Néandertal / Cro-Magnon

LA RENCONTRE

Sous la direction de
Marcel Otte

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Néandertal / Cro Magnon
La Rencontre
Chapitre 6

Moravian Bohunician

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Škrđla, Bohunicien de Moravie.

Les différentes acceptions du terme sont considérées dans une vision historique rétrospective. Il s'agit d'une tradition proche du Levallois aux enlevements pointus, aux outils aussi bien du Paléolithique moyen que supérieur. La question des pièces bifaciales associées reste très controversée. Il s'agit d'une trace d'une permanence régionale. Les définitions culturelles ont beaucoup évolué au fil de l'évolution de la recherche, et la notion stricte reste rare, d'autant que des restes aurignaciens y sont souvent mêlés. Toutes les stratigraphies montrent une superposition de l'Aurignacien sur le Bohunicien. L'aire d'expansion géographique semble limitée au bassin de Brno en Moravie, dans un rayon de 40 kilomètres. Les rares dates obtenues par OSL situent la culture entre 40 et 50 000 ans. La technologie a pu être approchée par de nombreux remontages, elle indique des points proches de la méthode Levallois mais aussi bien des pièces moustériennes classiques. La décoration personnelle se manifeste par des coquilles marines et l'emploi de l'ocre rouge. Des traces de traditions bifaciales peuvent être de source régionale, tandis que les tendances laminaires seraient des indications d'arrivée des premiers hommes modernes en Europe Centrale.

Marcel Oite.

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History of research

Research on the Bohunician may be separated into three historical stages. The first stage began with early isolated finds and concluded with Valoch’s excavation in Brno-Bohunice. The second stage involved Svoboda’s and Valoch’s intensive
excavations at the Stráňská skála hilltop sites during 1981-1987. The last stage is connected with the re-excavation of Stráňská skála during 1997-2000 (Svoboda, Bar-Yosef (Eds), 2003) and a salvage excavation in Bohunice in 2002 (Škröll & Tostevin 2003, 2005; Richter et al., 2008, 2009). Excavations of Bohunicean contexts still continue. The new Bohunicean site of Tvarožná was excavated in 2008 (Škröll et al., 2009), a small collection of artifact within intact sediments were excavated in Lšení-Hrubé podsedky (Oliva’s Podolí I site, Oliva 1981; Škröll et al., 2011) and Podolí-Nad výhonem (unpublished as yet).

Similarly, the history of understanding of the Bohunicean industry specific character also has an important trajectory. In the 1970s, Valoch (1976) recognized specific characteristics of the industry from Brno-Bohunice, characterized by the prevalence of Stráňská skála-type chert and of evolved Levallois technology together with bifacial reduction, radiometrically dated as early as ca. 40 kya 14C BP, and influenced by its similarity with industries from the Bobava microregion (Valoch 1956, 1973), he described it as a Szeléti of Levallois facies (Szelétiion de facies levallois). Subsequently Svoboda, who analyzed collections from the large surface sites Ondratice I and Lšení-Crvté, recognized the similarity of those industries with the Brno-Bohunice industry and defined “a complex Bohunice – Lšení – Ondratice” (Svoboda 1978), and later the “Bohunice-type industry” (Svoboda 1987). However, the industry was finally labelled Bohunician (Oliva 1979; Svoboda 1990).

The problem of the term Bohunician is its heterogeneity when comparing two key groups of sites (Bohunice and Stráňská skála) and its different meaning for different authors. While Oliva (1979) separated the Levallois component of the industry from the bifacial technology products which, in his view, were obtained by trade from Szélléti workshops, Svoboda (1980, 1990) concluded that the products of bifacial reduction represent an integral part of the Bohunician industry. The possible explanations of the role of bifacial reduction within Bohunician industries were studied in detail on the basis of the Bohunice 2002 collection (Tostevin & Škröll 2006). In addition, the technologically oriented definition of Bohunician as a fusion of Levallois and Upper Paleolithic narrow prismatic core reduction principles were based on refitted cores from Stráňská skála (Svoboda & Škröll 1995; Svoboda & Bar-Yosef (Eds), 2003). However, an alternative interpretation was presented by Valoch et al., (2000). By this time Valoch (1976) had noted the similarity of the Bohunice assemblages with Near Eastern sites, an hypothesis which was later tested using in-depth technological analysis (e.g. Svoboda & Bar-Yosef (Eds), 2003; Škröll, 2003a, b). The term Bohunician has been recently enlarged on the Eurasian scale to Emiro-Bohunician (Svoboda, 2004; Bar-Yosef & Svoboda, 2003).

