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BIOLOGICAL AND CULTURAL IDENTITY OF THE FIRST FARMERS: INTRODUCTION TO THE VEDROVICE BIOARCHAEOLOGY PROJECT

ABSTRACT: In this volume we present the results of a comprehensive international collaborative research program focused on the human skeletal remains recovered from the Early Neolithic cemetery of Vedrovice, Moravia, Czech Republic. The overall focus of the research program had two key strategic goals. First, to establish a comprehensive holistic bioarchaeological research programme involving a collaborative research team encompassing a diverse range of institutions and specialists in an international setting. Secondly, to generate new knowledge regarding the emergence of the Linear Pottery or Linearbandkeramik (LBK) culture and the transition from hunting-gathering to farming in Central Europe in the broader context of European neolithisation. To achieve these goals the research program incorporated researchers from the Czech Republic, Germany, and the United Kingdom who applied multiple bio-archaeological approaches to the available skeletal material, including AMS radiocarbon dating, palaeopathology studies, dental microwear studies, ancient DNA, chemical trace analyses, as well as material culture studies, in order to illuminate the nature of ancestry, diet, health, migration and cultural diversity in the constitution of the LBK culture at Vedrovice.

KEY WORDS: Bioarchaeology – Neolithic – Vedrovice – LBK – Cultural transition – Neolithisation – Central Europe

CONTEXT OF RESEARCH

Through the disciplinary lens of archaeology, the question of origins has remained at the forefront of research (Gamble 2007). Within this scope, the origin of agriculture, and its spread through Europe, is one of the most significant bio-cultural transitions undergone by human societies. One major problem has been the biological and cultural ancestry of the first farmers in Central Europe. Did agriculture originate among local indigenous hunter-gatherers, or was it brought by migrating colonist farmers?

Fundamental to this debate is the Central European Linear Pottery Culture or Linearbandkeramik Culture

(LBK) which has been broadly dated to 5700 BC–5000 BC (Lenneis, Stadler 1995, Lenneis *et al.* 1996, Lüning 1988, Modderman 1988, Quitta 1960, Stadler 1999). As such, it is the earliest agro-pastoralist phenomenon outside of the Balkans, stretching at its height as far west as Normandy. Assumptions about its overall uniformity have traditionally been interpreted as reflecting colonization events, indicating a rapid east-west spread of agro-pastoralist populations (Ammerman, Cavalli-Sforza 1984, Cavalli-Sforza, Cavalli-Sforza 1995, Childe 1957 [1925], Modderman 1988, Neustupný 2004, Piggott 1965, van Andel, Runnels 1995, Vencl 1986). This uniformity has, however, come under increasing doubt with the recognition of local and regional

typological variability in LBK ceramic, lithic, and dietary repertoires suggestive more of continuity and the passage of traditions from indigenous hunter-gatherer populations (Bánffy 2004, Bentley *et al.* 2003, Gronenborn 1998, 1999, 2003, 2004, Lukes 2004, 2005, 2006, Lukes, Zvelebil 2004, Mateiciucová 2004, Price 2000, Rulf 1995, 1997, Whittle 1996, Zvelebil 2000a, 2000b, 2004, Zvelebil *et al.* 2008a, 2008b).

Arguably, the ability to see beyond the once "clear" replacement of local hunter-gatherers by incoming migrant farmers has been made possible by a reflexive examination of the interpretive framework within which traditional research has been conducted, critically evaluating the defined dichotomy of "the Mesolithic" and "the Neolithic" way of life, associated chronologies and typologies; patterns of mobility and sedentism; economy and food production; the permeability of boundaries and frontiers; the significance of material culture and its variability; theoretical frameworks of interpretation; as well as the impact of excavation and taphonomy in making sense of the past.

In the process of challenging established assumptions – which have elsewhere been referred to as "agricultural thinking" (Gamble *et al.* 2005) – a rich spectrum of transition encompassing overlapping concepts previously collapsed into the anticipated opposition of vanishing indigenous groups and incoming colonists has been illuminated, allowing the archaeologist to explore a mosaic of regional variation within the once uniform LBK. What if local indigenous groups had a role to play after all? In many respects, this particular question served as the inspiration for the research presented herein, since it brought to the forefront the complexity of human social interaction and the ways in which such interaction may have been imprinted archaeologically.

