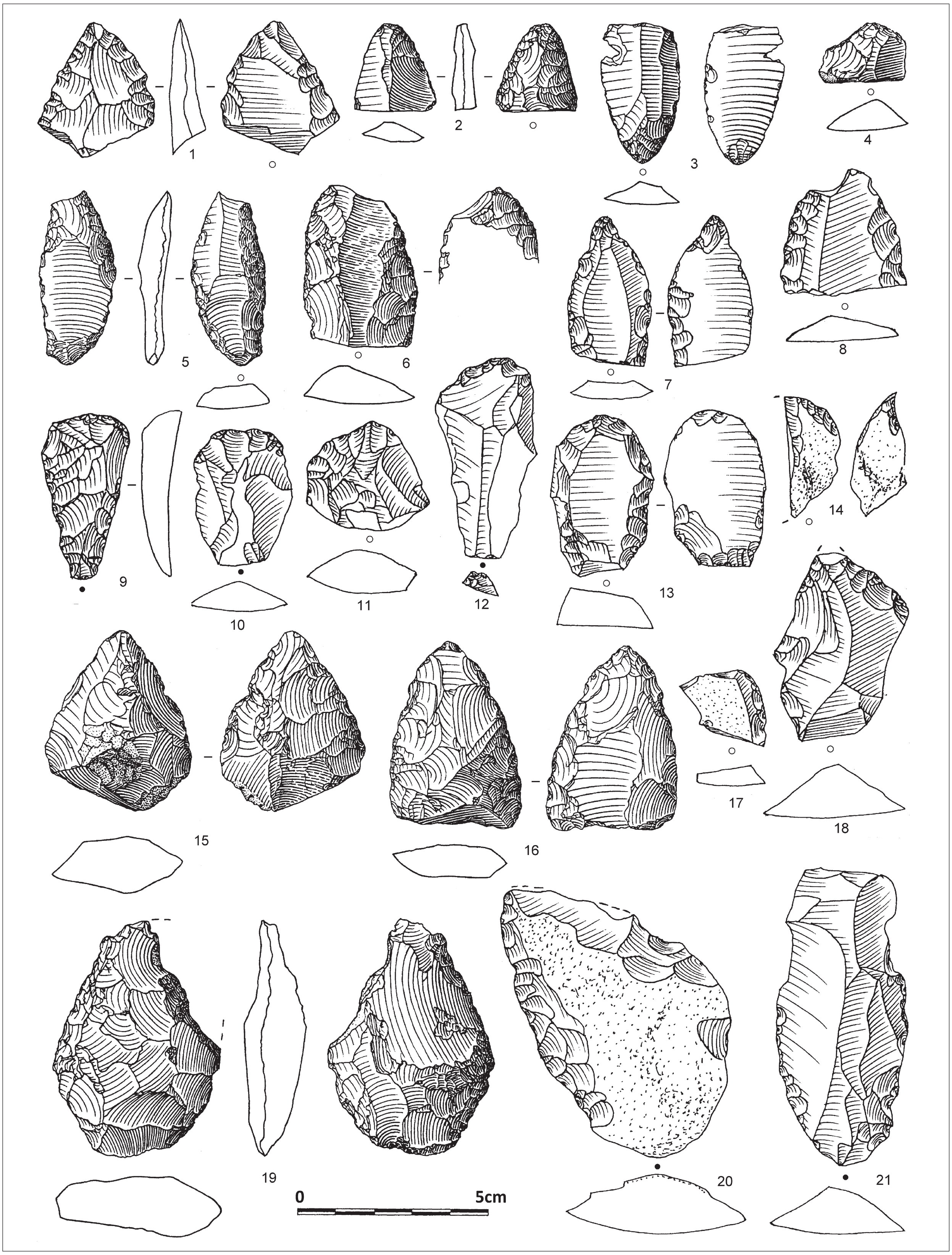

Fig. 4. Selected artifacts from surface collection. Raw materials: 1, 4, 5, 6, 8, 14–16, 18, 19: KL chert; 7, 9, 10, 17: erratic flint; 20: Olomučany-type chert; 11: Stránská skála-type chert; 3, 12, 21: probable Stránská skála-type chert; 2, 13: radiolarite. ⅔ nat. size.

Abb. 4. *Artefakteauswahl von Oberflächenfunden. Rohmaterial: 1, 4, 5, 6, 8, 14–16, 18, 19: Krumlovský les-typ Hornstein; 7, 9, 10, 17: erratischer Feuerstein; 20: Olomučany-typ Hornstein; 11: Stránská skála-typ Hornstein; 3, 12, 21: vermutlicher Stránská skála-typ Hornstein; 2, 13: Radiolarit. ⅔ nat. Grösse.*

Year of excavation	Area excavated (m^2)	No. of artifacts recorded in 3D	No. of artifacts found during wet-sieving	References
2010	8.75	138	59	Škrdla et al. 2010; Škrdla et al. 2011
2011	3.00	140	272	Škrdla et al. 2012
2012	3.00	111	641	Škrdla et al. 2013
2013	1.50	26	120	
Total	**16.25**	**415**	**1092**	

Fig. 5. Results of 2010 - 2013 excavation.