The first stage of research

Paleolithic occupation was documented on several spots within the territory of Red Hill, an elevation on the western margin of the Brno Basin (Škröll & Tostevin, 2003, with ref.). Isolated artifacts (including an artifact resembling a
Levalloisian morphology) had been reported from Kohn's Brickyard since the end of the 19th century (Makowsky, 1889, 183, Fig. 219). Skutil also reported finds of probable EUP lithics showing Levalloisian technology from the territory of Brno's central cemetery as early as 1936 (Skutil, 1936, Taf. X:1). The most important site, however, is Bohunicke-Kejbal and its vicinity, which were surveyed by K. Valoch during loess exploitation and the building of a panel factory, a new road, and new houses between 1962-1973 (completely published in Valoch, 1976). In addition, the locality IV of the Bohunicke-Kejbal site cluster was excavated by Valoch during 1977-1981 (Valoch, 1982).

The second stage of research

This stage is related to the excavations at the Stráňská skála hilltop sites. The excavations were initiated in 1981 when a water pipeline trench cut a large Aenolithic sunken feature. Because white patinated Paleo lithic artifacts were discovered within the Aenolithic feature infilling and within the intact sediments at the bottom of this feature, Valoch (Stráňská skála III-I; Valoch et al., 2000) and subsequently Svoboda (Stráňská skála III-2; Svoboda, 1987) conducted excavations. Both excavations uncovered a characteristic Bohunician industry within an Interpleniglacial soil. During the following years Svoboda continued in systematic excavation on the Stráňská skála hilltop and discovered the sites labeled Stráňská skála IIIa, IIIb, and IIa (Svoboda & Valoch, 2003, with ref.). Svoboda (1991) made an important stratigraphic observation when he documented the superposition of industries: a Bohunician horizon (in the lower part of the interpleniglacial soil) and a Middle Aurignacian (in the upper part of the interpleniglacial soil) and in addition, in the case of the IIa site, an Upper Aurignacian industry above the Middle Aurignacian layer, i.e. in the bottom part of the upper loess.

The third stage of research

The excavation at Stráňská skála was repeated in collaboration between Svoboda and Bar-Yosef at the end of the 1990s. These were the excavated sites labeled IIIc, IIId, IIIe, and IIIf in the area between the formerly excavated sites III and IIIa. Only the site IIIe, however, located close to IIIa, had yielded a significant Bohunician assemblage (Svoboda & Bar-Yosef, eds. 2003).

The last attempt in Bohunicke had been conducted as a collaboration between Škrůš and Tosevin during July and August of 2002. The rescue excavation of the site of Bohunicke "Kejbal" in 2002 was necessitated by the building of a new superstore and the ensuing widening of Kamenický Street over the location of Valoch's locality IV. Contrary to former excavations at Bohunicke, a laser theodolite was used to provenience artifacts and excavated sediments were washed using sieves with a 3 mm-diagonal grid. The main goal was to test the homogeneity/heterogeneity of the industry, i.e. Oliva's (1981, 1984) traded point hypothesis. As refitting shows that bifacial reduction as well as Levalloisian core reduction were
performed at the site, Oliva's traded point hypothesis was rejected. As no spatial patterns of the studied attributes (raw material, Levalloisian technology, bifacial reduction) were identified, it was concluded that both technologies were pursued within this Bohunician locality. Only one exception was observed – the distribution of Krumlovský le-type chert varied over an excavated area. AMS, TL and OSL techniques were applied in order to set the time frame of the deposition of the layer and the age of excavated industry (Richer et al., 2008; Richter et al., 2009).


Geographic distribution of the Bohunician industry

The Brno basin and the near vicinity represent the center of the Bohunician occupation in Moravia, from where more than a half of the sites as yet known in Moravia were reported (Fig. 1). Clusters of stratified sites were reported from Stránská skála (Svoboda & Bar-Yosef (Eds), 2003 with ref.) and Bohunic (Valoch, 1976; Škrdlá & Tostevin, 2005, with ref.) and an isolated site was recently excavated within the Líšeň site cluster (Škrdlá et al., 2011). In addition, there was a documented series of almost ten surface sites along the eastern margin of the Brno basin, including Slatina-Podstránská (Valoch, 1974b), Židenice-Bílá hora (Nerudová, 2006), Líšeň (min. 5 sites, e.g. in the fields Čtvrtě, Hrubé podsedky, Za zámek; Oliva, 1985 and Podoli-Nad vyhonem, unpubl.).

