



Hominid visitation of the Moravian Karst during the Middle-Upper Paleolithic transition: New results from Pod Hradem Cave (Czech Republic)



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ABSTRACT

In 1956–1958, excavations of Pod Hradem Cave in Moravia (eastern Czech Republic) revealed evidence for human activity during the Middle-Upper Paleolithic transition. This spanned 25,050–44,800 cal BP and contained artefacts attributed to the Aurignacian and Szeletian cultures, including those made from porcelanite (rarely used at Moravian Paleolithic sites). Coarse grained excavation techniques and major inversions in radiocarbon dates meant that site chronology could not be established adequately. This paper documents re-excavation of Pod Hradem in 2011–2012. A comprehensive AMS dating program using ultrafiltration and ABOX-SC pre-treatments provides new insights into human occupation at Pod Hradem Cave. Fine-grained excavation reveals sedimentary units spanning approximately 20,000 years of the Early Upper Paleolithic and late Middle Paleolithic periods, thus making it the first archaeological cave site in the Czech Republic with such a sedimentary and archaeological record. Recent excavation confirms infrequent human visitation, including during the Early Aurignacian by people who brought with them portable art objects that have no parallel in the Czech Republic. Raw material diversity of lithics suggests long-distance imports and ephemeral visits by highly mobile populations throughout the EUP period.

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1. Introduction

In Europe, the period between 50 and 35 ka (often referred to as the Middle to Upper Paleolithic transition—M-UP from here on) has been a topic of ongoing interest. During this period, Neanderthals disappear from the archaeological record while anatomically modern humans (AMHs) proliferate and significant changes occur in artefact industries/technologies. The prevailing view proposes that AMHs migrated into Europe from somewhere in the east or

southeast (Otte and Koziowski, 2003; Tostevin, 2003; Mellars, 2004, 2006; Müller et al., 2011; Douka et al., 2013; Hublin, 2015; Svoboda, 2015), travelling along the Mediterranean rim and Danube (Mellars, 2004, 2006), bringing with them specific Upper Paleolithic stone and bone assemblages. Central Europe occupies a key position along the proposed Danubian route, between the intensively studied western European sites and those in the Levant and Russian plains.

Within Central Europe, Moravia, in the east of Czech Republic, may have acted as a corridor between glaciers in glacial stages and through a system of lowland passages during interglacials (Svoboda et al., 1996, 2009; Svoboda, 2009). This would have focused both migrating and indigenous populations into a small geographic area

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and facilitated contact (Hoffecker, 2009; Müller et al., 2011; Bradtmöller et al., 2012). The Moravian site of Brno-Bohunice, dated to 48.2 ± 1.9 kyr BP_{TL} (Richter et al., 2008), may represent the earliest industry attributed to AMH in Europe (Hoffecker, 2009; Müller et al., 2011) based on its similarity with the Emiran industry of Boker Tachtit (Tostevin, 2000; Škrdla, 2003). This is one of many sites of high potential in this region, however, detailed chronologies rarely get published in the archaeological literature. For this reason, discussions about the M-UP transition usually focus on contemporary studies from the Near East and western Europe, with the role of Central Europe poorly understood (Svoboda, 2009). This paper begins to address this imbalance by collating existing information about human activity in this region and conducting a fine-grained re-excavation of the Pod Hradem Cave in the Moravian Karst, Czech Republic. As will be explored below, previous excavations have revealed a stratigraphic profile spanning the M-UP transition. For this reason, a subsidiary aim will be clarifying the relationships between chronology and transitional technocomplexes in Moravia.

1.1. The chronology of the M-UP transition in Central Europe

The chronology for M-UP transition human activities in Central Europe has primarily been built using radiocarbon dates. Key sites dating to the M-UP transition include Willendorf II (Nigst et al., 2008, 2014) and Krems-Hundsteig (Neugebauer-Maresch, 2008) in Austria; Dzeravá Skala and Čertova Pec in Slovakia (summary in Kaminská, 2015); eight cave sites in the Bükk Mountains of Hungary including Szeleta, Peskő, and Istállósókó (Kadić, 1916; Vértés, 1961; Mester, 2002, 2014; Davies and Hedges, 2008–2009; Davies et al., 2015); and Dzierżysław (Fajer et al., 2005), Nietoperzowa Cave (summary in Cyrek et al., 2012), and Lubotyń (Poitowicz-Bobak et al., 2013) in Poland. The M-UP transition in Czech Republic is represented at sites such as Mladeč Caves (summary in Teschler-Nicola, 2006), Stránská Skála (Valoch et al., 2000; Svoboda and Bar-Yosef, 2003), Vedrovice V (Valoch et al., 1993), Bohunice (Valoch, 1976; Tostevin and Škrdla, 2006; Richter et al., 2009), Moravský Krumlov IV (Neruda and Nerudová, 2009, 2010), Milovice (Oliva, 1993), Želešice (Škrdla et al., 2010, 2014), and Pod Hradem Cave (Valoch, 1965; Nerudová et al., 2012b).