Abb. 5. *Ergebnisse der Grabungen 2010-2013.*

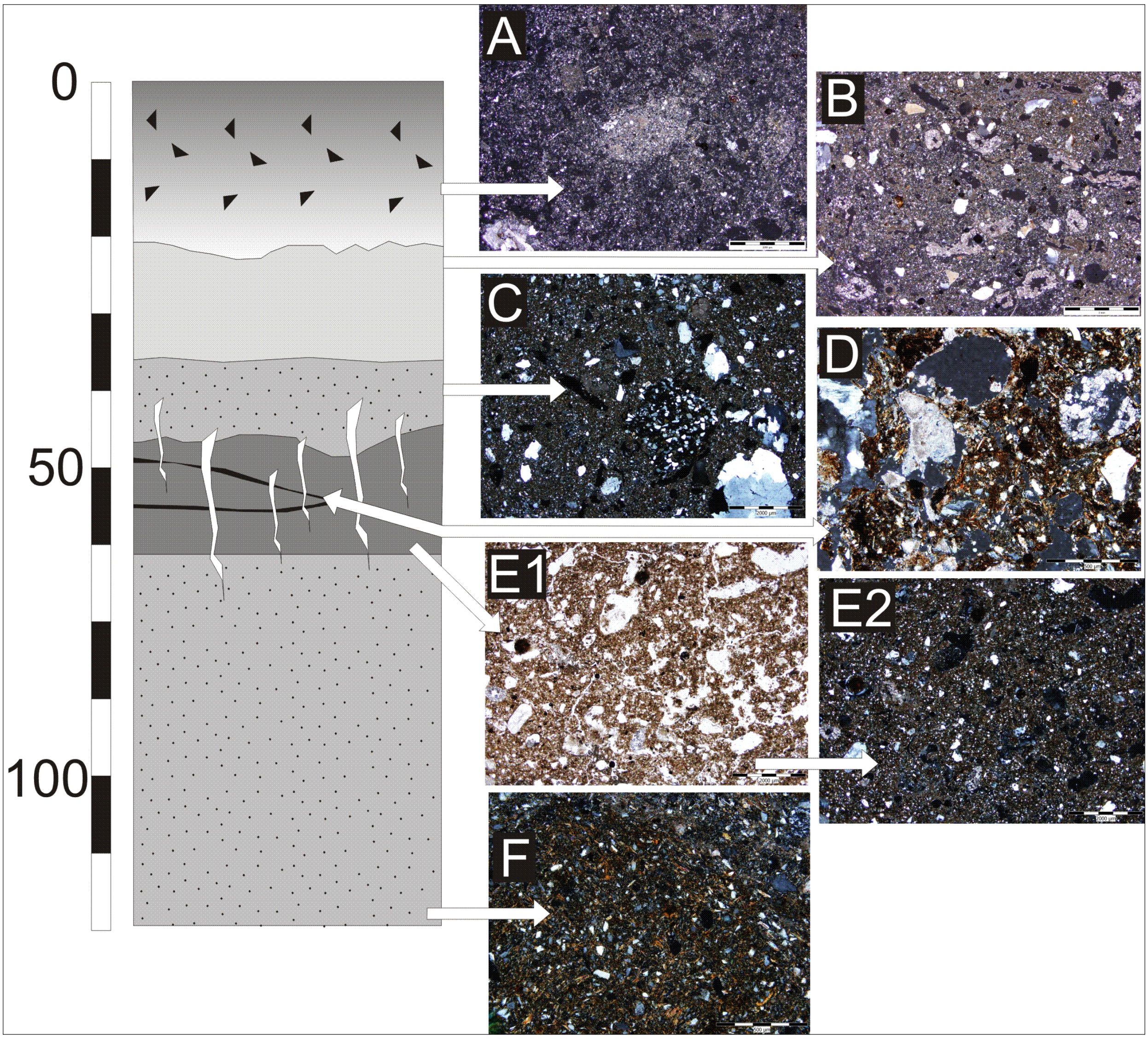

Fig. 6. Generalised section of the Želešice locality with micromorphological features: A – ploughed and degraded recent soil with the micro-charcoal and fragments of soil crusts (XPL); B – loess with well-developed recalcified root cells; C – sandy loess-like material with sections of tertiary sands (XPL); D – redeposited fireplace with charcoal, recalcified root cells and carbonate coatings and inlfillings (XPL); E – highly bioturbated soil of cambisol type (1 – PPL; 2 – XPL); Fragment of underlying sandy loess and sands with developed striatic B fabric.

Abb. 6. *Gesamtes Profil der Želešice-Lokalität und mikromorphologischen Ausschliffe: A – gepflügter und degradierter rezenter Ackerboden mit Mikro-Holzkohlen und Fragmenten der Bodenkrusten (XLP); B – Löss mit gut hochentwickelten rekalzifizierten Wurzelzellen; C – sandiges löss-ähnliches Material mit Fragmenten der tertiären Sanden (XLP); D – redeponierte Feuerstelle mit Holzkohlen, rekalzifizierten Wurzelzellen, Karbonatkrusten und -ausfüllungen (XLP); E – stark bioturbater Boden des Kambisol-Types (1 – PPL; 2 – XPL); Fragment der untenliegenden sandigen Lösse und Sande mit entwickeltem streifigem B-Gefüge.*