Bohunician sites have been reported outside the Brno basin, up to a distance of 40 km from the basin. Only two sites are stratified, the rest being surface sites. Seven kilometers to the east from the Brno basin (distances are measured from Stránská skála) is the Tvarožná site excavated in 2008 (Škrdlá et al., 2009) and 34 kilometers to the northeast is the Želeč/Ondratice I site cluster excavated from 2009 to the present (Svoboda, 1980; Škrdlá & Mlček 2010; Mlček et al., 2011). The other sites are surface sites including Želečice II (10 km SW) (Freising, 1933), Ořechov I&IV (13&14 km) (Nerudová, 1999; Škrdlá et al., 2011), Dolní Kounice 18 (20 km SW) (Oliva, 1989), Mohelnko (34 km W)(Škrdlá & Plch, 1993) and Lináce (33 km W) (Oliva, 1986). In addition, isolated Levalloisian artifacts, possibly related to Bohunician technology, were reported from many sites within Moravia. Generally, the Bohunician technological features or technocomplex penetrated the Czech-Moravian Highland following Jihlava River to the west (as indicated by Dolní Kounice 18, Lináce II, and Mohelnko) and Central Moravia through Vyskov Gate to the northeast, as indicated by Tvarožná and Ondratice.

The Bohunician in neighboring countries is represented by the sites of Dzierzyslaw I/Trebon along the Polish – Czech border (134 km NE) (Foltyn & Kozlowski, 2003; Svoboda et al., 2002), Hradisko/Sedlec in northern central Bohemia (204 km NW) (Vencl, 1977; Neruda & Nerudová, 2000) and Nižný Hrabovec in
eastern Slovakia (373 km to the east) (Kaminská et al., 2009). The industry from Piekary IIa (Sitlivý et al. 2004) is questionable as a Bohunician industry.

There are some sites showing a Bohunician industry far to the east – Kulychivka in Ukraine (ca. 654 km E from the Brno basin) (Demidenko & Usik, 1993; Meignen et al., 2004) and, to the south, Temnata cave in Bulgaria (ca. 853 km SE from the Brno basin) (Ginter et al., 1998).

Stratigraphy and dating

The earlier phase of the MIS-3 stratigraphical sequence in south Moravian sites is characterized by the Bohunic soil defined by Valoch and Haesaerts (Valoch, 1996). This soil, respectively a soil sediment, was documented at the most important stratified EUP sites of Bohunic, Stránská skála and Vedrovice V and consists of two parts – the upper part, dark brown and a lower part, orange brown in color. While in the upper part a Middle Aurignacian industry (as at Stránská skála IIIa) was documented, a Bohunician (Bohunic, Stránská skála) or a Szeletian industry (Vedrovice V) was documented in the lower part of this soil complex. Based on the industrial types and available datings for the above mentioned sites, the upper part can be correlated with GIS-8 (Denekamp) and the lower part can correspond with a series of warmer episodes GIS-9-12 according to the dispersion of the obtained dates. This means that the lower part of the soil sediments cover a relatively large time span between 48-40 ka. The upper part has the characteristics of a cherno- zem soil and may correspond with the PK I soil of Kukla (1975). The lower part has the characteristics of pararendzinas (Smolíková, 1976, 2003). At the bottom of a characteristic south Moravian stratigraphic sequence is a cryoturbated horizon with re-deposited underlying soils (PK II and lower), loesses and Tertiary deposits developed probably during the colder phase HE5.

For the dating of the Bohunician occupation a wide range of dating techniques has been utilized. The techniques include 14C (both classical and AMS method), TL, IRSL and OSL methods (several protocols) (Richter et al., 2008; Richter et al., 2009 with ref.; Nejman et al., 2011 with ref.). The results of these studies are described in the following paragraphs.

Radiocarbon dating

The radiocarbon dates from the Bohunician sites were obtained in several series. The first dates are from the original excavations in Bohunic (1973 excavation; Valoch, 1976) and Stránská skála (1982-1986 excavations; Svoboda, 1991, 2003a with ref.) and were dated in the University of Groningen using the classical counting method. The second series of dates is from the new excavations at Stránská skála done by the Czech-US team during 1997-2000 (Svoboda, 2003a). Excavated samples were dated in the University of Groningen and University of Arizona Laboratories using AMS. The next dating attempt was realized by
W. Davies in the frame of the EFCHED project organized by the University of Oxford (Richter et al., 2009). The samples collected during the 2002 excavation in Bohunice (Škrda & Tostevin, 2005) and Valoch’s samples collected during his excavations in the 1970’s (stored in the Moravian Museum) were dated in Oxford using AMS. Other isolated dates were recently obtained from the test pits at the sites of Lišeň-Hrubé padělký (Škrda et al., 2011) and Želeč-Holcase (nearby Ondratice I) (Škrda & Mlěnec, 2010). All available dates were calibrated using CalPal (Weninger et al., 2007). The resultant calibrated ages show a relatively wide time frame for the Bohunician occupation of Moravia. However, the young dates can represent later intrusions due to geological or anthropogenic processes – see the discussion in Richter et al. (2009).