In addressing this question, we narrowed the scale of our research to site level at which the debate of ethnic referent and the LBK archaeological culture can be shifted to the consideration of a single community at a single site where knowledgeable agents engaged the materiality of life in the daily cycle of practice and negotiation of identity in accordance with individual and communal motives (as per the concepts of agency, *habitus* and practice discussed elsewhere by Barrett 1994, 1997, Bourdieu 1977, 1990, Dobres, Robb 2000, Giddens 1979, 1984, Hodder 1982, 1992, 2000, Shanks, Tilley 1992). Arguably, while brokering personal and group identities, individuals would have made reference to the existing social and material world.

The social world is not random. Instead, it is structured by memories and learned experiences bound by established cultural traditions. Changes in materiality over time permit insights into the nature of inter-generational transmission of culture and shifting identities (Boyd, Richerson 1985, Gillespie 2001), thereby providing archaeologists with the opportunity to examine the variable expression of materially grounded identities in different contexts. We therefore sought to explore constructed identities via the exploration of personal biographies of site occupants for

insights into the local versus colonist debate at the transition from hunting-gathering to farming (Lukes, Zvelebil 2007, Zvelebil *et al.* 2008a,b).

In developing this approach, we considered the three main approaches used to model the emergence of the LBK culture, namely Migrationist models which highlight the role of incoming colonists (Cavalli-Sforza, Cavalli-Sforza 1995, Childe 1957 [1925], Piggott 1965, van Andel, Runnels 1995, Vencl 1986), Indigenist models which focus on the role of local indigenous groups (Barker 1985, Dennell 1983, Pluciennik 1998, Thomas 1986, Tilley 1994, Whittle 1996); and Integrationist models which explore the interaction of both population groups (Chapman 1994, Price 1987, Renfrew 1996, Zvelebil 1986, 1995, 1996). Whereas previously these models of LBK emergence sought to examine settlement patterns, from a socio-anthropological perspective, each of these models also outline the nature of social interaction, participation and inter-generational transmission of knowledge at the Mesolithic-Neolithic transition (Lukes 2004, 2005, Lukes, Zvelebil 2007). In other words, at the communal level, the LBK can be understood as a cultural tradition subject to inter-generational transmission and acquisition of knowledge, structured and motivated by social context as expressed through variation in stylistic elements of material culture.

Consequently, the focus of this research became the objective exploration of LBK constitution through an examination of personal biographies and communal identity derived from the application of bio-archaeological analyses to human and material remains (Lukes 2004, 2005, Lukes, Zvelebil 2007, Zvelebil 2000b, 2004, Zvelebil *et al.* 2008a,b).

The challenge was to identify a site which (1) dated to an early or formative phase of the LBK during which the interplay of potential constituent populations could be analyzed (2) spanned several generations during which inter-generational transmission of culture and changing negotiation of identity could be manifest (3) had been excavated on a scale of sufficient magnitude to yield a wide range of material culture and (4) had a level of preservation which permitted the study of both material and human remains in various contexts, suitable for the application of bio-archaeological techniques in order to generate objectively testable datasets.

The site of Vedrovice in Moravia, Czech Republic, met each of these criteria and was selected for research. The site itself comprises several key components, including a settlement with traces of the materiality of daily life dated to the Early Neolithic (Podborský 1993, Podborský *et al.* 2002, Čížmář 2002, Lukes 2005), as well as a cemetery which has yielded one of the largest collections of Neolithic human remains in Central Europe accompanied by a well documented record of material culture (Podborský *et al.* 2002).

The research presented herein is the result of an international collaborative partnership between the

Department of Archaeology, University of Sheffield and the Anthropos Institute of the Moravian Museum in Brno, as well as additional researchers participating from the Czech Republic (Charles University), Germany (Mainz University, Max Planck Institute for Evolutionary Anthropology, Leipzig) and the United Kingdom (Bradford University, Hull University, Oxford University, Sheffield University), funded by a grant from the Arts and Humanities Research Council (B/RG/AN185/APN18452). This body of work is centred on the application of bio-archaeological approaches to a collection of human remains recovered from the Vedrovice "Široká u lesa" cemetery through which the notion of a major local Mesolithic contribution in the origin of Central European agriculture, and also the general constitution of the local LBK culture can be examined.