on a very gentle slope. Sandy material was probably derived from underlying tertiary sediments. The matrix of the loess material is light-brown with crystalic and occasionally granostriated birefringence. Organic matter occurs as decomposed black or brown particles (up to 200 µm; up to 3 %). Calcium carbonate manifests as infillings and hypocoatings (5 %), as well as in channels infilling recalcified root cells (10 %). Towards the bottom of the section, illuviation visibly increases and sandy loess like material starts appearing (Fig. 6: C). The percentage of calcium carbonate infillings and hypocoatings (50 %), as well as the channel infilling of recalcified root cells (30-50 %) also increase. Frost edges begin to appear. These frost edges can be observed up to 50 cm down the section. The charcoal fragments (Fig. 6: D) probably derive from the cultural layer below and were redeposited in the heavily eluviated horizon on the gentle slope. This layer relates to the interstadial soil of cambisol type (Fig. 6: E1, 2). The soil material is composed of moderately sorted silt. Its microstructure is vughy to angular blocky. The main types of pores are vughs (30 %) and channels (10 %). Cracks are rare. Related distribution is porphyric. C/F ratio (200 µm) = 5:95; C/F(50 µm) = 40:60. The matrix of the sample is light-brown with crystalic B fabric. Organic matter occurs as decomposed black or brown particles (up to 100 µm; up to 3%). Calcium carbonate is present as infillings and hypocoatings (20 %), as well as channel infilling in recalcified root cells (50 %). FeOH nodules were also identified (up to 3 %), mainly at the base of the sample. There is evidence that the upper part of the soil horizon is redeposited and covers the relicts of a hearth. The matrix of the hearth layer (Fig. 6: E) is dark-brown with crystalic B fabric. Channels are infilled by recalcified root cells. Calcium carbonates also partly impregnate the matrix and form the hypocoating. Organic matter is difficult to distinguish from fine grained charcoal, but generally is composed of fine-grained black and brown particles. Fine-grained charcoal particles account for at least 30 % of the total charcoal. Particles 1-2 mm in size account for up to 5 % of the total charcoal. Horizontal cracks are visible within this layer and are probably a result of combustion. Several small fragments (up to 5 mm) of red ochre were also collected.

Sandy loess-like sediments (Fig. 6: F) with a more distinct orange hue comprise the lower part of the section. This part of the section is heavily affected by frost action and probably also by slope processes. Sandy material probably originates in the underlying tertiary sediments. The matrix of the loess-like sediments is light-brown to brown-orange in colour with a crystalic birefringence and occasionally grano-striated birefringence. Organic matter is present as decomposed black or brown particles (up to 200 µm; up to 3 %). Calcium carbonate is present as infillings and hypocoatings (5 %), as well as channels infilling the recalcified root cells (10 %). The orange-brown sandy soil sediment of the different thickness – Fig. 6: F) formed a lowermost part of the excavated sequence.

Vertical distribution of excavated artifacts indicates that the main artifact bearing horizon was a brownish layer with a fireplace (Fig. 6: E), however the artifacts were scattered in the sediment layer below and also above (Fig. 7, 8). The refitting lines suggest homogeneity of the main find horizon and no refits with artifacts within upper part of the section were documented (Fig. 8). Because of the nature of those sediments and the gradient, we presume that the

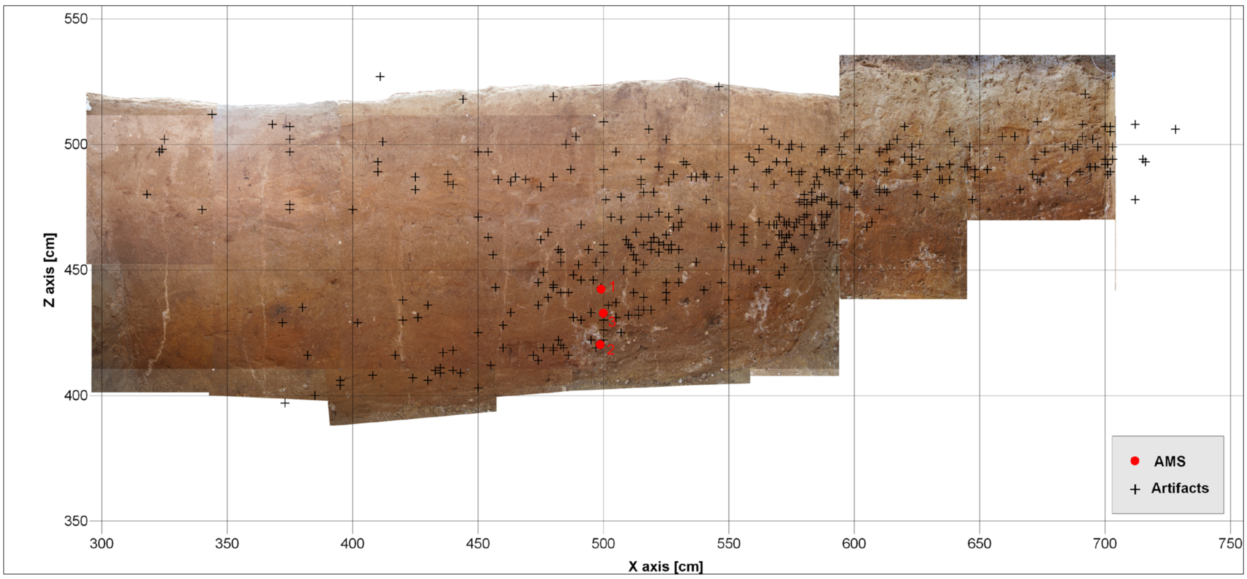

Fig. 7. Vertical distribution of finds projected onto a photograph of the XZ profile (Y=200)

Abb. 7. *Vertikale Verteilung der Funde projiziert auf das Foto des XZ-Profils (Y=200).*