A recurring problem at most of the sites in Central Europe has been the paucity of fine-grained research involving use of modern pretreatment methods for radiocarbon samples (e.g., ABOx-SC for charcoal and ultrafiltration for bone collagen). For this reason, it has been problematic assessing the M-UP transition in Central Europe in the way that has been so successfully applied in Western Europe (e.g., Higham et al., 2010; Szmjdt et al., 2010; Higham, 2011; Talamo et al., 2012; Douka et al., 2014; Wood et al., 2014). This problem is exacerbated by the lack of information about which species, Neanderthal or modern human, were responsible for the various technocomplexes. Diagnostic skeletal remains have not been recovered from transitional sites in Czech Republic, with the earliest reliable evidence dating from the Aurignacian period at Mladeč Caves. Attempts to resolve chronologies have begun, including the redating of several key sequences using Optically Stimulated Luminescence, Thermoluminescence, Electron Spin Resonance (Richter et al., 2008, 2009; Nejman et al., 2011) and radiocarbon (Neruda and Nerudová, 2013; Davies et al., 2015). This has improved the resolution of some site chronologies, in particular the Micoquian at Kůlna (Neruda and Nerudová, 2014) and Bohunician at Bohunice (Richter et al., 2008, 2009). It has also flagged a pressing need for well-dated sequences from undisturbed sites in Central Europe spanning the M-UP transition.

1.2. Relative chronologies for the M-UP transition in Central Europe

Site chronologies in Central Europe frequently rely on typologies and relative chronologies of lithics. Between 50 and 35 ka, five main industries have been identified in the region. The Middle Paleolithic Micoquian and the Mousterian are both thought to have been produced by Neanderthals and typically consist of sidescrapers, denticulates, and bifacially retouched artefacts (Valoch, 1994; Mellars, 1999; Svoboda et al., 2009). The pan-European Upper Paleolithic Aurignacian technocomplex is characterised by carinated endscrapers, burins, bone points, and decorative objects interpreted as beads and bracelets. This is widely regarded as being manufactured by AMHs (e.g., d'Errico et al., 1998; Mellars, 1999), however, this remains uncertain due to the scarcity of the human fossil record at these sites (Trinkaus and Zilhão, 2013; but see; Benazzi et al., 2015).

Located stratigraphically between the Middle Paleolithic and the Aurignacian industries are the Szeletian and Bohunician. The Szeletian is classed as a 'transitional industry', characterised by non-Levallois flake and blade production (Oliva, 1991; Svoboda, 1993; Valoch, 2000), whilst the Bohunician is characterised by the production of blades and Levallois flakes using a combination of Levallois and blade reduction techniques (e.g., Škrdla, 1999; Neruda and Nerudová, 2005; Škrdla and Rychtaříková, 2012). The authorship of these industries is only tentatively known due to the absence of diagnostic fossil evidence. The Bohunician is often attributed to AMHs as it is similar to AMH assemblages from the Near East (Tostevin, 2000; Škrdla, 2003, 2014; Nejman, 2008; Hoffecker, 2009). However, it also has similarities with some lithic assemblages dated to the Middle Paleolithic period, with both Levallois and Upper Paleolithic-like reduction strategies (Ameloot-Van der Heijden, 1993; Révillion, 1995), but these similarities have rarely been discussed (Valoch et al., 2000).

It is expected that the Szeletian was produced by Neanderthals, as Middle Paleolithic tool types and bifacial retouch are common (e.g., Valoch, 1990a, b; Oliva, 1991; Svoboda, 2005, 2006; Neruda and Nerudová, 2013). Studies have shown remarkable similarities between the Szeletian industry from Vedrovice V and the Micoquian industry from Kůlna (layers 6a and 7a). These similarities include implement typology (especially the high proportion of notched flakes) and the large size of retouched flakes (Nejman, 2006), as well as the use of local raw materials (as opposed to long distance imports) for producing lithic artefacts and the absence of the Levallois technique (Neruda and Nerudová, 2013). Tostevin and Škrdla's (2006) findings also corroborate the conclusion that the industries at these two sites share many similarities, e.g. in blank selection, retouch methods, and location of retouch.

1.3. Human movements into Moravia during the M-UP transition

As noted above, Moravia is thought to have acted as a corridor funnelling the migrating and indigenous populations producing these different lithic industries into a small area. During the transition period (with the onset of GIS 12 at approximately 47 kyr), European environments rapidly changed from desert-steppe into open forest biomes (e.g., Allen et al., 1999; Müller et al., 2011; Bradtmöller et al., 2012). This presented an opportunity for AMHs to migrate into Europe from the Near East and occupy present day Czech Republic (Müller et al., 2011). It has been suggested that Bohunician sites in the Czech Republic represent the westernmost advance of this migration (Hoffecker, 2009). This scenario is consistent with the similarity between Bohunician lithic assemblages and those from Temnata in southeastern Europe and Boker Tachtit (Škrdla, 2003; Hoffecker, 2009), possibly also Ksar Akil and Üçagizli (Kuhn, 2004) in the Levant. Svoboda suggests that "cultural

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