VEDROVICE

The site of Vedrovice is located in southern Moravia in the south eastern part of the Czech Republic near Moravský Krumlov in the Znojmo district (Ondruš 2002). Sections of the site were excavated between 1961 and 2000, and encompass the settlement, three enclosures as well as two cemeteries: the early LBK cemetery "Široká u lesa" (our study focus) and the "U Vinklerovy cihelny" burial ground (Humpolová 2001, Humpolová, Ondruš 1999, 2002, Podborský *et al.* 2002).

The Vedrovice site is invaluable to the study of the Neolithic in Central Europe. First, conditions at Vedrovice permitted the preservation of a large range of material culture including: ceramic vessels, miniature vessels, weights, drilled ceramic disks and figurine fragments; post holes from housing structures; pits; ovens; flaked and polished stone tools; grinding stones; faunal remains; bone tools and crucially, human skeletal remains key to the generation of individual biographies (Berkovec 2003, Berkovec, Veselá 2003–2004, Berkovec *et al.* 2004, Crubézy 1996, Crubézy *et al.* 1997, 2002, Humpolová 2001, Humpolová, Ondruš 1999, Ondruš 1963, 1965, 1972, 2002, Podborský *et al.* 2002). This range of preserved material culture and osteological remains has few parallels at other Central European LBK sites.

Secondly, the site has been extensively excavated and documented. The "Široká u lesa" cemetery itself was systematically excavated between 1975 and 1982 during which an area of 4500 m² was cleared and found to contain at least 85 burials dated to the LBK (Ondruš 2002). A catalogue of material culture recovered from these burials was published by Podborský *et al.* (2002), though it did not contain a comprehensive analysis of the human skeletal remains presented here. The site also comprises the so-called settlement area bound by a large enclosure in close proximity to the "Široká u lesa" cemetery, which was partially excavated between 1961 and 1974 (Ondruš 2002). Contemporaneity of the cemetery and settlement area was established by earlier pottery studies (Čižmář 2002, Ondruš

2002, Lukes 2006), and using the typology developed by Tichý (1962), as updated by Čižmář (2002), date the Neolithic occupation of the site to the early LBK.

Thirdly, the site immediately lends itself to the identification of special contexts and activity areas, namely daily lived experience at the settlement comprising housing structures, pits and ovens (Berkovec, Veselá 2003–2004), in contrast to funerary activities at the cemetery (Podborský *et al.* 2002). Though the archaeological materials recovered from the cemetery and settlement are comparable, there are a number of key differences. The material from the cemetery has a much greater degree of preservation and smaller frequency of fragmentation, yielding for instance the highest percentage of complete vessels (Čižmář 2002, Lukes 2006). Furthermore, differences in composition and type have been identified between the two areas, leading to the suggestion that "the world of the living had been kept separate from the world of the dead" (Berkovec *et al.* 2004: 174). Hence, individual burials provide the unique opportunity to apply objective bio-archaeological approaches as supplemented by material culture in the form of grave goods in order to construct individual biographies facilitating the exploration of the nature of individual identity in contrast to communal identity evident at the settlement.