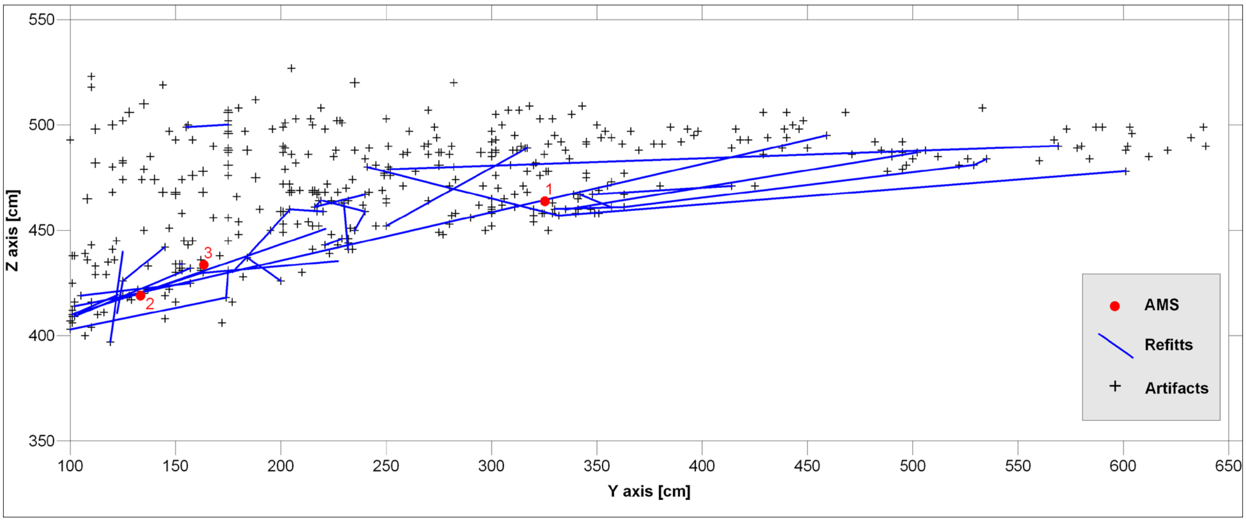

Fig. 8. Vertical distribution of finds with refitting lines projected into the YZ profile

***Abb. 8.** Vertikale Projektion mit Refitting-Linien des YZ Profil.*

artifacts in the upper part of the section moved from a nearby area, where they laid on the surface and were subsequently redeposited. Therefore we cannot exclude possible contamination of material from above the main find horizon with a chronologically different assemblage. However, comparisons of the vertical distribution of raw materials do not support the contamination hypothesis and the excavated assemblage appears to be homogeneous. This presents a contrast to the surface collection (see discussion below).

Dating

Three samples from small charcoal lenses in the lower layer (Fig. 6: E) were dated (Fig. 9). The first sample was collected from a charcoal lens in the 2010 profile (Poz-37821) and two other samples (Poz-51617 & OxA-27342) from small charcoal concentrations within the 2012 excavation (Fig. 7, 8). The resulting ^{14}C ages were calibrated in CalPal 2007_{HULU} (Weninger et al. 2007) and CALIB (Stuiver & Reimer 1993) with IntCal09 calibration curve (Reimer et al. 2013). While the first date is similar to other Moravian Szeletian dates (cf. Mook 1993; Davies & Nerudová 2009) and fits with GI 11, two other dates are older and fit with the preceding GI 12 (Fig. 10). These earlier ages correspond with dating results for Willendorf II, AH-2 recently attributed by P. Nigst (2012) to the Szeletian, as well as with OSL dates from Vedrovice V and Moravský Krumlov IV (Nejman et al. 2011). Recently, similar radiocarbon dates were obtained for Vedrovice V (Haesaerts et al. 2013). The frost wedges infilled by loess-like material and calcium carbonate dissecting the sandy loess horizons (Fig. 6: C) and continuing down the section indicate that artifacts in the upper part of the section were redeposited before its formation (MIS 2 or earlier). A similar frost wedge dissecting soil sediments was documented at the Bohunician site Tvarožná X (Škrdla et al. 2009).

Stratified collection

Only 413 artifacts recorded in absolute coordinates were analyzed for raw material (Fig. 11) and technology. The artifacts obtained from wet-sieving, mainly microchips and microfragments (in total 1092 items), were not included in this analysis. All artifacts were analyzed as a single assemblage, i.e. they were not separated into individual layers.

The prevailing raw material is Jurassic KL chert originating in local gravels. Isolated pebbles of this

	^{14}C BP		$CalPal2007_{HULU}$		CALIB & IntCal13	
Labcode	**date**	**std**	**calBP**	**std**	**calBP 1sigma**	**calBP 2sigma**
Poz-37821	37 770	800	42 300	510	41 500-42 640	40 670-43 180
Poz-51617	42 500	1 500	45 810	1 510	44 420-47 300	43 210-48 900
OxA-27342	41 300	700	44 580	760	44 150-45 390	43 440-45 920

Fig. 9. List of available radiocarbon datings.