The main problem of radiocarbon dating is the insecurity of the association between the dated carbon and the human occupation.

- Thermoluminescence (TL) dating

TL dating results are still only available for Bohunice 2002 excavation, from where D. Richter measured eleven heated artifacts with a resulted weighted average of $48.2 \pm 1.9$ ka (Richter et al., 2008).
Optically Stimulated Luminescence (OSL) dating

Richter conducted OSL dating directly within Area A of the Bohunicce 2002 excavation. Richter et al. (2009) had tested several dating techniques and found the most reliable data were obtained by Single-Aliquot-Regeneration (SAR) OSL analysis of fine grain quartz extract. The resulting OSL dating of fine grain quartz gave 30.9 ± 3.1 ka for the loess sample located above the archaeological horizon, which itself provided an age of 58.7 ± 5.8 ka. The lowest sample gave an estimate of 104.3 ± 10 ka.

Nejman (Nejman et al., 2011) continued the dating attempts on the same site one year later. He sampled two profiles (test pit 1 and 3): the first test pit was located 2 m to the south from the main Area A (see Škrdla & Tostevin 2005, 37) and was sampled in 2003, the second was located 11 m to the north from the Area A, near Area D, and was sampled in 2005. The stratigraphy in both mentioned test pits was the same as that in Area A. In the first attempt, the upper loess, the upper and lower soil sediments (the artifact bearing horizon was in the bottom one of the two) and the underlying sediment were dated. The resultant ages were earlier for the upper loess and later for the lower soil sediment than expected. The dates from the upper soil sediment and the underlying horizon were close to expected ages. Because of the necessity to check these values we sampled the test pit 3 profile in 2005. The profile was cleaned and during its cleaning the position of artifacts was recorded to allow us to point the sampling tube directly into the artifact bearing horizon. The second sample was collected from the boundary between the lower and upper soil sediments and the third one from the upper soil sediment. Although the age for the upper soil sediment is older than expected, the age for the artifact bearing horizon is close to the result obtained by Richter using TL. The second site dated by OSL is Stranská skála, where a sampling pit was opened near the trench of Stranská skála IIIc. The resultant dates are more consistent compared to Bohunicce and fit better with stratigraphy and archaeological record. The upper loess is dated back to 30 ka and the upper soil sediment to 40-43, which almost correspond to the radiocarbon dating of the Aurignacian industry excavated from this horizon at the nearby site of IIIa (Svoboda 2003). The dates from the Bohunicce artifact bearing horizon range from 41-64 ka, which is not unexpected and may reflect cryoturbation documented within the layer in the site. The date from the underlying sediment documents additions of earlier material probably due slope erosion.

Summarizing OSL dating attempts on both sites, the dates from the same horizon show higher scattering than expected. To understand the nature of such scattering in the OSL results necessitates the use of sediment micromorphology in each site.
Tab. Bohunician OSL dates. Boh-Area A: Bohunice 2002, Area A (Richter et al., 2009); Boh-TP1: Bohunice, Test pit 1; Boh-TP2: Bohunice, Test pit 2; SS-IIIc1 and SS-IIIc2: Stránská skála IIIc, first and second series of dates; all later dates from Nejman et al., 2011.

<table>
<thead>
<tr>
<th></th>
<th>Boh_Area A</th>
<th>Boh-TP1</th>
<th>Boh-TP2</th>
<th>SS-IIIc1</th>
<th>SS-IIIc2</th>
</tr>
</thead>
<tbody>
<tr>
<td>Upper loess</td>
<td>30.9 ± 3.1</td>
<td>41.00 ± 3.90</td>
<td></td>
<td>29.60 ± 2.30</td>
<td></td>
</tr>
<tr>
<td>Upper Paleosol</td>
<td></td>
<td>37.10 ± 3.00</td>
<td>46.35 ± 3.33</td>
<td>40.50 ± 3.00</td>
<td>42.60 ± 2.59</td>
</tr>
<tr>
<td>Lower Paleosol</td>
<td>58.7 ± 5.8</td>
<td>38.30 ± 3.00</td>
<td>52.89 ± 3.81</td>
<td>64.00 ± 5.90</td>
<td>40.59 ± 3.83</td>
</tr>
<tr>
<td>Underlying sediments</td>
<td>104.3 ± 10</td>
<td>95.30 ± 7.80</td>
<td></td>
<td>141.90 ± 11.00</td>
<td></td>
</tr>
</tbody>
</table>

**Conclusion dating**

The radiocarbon dates (calibrated using CalPal, Weninger et al., 2007) have a relatively wide spread (between 40-48 kya). Without using the ABOX-SC technique, the results from the time of MP/UP boundary may be influenced by a small amount of recent carbon and must be regarded as minimum ages (Joris & Street, 2008). Because the spread in OSL dating is even larger, the most reliable date is represented by the TL date from Bohunice 2002. Compared to the radiocarbon and OSL dates, which correspond to the last time sunlight impacted the individual grains dated during OSL and so may have been influenced by many geological processes, the TL date was obtained directly from heated stone artifacts and is more closely related to the human occupation.