Finally, in both time and space, the site of Vedrovice is potentially located at the periphery of distribution of the earliest LBK. Although most researchers would agree the Formative LBK probably first emerged in western Hungary, exactly how far and where this Formative LBK is distributed continues to be debated. Some researchers presume the distribution of the Formative LBK from western Hungary to Slovakia, Austria and Moravia (Pavúk 1979, 1980, 1994, Tichý 1960), whereas others postulate the presence of the Formative LBK from western Hungary, Slovakia and lower Austria, but exclude Moravia and regions further west (Bánffy 2004, Podborský 1993). This results in the "earliest" LBK being mapped throughout a vast area of Central Europe (Bogucki 2001, Gronenborn 1994, Jochim 2000, Lüning 1988). The wide distribution of the LBK throughout Europe has prompted a distinction between the "earliest" LBK associated with the Formative LBK in the core area of Transdanubia and the Danube valley, present day northwest Hungary, southwest Slovakia, Austria and Moravia (Gronenborn 1999, Kalicz 1995, Pavúk 1980, 1994) from the remaining "early" LBK assemblages distributed throughout Central Europe. Although post-Formative LBK assemblages may be the "earliest" in each respective region, they likely resulted from different cultural and genetic transmission processes. Specifically, in the case of the Formative LBK, whether by colonization, active participation of local hunting-gathering populations or some combination of these two, the donor cultures are derived from the First Balkan Neolithic. In the case of the post-Formative LBK, the donor cultures arguably involve other LBK communities since the chronological time span between the two horizons has been approximated at a minimum of 100 and a maximum of 200 years (see for instance Gronenborn 1998, 1999, compare

Čižmář 1998, 2002, Gläser 1993, Lenneis, Lüning 2001, Neustupný 1956, Pavlů, Vokolek 1992, Pavúk 1980, 1994, Tichý 1960, 1962).

Although internment in the "Široká u lesa" has been clearly associated with the early LBK (Čižmář 2002), prior to the commencement of our research, the relationship with the Formative LBK as defined above remained unclear. Especially since pottery excavated from three settlement features (not longhouses) in the year 2000 (research made possible by the Czech Science Foundation grant number 404-03-0741 under the project title "*Vedrovice: ohrazená osada kultury s LnK*" [Vedrovice: Enclosed Settlement of the LBK Culture] (directed by Alena Humpolová and Tomáš Berkovec) displayed older characteristics suggesting the site may have been established at the end of the Formative LBK (Lukes 2005, 2006, Humpolová pers. comm.). Interestingly, faunal remains recovered from these features were dominated by wild animal species, unlike any other area on-site (Berkovec, Nývltová-Fišáková 2003, Nývltová-Fišáková 2004a,b). Given the anticipated chronological time span between the two early LBK horizons has been approximated at a minimum of 100 and a maximum of 200 years, the close chronological succession of these phases suggests the potential for inter-generational transmission of culture and the opportunity to examine the changing negotiation of identity by individuals within the community precisely at the Mesolithic-Neolithic transition.

The participation of the Vedrovice population in exchange networks for both materials and potential partners beyond the site are indicated by Spondylus, and by stone tools recovered from the site and cemetery, including Szentgál radiolarite 235 km away, Jurassic Krakow flint 260–270 km away, and Baltic erratic flint 130–150 km away from the site (Mateiciucová 2002). Through the construction of individual life biographies, the association of these materials with individuals has the potential to inform on the construction and negotiation of individual as well as communal identities.

In aggregate, the Vedrovice site provides a unique opportunity to construct individual biographies based on results of objective bio-archaeological analyses supplemented with material culture from the cemetery and the settlement in order to examine the constitution of the early Neolithic LBK culture.

PROJECT AIMS

Program of Research

Samples for the research program were obtained in two phases. In the summer of 2006 preliminary sampling took place at the Anthropos Institute of the Moravian Museum, and confirmed the preservation of the human skeletal remains permitted for the extraction of biological material for successful radiocarbon dating, ancient DNA sequencing, trace elemental and isotopic dietary and mobility reconstruction, and dental microwear analyses.

Comprehensive sampling was conducted in the summer of 2007, and resulted in the collection of samples discussed throughout the issue 1/2008 of the journal *Anthropologie*. In addition, the research team met twice over the duration of the project, once in Sheffield, United Kingdom and then again in Brno, Czech Republic in order to present research and results, brainstorm, exchange project findings and explore the limitations of the bio-archaeological research program. Marek Zvelebil and Paul Pettitt directed the project, and Alena Lukes acted as project manager.