***Abb. 9.** Liste der erreichbaren Radiokarbondatierungen.*

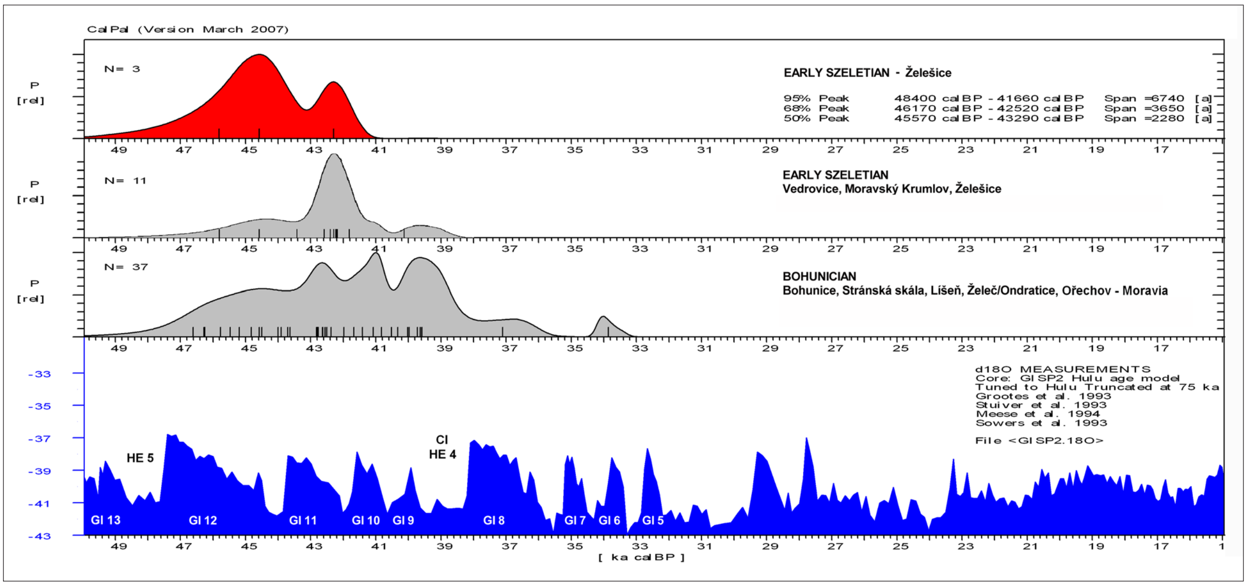

Fig. 10. Calibrated radiocarbon dates. Želešice (above) and other Moravian Szeletian dates (Vedrovice V, Moravský Krumlov IV).

Abb. 10. *Kalibrierte Radiokohlenstoffdatierungen. Želešice (oben) und andere Datierungen des Mährischen Szeletien (Vedrovice V, Moravský Krumlov IV).*

raw material are present directly at the site, however, the main sources are located in Miocene gravels in the vicinity of Mělčany, Pravlov and Trboušany (cf. Přichystal 2009), i.e. 6 km to the southwest from the site. In addition, quartz, Cretaceous spongolite cherts and a fragment of an unidentified local rock were most probably collected from local gravels or from the Svratka river terrace located 4 km to the east. Raw materials of local origin comprise 46 % of the assemblage.

The second group (22.3 % in total) includes raw materials of semi-local origin (10–30 km from source). The most important is the presence of Jurassic Stránská skála-type chert, whose source is strictly localized to the Stránská skála outcrop located 12 km to the northeast of the site. Other important raw materials include Cretaceous Olomučany-type chert characterized by its rich glauconite content (35 items), whose source is localized to the Olomučany area in the Moravian Karst 26 km north-northeast of the site. This group includes three types of siliceous rocks whose provenience is not clear; (i) a white-patinated chert (12 items) rich in inclusions (petrosilex) resembling cherts from Rudice deposits in Moravian Karst, (ii) a raw material of lower quality macroscopically resembling the Olomučany chert (17 items) which may originate in the Moravian Karst, or in the wider area of the Carpathian Foredeep (however, the dimensions of artifacts from this chert and the utilization method (i.e. not used sparingly) suggests the closer source), and (iii) a siliceous weathering product most probably from the vicinity of the site or outcrops around Krumlovský les.

The third group of raw materials includes materials imported from a distance of more than 50 km away from the site. This group accounts for 11.6 % of the collection. The raw material types are radiolarite most probably from the White Carpathians clippen belt zone (the nodule cortex indicates primary outcrops), erratic flint from northern Moravia or southern Poland glacifluvial deposits and Troubky/Zdislavice-type chert from Litenčice Highland. The minimum distance of radiolarite outcrops is 115 km to the east, the erratic flint 100 km to the northeast, and Troubky/Zdislavice-type chert 50 km east-northeast (in a straight line) from the site.

The most common technological category - over one half of the collection (236 items, 57 %) consists of

Raw material	n	%	Group %
KL chert	172	*42*	46
Quartz	8	*2*	
Spongolite chert	9	*2*	
Local rock	1	*0*	
Olomučany-typ chert	35	*8*	22
Stránská skála-type chert	21	*5*	
Rudice deposits	12	*3*	
Chert resembling Olomučany	17	*4*	
Siliceous weathering product	7	*2*	
Radiolarite	39	*9*	12
Erratic flint	6	*1*	
Troubky/Zdislavice-type chert	3	*1*	
Burnt	35	*8*	20
Unidentified	48	*12*	

Fig. 11. Raw material composition.

Abb. 11. *Zusammensetzung des Rohmaterials.*

flakes. There are 12 cores, often irregular in shape. The only exception is a bidirectionally reduced specimen (Fig. 3: 9). Two artifacts are microcores (smaller than 3 cm). Blades are relatively rare (10 items), however blade fragments are represented by 46 artifacts. There are only 6 microblades and one microblade fragment. Blades, microblades and their fragments account for 17.4 % of the assemblage. Nine blades and 3 flakes are partially retouched. Retouched tools account for almost 10 % of the assemblage. The collection also includes 20 fragments, 25 microchips (smaller than 1.5 cm) and 4 raw material pebbles.

Several artifacts have a faceted striking platform (Fig. 3: 1-4, 7, 8). However, in contrast to the Bohunician technology (cf. Škrdla & Rychtaříková 2012), the faceting is coarser without the characteristic overhang. The dorsal scar pattern is unidirectional (Fig. 3: 1, 3, 4) or centripetal (Fig. 3: 2, 7, 8) rather than bidirectional or opposed directional. We can conclude that although several artifacts have a faceted striking platform, the general character of those artifacts differs from the products of Bohunician technology. Two retouch flakes were refitted (Fig. 3: 5) and one flake is a thinning flake from flat retouch (Fig. 3: 6). In addition, two quartz pebbles which were probably used as hammerstones were classified as heavy duty industry and are not included in the list of technological categories.