**Contemporary cultural units**

The earlier phase of MIS-3 in the middle Danube basin is probably still characterized by the Late Middle Paleolithic Micoquian as documented in Kůlna Cave (cf. Nejman et al., 2011), supplemented by the so-called transitional technocomplexes (Bohunician and Szeletian) and a relatively early appearance of Early Aurignacian in Willendorf II (Svoboda et al., 1996; Bar-Yosef & Svoboda, 2003a; Nigst et al., 2008). The available radiocarbon record indicates a contemporaneity of both transitional technocomplexes and the Early Aurignacian (Skrála & Rychtaříková, 2002, Fig. 2); i.e. three main EUP technocomplexes were present on a relatively small territory of Moravia (or very close to Moravia in the case of Willendorf) in the crucial period of early contacts of local Neanderthal populations with penetrating AMH during the time span between 50-40 kya (cf. Hoffecker, 2009):

1. Bohunician with evolved Levalloisian technology and a mix of Middle and Upper Paleolithic tool kit (Bohunice, Stránská skála, Tvarožná, Lišně);
2. Szeletian with bifacial reduction combined with reduction of discoidal and prismatic cores and a mix of Middle and Upper Paleolithic tool kit (Vedrovice V, Moravský Krumlov IV, Želešíce III);

3. Early Aurignacian with an Upper Paleolithic reduction of prismatic cores and prevailing Upper Paleolithic tool kit – as documented in Willendorf II, AH3 (Nigst et al., 2008) at Wachau Gate, 134 km to the southwest from Stránská skála.

The Moravian radiocarbon record indicates that both transitional technocomplexes – Bohunicean and Szeletian – were replaced by the Middle Aurignacian after the Heinrich Event 4 cold phase, most probably following the Campanian Ignimbrite (CI) eruption on Phlegraean Fields near Napples ca. 40/39 kya (cf. Rousseau, 2006; Hoffecker et al., 2008).

Although the discovery of hundreds of EUP sites over the last century has made Moravia the region with the densest EUP occupation within the Middle Danube region (cf. Valoch, 1993), the majority of the EUP sites are surface sites without
intact sediments. This aspect of the archaeological record makes the refinement of the chrono-technological classification of assemblages between 50–40 kya far more difficult.

- **Settlement strategies**

The very beginning of the Upper Paleolithic in the Middle Danube is characterized by a behavioral shift. People avoided protected sites in caves and rockshelters located in highlands, which were previously settled during the Middle Paleolithic (MP), and now occupied the open landscape instead. Most Early Upper Paleolithic (EUP) sites are strategically located at elevated locations (often 250–350 m asl., i.e. ca. 50–150 m above a local river level) flanking big river valleys and basins. Because all EUP technocomplexes preferred similar locations within a landscape, the most suitable locations were probably reoccupied in the course of time and this fact makes separation of expected individual occupational phases (and possibly also different technocomplexes) difficult in the case of surface sites (i.e. where cultural layers were not covered and interstratified by aeolian deposits). Aeolian deposits (loesses) which may have covered and interstratified material deposited during individual occupational phases, are deposited commonly on leeward and backward sides of elevations while the top of elevations are most often missing.

- **Raw material supply in the Bohunician**

The Bohunician lithic economy is characterized by utilization of local cherts supplemented by infrequent imports (up to max. 10%). The Stránská skála-type chert was utilized in the Brno basin, local orthoquartzite and chert were utilized in Ondrášovice/Želeč and in Krumlovský les area the local Krumlovský les-type chert dominated. While we can trace the distribution of Stránská skála-type chert to its point source in the Stránská skála cliff face on the eastern margin of the Brno basin, the outcrops of other raw materials are not so strictly localized. Radiolarite was imported probably from the White Carpathians sources and erratic flint from northern Moravian or the south Polish glacio-fluvial deposits.

- **Bohunician technology**

The Bohunician technology was originally defined as a mixture of Levallois technology and Upper Paleolithic prismatic core reduction. Later, based on the analysis of refitted cores from Stránská skála where both techniques were used on the same core, the definition was refined as a conceptual fusion of Levallois and Upper Paleolithic technologies (Škrálla 2003a, b). All reconstructed cores from Stránská skála (to date 14 very completely reconstructed cores and a series of shorter sequences) show the tendency towards production of Levallois points (or a series of points) as the target artifact (Škrálla, 2003a, b; Škrálla & Rychtaříková, 2012). In
this concept blades were removed in order to shape the frontal surface of the core and represent (technologically) a secondary product. However, both blade and flake (including Levallois flake) blanks were frequently used for tool production.