Radiocarbon Dating

Establishing the precise chronology and time of occupation, was seen as one of the primary research goals. Selected burials were dated directly by Accelerator Mass Spectrometry (AMS) in order to clarify the overall chronology of the LBK in the region and to test the established ceramic-based chronological phasing. The AMS radiocarbon dating project was undertaken by Robert Hedges of the University of Oxford and Paul Pettitt of the University of Sheffield. Prior to the radiocarbon dating conducted as part of this research program, only two radiocarbon dates were reported by Podborský (2002a, 2002b) for the Vedrovice site: 6220±35 BP and 6155±35 BP (VERA-1831, VERA-1832). Upon the completion of our research program, Vedrovice is the most comprehensively dated LBK cemetery in Europe.

Palaeoanthropology and Palaeopathology

A study of palaeopathology, determination of age and sex, as well as a demographic analysis was undertaken by Malcolm Lillie from the University of Hull in order to understand the health condition of the Vedrovice population. In addition, clarification of the age and sex determinations was key to establishing subsequent age-sex dependent patterns and completing the Vedrovice database. Special attention was given to exploration of a range of pathologies, as might be expected for a population at the transition to agriculture and indicative of specific subsistence patterns, including: carious lesions, *cribra orbitalia*, calculus deposits and reduction of the dental arcade. Attention was also given to skeletal markers indicative of potential hereditary relationships and identification of unique individuals such as Schmorl's nodes, osteophytic lipping, healed injuries and dental grooving.

Dental Microwear

Dental microwear studies were undertaken to ascertain the dietary regime of the population. A study of dental occlusal microwear was conducted by Pia Nystrom of the University of Sheffield. A complementary study of buccal dental microwear was undertaken by Ivana Jarošová of the Anthropos Institute, Moravian Museum. The combination of dental microwear studies focusing on the striations and pits identified on different parts of the tooth, permitted the evaluation of both short term subsistence patterns shortly before death, as well as longer term patterns of dietary preference and sex-based differences in consumed foods,

especially the importance of cereal-based food among the Vedrovice population.

Ancient DNA

A study of ancient DNA was undertaken by Barbara Bramanti from the University of Mainz to establish genetic ancestry of a population sample. The question of ancestry is often addressed indirectly through the study of material culture. The Vedrovice human skeletal remains provided a unique opportunity to address this question directly. Samples were therefore taken to study both nuclear and mitochondrial DNA in order to evaluate potential source populations for the Vedrovice settlement.

Chemical Trace and Isotopic Studies

Analysis of Strontium was undertaken by Janet Montgomery from the Bradford University, and Václav Smrčka from the Charles University in Prague to reconstruct migrational patterns of the Vedrovice population. Although this analysis does not clarify the location from which individuals originated, it does provide an exceptional opportunity to examine patterns of population movement within this early Neolithic population.

In addition, analyses of Nitrogen, Sulphur and Carbon were undertaken by Michael Richards from the Max Plank Institute for Evolutionary Anthropology in Leipzig and Václav Smrčka from the Charles University in Prague to further clarify the dietary regime of the population. This suite of analyses provide a direct evaluation of the subsistence practices evident amongst the Vedrovice population, and as such, a unique opportunity to contrast findings from palaeopathology and dental microwear studies.

Material Culture Studies

A study of material culture based on social predictive models contrasting interpretation of the cemetery and settlement was undertaken by Alena Lukes from the University of Sheffield. The informative potential of this approach is vastly enriched by the opportunity to supplement data from artefactual remains, with direct indications from bio-archaeological analyses.

Synthesis

The various analyses noted above permitted Marek Zvelebil and Paul Pettitt to complete a holistic synthesis of the biological and cultural origins of the Vedrovice population unparalleled in previous studies of the Central European Neolithic. The discoveries provide new insight into the Neolithisation of Central Europe, as well as provocative directions for future research.

FUTURE DIRECTIONS

The multi-disciplinary approach to bio-cultural archaeology employed here elucidates a major aspect of the Neolithisation of central Europe and the development of the LBK

culture. The holistic approach presented here informs at four different levels: the recognition of individual life biographies through the interpretation of various analyses on individual skeletons and their associated grave goods and burial practice; the recognition of group identity and social position within this as seen through health, diet and prestige markers, varying through age, gender and immigrant/local difference; elucidation of major elements of life at the community level and cultural homogeneity and variation within; and the history of the community at the regional scale.

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