The collection of tools is characterized by end scrapers including an end scraper with lateral retouch on a massive blade (Fig. 12: 15), a blade end scraper refitted from three fragments (Fig. 12: 17), a blade end scraper combined with opposed notch reconstructed from three fragments (Fig. 12: 14), an end scraper on a laterally retouched blade (Fig. 12: 16), an end scraper on a laterally retouched flake (Fig. 12: 13), two end scrapers on a broken blade (Fig. 12: 18, 19), two end scrapers on a flake (Fig. 12: 10, 12), an atypical end scraper on a flake (Fig. 12: 8), and two end scrapers are represented only by a broken end (Fig. 12: 9, 11). Although many of the end scrapers are on thick blanks and steeply retouched, none of them are carinated.

The end scraers are supplemented by side scrapers, burins, splintered pieces and points. Side scrapers include a transversal side scraper (Fig. 12: 25) and a side scraper reconstructed from two joined broken pieces (Fig. 12: 24). Burins include two burins on a broken blade (Fig. 12: 26) and a refitted burin (Fig. 12: 35). The group of splintered pieces is composed of a splintered piece reconstructed from 3 chips (Fig. 12: 34) and two other items (Fig. 12: 20). Of particular significance are the Jerzmanovice-type points, i.e. ventroterminally retouched points (Fig. 12: 3, 5), two unifacially flat retouched points with ventroterminal retouch (Fig.12: 4, 7), a fragment of a convergently retouched point (Fig. 12: 2), and a fragment of a convergently retouched blade point.

The collection of tools is completed by a truncated blade (Fig. 12: 21), a piece refitted from medial & proximal blade fragments (Fig. 12: 36; the latter fragment was reutilized as a microcore after a break), a bec (Fig. 12: 22), a retouched blade (Fig. 12: 23), four retouched tool fragments (Fig. 12: 27, 28, 29, 33) and partly retouched broken blades (Fig. 12: 6, 30-32). Wet-sieved material includes the tip of a small radiolarite point (Fig. 12: 1) and a retouched tool fragment.

Tool type and raw material analysis of the stratified artifacts indicates that tools were manufactured predominantly from KL chert (16 items), although this is somewhat proportionate to the overall ratio of this raw material in the assemblage. Thirteen tools are manufactured from radiolarite and 5 tools from Olomučany chert. Tools from other raw material types are rare. Jerzmanowice points are made exclusively from radiolarite. In contrast, the surface collection contains two Jerzmanowice points from KL chert, one from Stránská Skála chert, one from SGS and one from radiolarite. It is worth noting that although radiolarite accounts for less than 10 % of the assemblage, a third of all tools are made from this raw material. Other types of points in the stratified collection are manufactured from KL chert (2 items) and radiolarite (1 item). Leafpoints in the surface collection were manufactured exclusively from KL chert. Very few tools in the stratified collection are manufactured from Troubky/Zdislavice-type chert (1 item), siliceous weathering product (1 item) and Stránská Skála chert (1 item).

Discussion

Comparison of the surface and stratified collections shows notable differences in both raw material spectrum and typology, so the degree of homogeneity of the surface collection is in question. The most important difference is the significantly increasing proportion of radiolarite and raw material originating in the Moravian Karst (Olomučany-type chert, Rudice-type chert) in the stratified collection while only several pieces are present in the surface collection. In contrast, KL chert is present in the surface collection in greater proportions. The second important difference is the absence of leaf points in the stratified collection. When comparing Levallois products, there are more elongated artifacts with parallel dorsal scars (including an artifact with a bidirectional dorsal scar pattern) in the surface collection.

There are only two other stratified Szeletian sites in Moravia, both located in the vicinity of KL chert outcrops in the Krumlovský les area. Vedrovice V is located 17 km southwest of Želešice and Moravský Krumlov IV 13 km southwest of Želešice. Although the proximity to the raw material source could affect raw material economy and both technological and typological spectra, both assemblages are similar to Želešice III.

At Vedrovice V, K. Valoch (1993) excavated two artifact clusters with over 17 000 artifacts. Over 99 % of the raw material is KL chert obtained from nearby