The Bohunician technology as documented on completely reconstructed cores from Stráňská skála (Fig. 4) may be described as follows. The raw material nodules or prismatic blocks were shaped into a core with a frontal crest (shaped by a series of flake removals or utilizing a natural crest in the case of prismatic blocks) and one or two prepared reduction platforms. The core reduction started with the crested blade removal. It was followed by a series of blade removals, often reduced from both opposed platforms. The aim of these removals, called débordant blades (cf. éclat débordant, Bočeda, 1995), was the attainment of an elongated triangular shape on the frontal face of the core. At that point the core’s frontal face was ready for Levallois point production. Now, the first Levallois point or in many cases a series of two Levallois points were produced (from the same direction). The striking platform was often reshaped before each point removal. The outcome was a wide frontal face of the core, not pointed, and the loss of its distal convexity - the necessary shape for a further production of a Levallois point. Therefore, it was necessary to narrow the wide frontal face of the core with several blade removals to prepare it for the production of another Levallois point. This process, defined by these two steps - 1) shaping and narrowing; and 2) Levallois points production - continued until the exhaustion of the raw material. The striking platforms of blades and points were faceted allowing better control of the point of impact of the strike. The prevailing dorsal scar pattern of points was bidirectional or opposed directional (Škrدلá, 2003b, Table 7.1).

Bifacial reduction was documented only at the Brno-Bohunice type site. This technology of artifact shaping was not documented within the Stráňská skála site cluster (although found in surface collections) nor at Tvarožná, i.e. on other stratified sites. Although bifacially worked leaf-shaped implements are known from many surface sites reported as Bohunician sites, their relation to the Bohunician industry from those sites is not without doubt.

Although the excavated sediments from Bohunice 2002 and Tvarožná were wet sieved through 3mm mesh, no bladelet technology was documented.

Bohunician typology

The Bohunician typological spectrum represents a mixture of MP tool kit with UP tool kit. The MP tools are different types of sidescrapers, points and notched and denticulated tools (Fig. 3). The prevailing type of point is unretouched Levallois point (often elongated), supplemented by the retouched Levallois point, Mousterian, Chatelperronian and Quinson-type of points (Svoboda, 1987; Svoboda, 2003b). Another important type of point, within stratified assemblages known only from Bohunice, is the bifacially retouched and leaf-shaped point.
The UP toolkit is represented mainly by endscrapers produced on different types of blanks including both flakes (cortical, semicortical, non-cortical, Levallois and non-Levallois) and blades (cortical, non-cortical and crested) and infrequent burins made often by a single blow. The endscrapers are steeply retouched resembling Aurignacian forms, however, none of them are carinated. Similarly, no carinated burins were documented. It is also important to note the UP tool types (endscrapers and burins) made on Levallois points (e.g. Škrđla & Tostevin, 2005, Fig. 12:13,14). No bladelets were documented.

Non-utilitarian objects in the Bohunician

Discontinuity in the archeological record between the LMP and MP/UP transitional cultures is easy to distinguish through the presence or absence of objects of a “non-utilitarian” nature (objects suspected to have expressed a social relationship and beliefs rather than usefulness from our current point of view) in archaeological literature (cf. Sackett, 1982) which appears in the EUP technological complexes within Moravia. The most important examples are the presence of body decoration represented by ochre (of different color varieties), fossil marine shells, unusually shaped objects and uncommon raw materials (Fig. 4). The most important find is currently a fossil marine shell (Anilla sp.) from Líščí (2010 excavation, Škrđla et al., 2011). Although the surface of the mollusk is heavily weathered due to pedogenetic processes, the specific shape of the broken spira suggests that the artifact may have been pierced as is known from other contexts, e.g. Uçağızlı Cave in Turkey (Kuhn et al., 1999) or Uluzzian layers of Grotta del Cavallo in Italy (Benazzi et al., 2011).

Another important find from the Bohunicce 2002 assemblage is a flat pebble of Devonian limestone originating from the Boskovice furrow which may had been collected within the Svatka gravel terrace located below the site. Unfortunately the surface of the pebble is intensively weathered and no traces of use nor cut marks were recognized. Valoch (1976, 41) referred to another limestone pebble with possible irregular cut marks from the nearby site I.

Low-quality iron ore (containing hematite and goethite, of yellow and red colors) from Tertiary marine deposits were found within the Siráňská skála sites (Příchystal et al., 2003). Another kind of low-quality iron ore was utilized at Bohunicce 2002, characterized by a significant amount of silica and originating from Devonian basal clastics (a weathering product; Příchystal, pers.comm.).