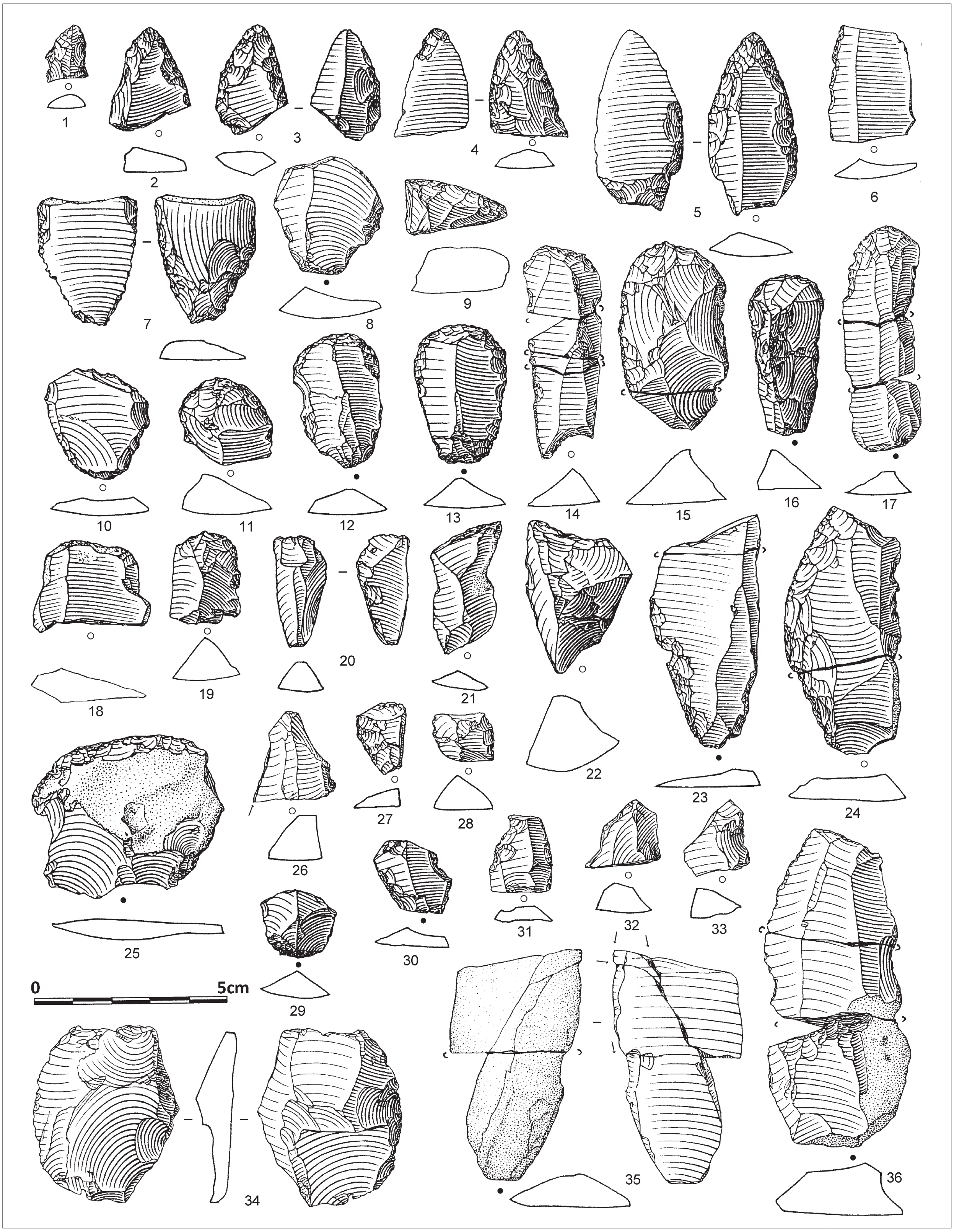

Fig. 12. Selected artifacts from the stratified collection. Raw materials: 2, 11–13, 15, 16, 18, 19, 25, 26, 28, 32-34: KL chert; 21, 23, 24, 36: Olomučany-type chert; 9: Stránská skála-type chert; 6: chert resembling the Olomučany type; 17: siliceous weathering product; 1, 3, 4, 5, 7, 11, 14, 27, 29, 30, 35: radiolarite; 22: Troubky/Zdislavice-type chert; 20, 31: burnt; 8: unidentified; ⅔ nat. size.

Abb. 12. *Auswahl stratifizierter Artefakte. Rohstoff: 2, 11–13, 15, 16, 18, 19, 25, 26, 28, 32-34: Krumlovský les-Typ Hornstein; 21, 23, 24, 36: Olomučany-Typ Hornstein; 9: Stránská skála-Typ Hornstein; 6: Hornstein ähnlich dem Olomučany-Typ; 17: Kieselige Verwitterungen; 1, 3, 4, 5, 7, 11, 14, 27, 29, 30, 35: Radiolarit; 22: Troubky/Zdislavice-Typ Hornstein; 20, 31: Gebrannt; 8: Unbestimmt;* ⅔ natürliche Grösse.

outcrops. Other raw materials include several pieces of radiolarite (0.5 %), erratic flint, Cretaceous spongolite chert and probably Troubky/Zdislavice-type chert (Valoch 1993: 28). At Vedrovice V the steeply retouched end scrapers and Jerzmanowice-type points are present as at Želešice III, but in contrast, leaf points, notches and denticulated pieces are also present.

At Moravský Krumlov IV, P. Neruda and Z. Nerudová excavated the remains of a lithic workshop yielding over 6000 artifacts exclusively made from KL chert (Nerudová 2009). The workskop produced bifacially worked artifacts including leaf points which together compose over 43 % of tools (Nerudová 2009: 152). Other tool types are rare, however, two end scrapers produced on massive flakes were recorded (Nerudová 2009: 150). Compared to Želešice III, the artifacts are generally less reduced, there is a greater focus on bifacial reduction and there are no imported raw materials. It is possible that workshop activities account for some of these differences.

Recently, several artifacts from intact sediments were excavated from a test pit at Bratčice I surface site (Škrdla & Nikolajev 2013, Škrdla et al. 2013). KL chert is the most common raw material in the surface collection, but artifacts made from radiolarite, erratic flint and Cretaceous spongolite chert are also present. This site has a high potential to yield a stratified and dated collection of artifacts. The surface collection has produced Jerzmanowice points and leafpoints. Although the currently available surface collection counts only a few hundred artifacts, the raw materials, technology and typology are very similar to Želešice III. In addition, the sites are located close together.