We can conclude that hominins responsible for the Bohunicce utilized non-utilitarian objects that include low-quality iron ores (containing hematite and goethite) from Devonian basal clastics or from Tertiary marine deposits, fossil mollusk shells from the Badenian gravel and sandy deposits and other important stones from gravel terraces. All sources were local. New immigrants arrived with a specific culture (expressed themselves using body
Figure 4.
Ochre (Bohuniczec 2002), limestone pebble (Bohuniczec 2002) and a pierced shell (Lisie after Skvlić et al., 2011).
decoration) and searched for necessary sources in the newly occupied area and its nearest vicinity including red ochre, marine shells, unusually shaped objects and uncommon raw materials.

The presence of ochre was documented also in Szeletian context in Vedrovice V (Valoch, 1993) and Želešice III (2011 excavation, not yet published).

Discussion

As described above, the Brno Basin represents the main center of Bohunician occupation in Moravia. In addition, the Stráňská skála rock with its raw material outcrop of Stráňská skála-type chert represents the material base for the Bohunician in the Brno basin (and was transported to the sites up to 40 km away from the Brno basin, where it represents up to 10% of the raw material). In more detail, the purest Bohunician industry (Levalloisian with no traces of bifacial reduction) is known only from the Stráňská skála primary workshop site cluster and from Tvarožná. The Bohunicie type-site has yielded an industry composed of two components – Levalloisian made almost exclusively on Stráňská skála-type chert and bifacial reduction used almost exclusively on Krumlovský les-type chert. However, Tostevin & Škrda (2006: 44) documented bifacial reduction on other raw material as evidenced by the presence of bifacial thinning flakes. Similarly, both components (Levalloisian and bifacial) were documented at Dzierzyslaw in Poland. When the surface sites are included into the analysis, the situation tends to be more difficult. There are sites with a pure Levalloisian technology and a lack of bifacial reduction, e.g. Ořechov 4 and Dolní Kounice 18 in Moravia, Hradisko/Sedlec in Bohemia, Nižný Hrabovce in Slovakia, Kulychivka in Ukraine and Temnata cave in Bulgaria. In the broader scale, the bifacial reduction was not applied at Üçağızlı Cave in Turkey, Boker Tachtit in Israel, nor Kasr Akil in Lebanon. On the other hand, there are sites in the Brno basin and its surroundings, where so-called “mixed” industries are present, i.e. industries with both Levalloisian and bifacial components. Those industries are known from surface sites in the Brno basin (Líščín-Črvtě, Hrubé Podsedky), the Bohra area (Ořechov 1 and 2, Želešice 2), the Mohelno area (Mohelno-Boleniska, Lhánice 1 and 2) and the Prostějov area (Ondraticice/Zeleeč).

Here, an important research question has to be asked: are the “mixed” industries homogeneous or heterogenous? They are almost exclusively known from surface sites. The only exception is the Bohunicie type-site. In addition, they are known almost exclusively from surface sites located outside of the Brno Basin (out from Stráňská skála respectively). Both Levalloisian and bifacial components are made on all on-site worked raw materials.

Two basic hypotheses may be formulated to explain the specific character of those industries:
1. The industries represent a specific variant of the industry combining Levantine technology and bifacial reduction usually known outside of the Brno basin. These industries may represent a chronologically non-contemporaneous unit with a pure Bohunician, a different way of landscape use (workshop site versus residential camp, hunting or other activity areas; cf. "Landscape" hypothesis in Tostevin, Škrda 2006, 34), or a result of a Bohunician interaction with local Late Micoquian or Lower Szeletian technocomplexes;

2. The industries are geologically heterogenous and represent a mechanically assembled mix of different technocomplexes deposited during repeated occupations (palimpsests) – "Pedogenic" or "Sequential occupation" hypotheses defined by Tostevin, Škrda 2006, 34. This hypothesis is supported by the presence of Aurignacian types in the assemblages.

How does one test the above formulated hypotheses (see also Tostevin & Škrda, 2006 for more detailed hypotheses)? Recently, we have tested it in the Bobrava area (Škrda et al., 2011). We have analyzed assemblages showing attributes of different technocomplexes and have concluded that the assemblages under study represent a mix of different occupational episodes rather than a homogeneous industry.

Unlike other raw materials, the Stráská skála-type chert is limited to the isolated Stráská skála rock, which makes tracing the distribution of this raw material important. The proportion of Stráská skála-type chert in the Bohunician collections decreases rapidly in a radial pattern while moving away from the source (i.e., away from the Stráská skála rock outcrop). This demonstrates that its export was limited to the nearest vicinity of the Brno basin; further away from the Brno basin its role decreases and local raw materials are used instead.

Oliva (e.g., 1988) claimed that Stráská skála-type chert was preferred for isolated Bohunician implements such as Levallois points in the Krumlovský Les area and those artifacts therefore represent the import of finished products rather than in situ production. However, the application of Levantine technology on different raw material types was documented in Mohelno (Škrda & Pch, 1993), Tvarožná (Škrda et al., 2009) and Ořechov 4 (Škrda et al., 2011).

Oliva (1981, 1984) also stated that leaf points in Bohunician assemblages, frequently made on imported raw materials, represent imports from Szeletian workshops. However, Tostevin and Škrda (2006) proved bifacial reduction in situ at Bohunicce, which applied also to the Stráská skála-type chert. Svoboda (1987, tab. 9) described a series of leaf points made from Stráská skála-type chert at Lšen-Cvrtě (determination by A. Příchystal under light microscopy, in total 20 % of the implements; Nerudová and Neruda 2011 reported 1.1 %, however, they incorrectly interpreted the numbers in Svoboda’s table). The leaf point/Levallois point ratio shows an important pattern, similar to the raw material distribution pattern described a paragraph above. The percentage of Levallois
points in the Bohunician collections decreases rapidly in a radial pattern when moving away from the source (i.e., away from the Strášká skála rock outcrop. At the same time, the percentage of leaf points increases. This means that the technologically purest Levalloisian Bohunician is known from the Brno Basin and the bifacial component with leaf points increase together with increasing distance from Brno. On the other hand, with the exception of Dzierzysław I, the sites in neighboring countries characteristically lack leaf points. However, there is a question to what extent this pattern is created by the surface character of analyzed assemblages.

The transitional or intrusive character of the Bohunician technocomplex in Moravia remains a pivotal question. Generally, the local Middle Paleolithic industries are characterized by a low frequency of Levallois technique and the rare MP Levallois points have flake-like proportions (Demidenko & Usik, 1993, 12; Škrdla, 1996, 103). In contrast to the Middle Paleolithic Levallois-based technologies (cf. Oliva 2006), the Bohunician technique was more volumetric and produced elongated rather than broad-based Levallois blanks. The Bohunician technology with its elongated Levallois points differs significantly and appears to be a new phenomena and represent intrusin to the region rather than gradual development from the local Middle Paleolithic technocomplexes (Svoboda & Škrdla, 1995; Škrdla, 1996, 2003a, b; Tostevin, 2000; Richter et al., 2008).

The most important question remaining to ask is which human type was the bearer of the Bohunician technocomplex - Neanderthal or AMH? The makers of the Bohunician avoided cave sites with good bone preservation and developed stratigraphy and preferred open air sites. The Bohunician assemblages were excavated from layers of soil or soil sediment where bone preservation is very bad. Therefore we have not yet found related human remains and such a discovery is not expected in the future. We have to work only with indirect evidence, which indicates the possibility that the Bohunician was created by AMH.

**Conclusion**

Why was Moravia the western-most destination for these hypothetically new immigrants? One possibility is raised by the snow cover simulations for stadials and interstadials during MIS-3 (Brandmüller et al., 2012) showing Moravia as a suitable region (periglacial zone) during the last glaciation. In addition, the Repeated Replacement Model (Brandmüller et al., 2012) predicts the contraction of occupation during Greenland Stadials (GS) and expansion during Greenland Interstadials (GIS).

There were no climatic barriers for AMH migration to northern latitudes as early as during GIS 13-14 (Müller et al., 2011). The TL dates for the Bohunic 2002 assemblage (Richter et al., 2008) fits with this period (Müller et al., 2011, 277). However, the Neanderthal occupation is also inferred in many European regions during those interstadials and stadials (Jöris, 2004; Hublin
& Roebroeks, 2009). From that point of view, the following very cold event (HE5) may have had a fatal impact on the European Neanderthal population and caused a Neanderthal population contraction. The intensity of HE5 was comparable to the coldest point in the MIS-4 period, when Neanderthal occupation significantly contracted (van Andel et al., 2003; Hublin & Roebroeks, 2009; Müller et al., 2011). In other words, during HE5 both Neanderthals and AMHs were in more suitable refuges and ready for new expansion, which occurred during a milder and a relatively long GIS 12. This idea is supported by a relatively early TL date for the Bohunician type site in Brno Bohunic (Richter et al., 2008, 2009; Hoffecker, 2009; Müller et al., 2011). So the Bohunician, as a part of a broadly distributed technocomplex known from the Near East to Europe and Asia, is a hot candidate to be the first appearance of AMH in Moravia. The discovery and excavation of new stratified sites with a “mixed industry” is necessary to test new hypotheses concerning AMN-Neanderthal internations in the region.

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