Olomučany and Rudice chert were obtained from outcrops located within several kilometres from Pod Hradem cave in the Moravian Karst. Recent excavations in Pod Hradem cave have produced evidence for short infrequent visits during the time period the Želešice site was occupied. This evidence could suggest that humans using the Zelešice site had links to the Moravian Karst region (Nejman et al. 2013).

Recently, P. Nigst (2012) attributed layer 2 (AH-2) from Willendorf II to the Szeletian technocomplex. The site is located within the Wachau Gate, ca. 120 km southwest of Želešice. Detailed data about raw material (specifically imported) composition are not available. The only published data demonstrate prevailing local siliceous limestone (67 %) followed by hornstone (25 %; Nigst 2012, 99). Leaf points have not been found, however, some side scrapers show flat retouch (Nigst 2012, Fig. 48: 4, 5). Steeply retouched end scrapers are present (Nigst 2012, Fig. 48: 1, 2).

In contrast to Willendorf, the industries (both upper and lower horizon) from Szeleta cave are characterized by prevailing leaf points while other tool types are rare (Adams 2009). However, the stratigraphy and dating of both horizons is suspect (see Lengyel & Mester 2008). There is a cluster of Szeletian sites in western Slovakia, however, identifying parallels with the Moravian Szeletian sites is problematic as only one site has an absolute date (Moravany-Dlhá) and it is significantly younger (falls into GI 8) (Kaminská et al. 2011). Other sites were recently reclassified as Micoquian (Kaminská et al. 2011).

Conclusion

The Szeletian raw material economy in Moravia is characterized by the utilization of local KL chert. In contrast to the Krumlovský les sites Vedrovice V and Moravský Krumlov IV, in Želešice the proportion of imported rocks is distinctly greater. Two important raw material types are present in Želešice: Olomučany-type chert from the central Moravian Karst and Stránská skála-type chert from the eastern margin of the Brno Basin. While the Olomučany-type chert suggests visits to the karstic area, Stránská skála-type chert suggests contact with the Stránská skála cliffside, where large Bohunician workshops were documented in the same time period (GI 12). The presence of erratic flint and radiolarite indicate contacts with northern Moravia and western Slovakia.

The cores at Moravian Szeletian sites are often irregular with a focus on producing flakes rather than blades (Valoch 1993). Some blades are present, however, the corresponding cores were not found. Bifacial reduction was successfully reconstructed at Moravský Krumlov IV (Neruda & Nerudová 2005). A small portion of blanks have a faceted striking platform. In contrast to Bohunician striking platform preparation, the faceting is coarser and straight (not continuing to the percussion point). Elongated artifacts with a bidirectional dorsal scar pattern that characterize the Bohunician technology are not present in stratified Szeletian collections.

The Szeletian is characterized by a type artifact – the bifacially retouched leaf point. Such artifacts were excavated at Vedrovice V and Moravský Krumlov IV. Leaf points are absent in the Želešice III stratified collection, but they are present in the surface collection. This could be due to the small sample size, however, we cannot exclude a behavioural interpretation – different site function as P. Nigst (2012) argued for Willendorf II. Another important typological feature is the presence of steeply retouched end scrapers resembling Aurignacian forms. However, no characteristic Aurignacian carinated end scrapers, nor bladelet technology were documented.

The most important typological feature of the Moravian Szeletian is the presence of Jerzmanowice-type points, which appear to be ca. 5 kya older than elsewhere in northern Europe (Flas 2011: Tab. 1). They are understood to be a type artifact of the Lincombian-Ranisian-Jerzmanowician technocomplex, which is traditionally connected with the last Neanderthals (Flas 2011). Artifacts with partial ventral retouch on proximal or distal tip were documented within excavated Bohunician assemblages at Stránská skála III (Svoboda 1987, Fig. 24: 4), IIIa (Svoboda 1987, Fig. 26: 12), and IIa (Svoboda 1991, Fig. 9: 10), and characteristic Jerzmanowice-type points are common at the nearby surface artifact cluster of Líšeň-Čtvrtě (Svoboda 1987, Fig. 32). The role of Jerzmanowice-type points in "transitional technocomplexes" (Szeletian and Bohunician) and their presence in northern European Late Middle Palaeolithic assemblages (Flas 2011) is an important question in current lithic archaeology.

Želešice is an important addition to the increasing number of late Middle Palaeolithic and EUP human occupation sites discovered in stratified, dateable contexts in southern Moravia. The number of such sites has been recently growing (Škrdla et al. 2011). It is hoped that through the discovery of these new sites in southern Moravia we will soon be in a position to conduct statistical analyses of intra-site and inter-site patterning, which will lead to the possibility of addressing pertinent questions such as structure of lithic technologies, chronological sequences and relationships between the different sites and assemblages. The increasing number of stone artifacts also offers a potential for usewear studies which can provide useful information about site function. Ultimately, these studies will allow us to address research questions regarding the presence of Neanderthals and Anatomically Modern Humans, who were known to inhabit southern Moravia during this time, including questions regarding the possible coexistence of these two hominid groups.

Acknowledgements: We would like to express our gratitude to Antonín Přichystal for raw material identification and Jiří Brenner for artifact drawings. We would also like to thank all volunteers for assistance during the excavation, the mayor of Želešice Jiří Kvasnička for assistance with logistics and the landowners for allowing the excavation. The fieldwork was funded by Grant No. IAA800010801 "Early Upper Palaeolithic occupation in Brno Basin and surrounds". This project was also partly funded through the SoMoPro program, with financial contribution from the European Community within the Seventh Framework Program (FP/2007-2013) under Grant Agreement No. 229603. The research was also co-financed by the South Moravian Region.

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