

Editors' note: Philip R. Nigst is the first recipient of the „Hugo Obermaier-Förderpreis“, an award made possible by a generous endowment of the late Hertha Halter, a long term member of the Society. It is dedicated to enabling awardees to carry out independent and original fieldwork relevant to the aims and interests of the Society.

Philip R. Nigst ist der erste Preisträger des „Hugo Obermaier-Förderpreises“. Der Preis konnte dank einer großzügigen Zuwendung aus dem Vermächtnis des langjährigen Mitgliedes Frau Hertha Halter ausgelobt werden. Die Förderung soll Doktorandinnen und Doktoranden ermöglichen, ein eigenes Grabungsprojekt durchzuführen.

New research on the Aurignacian of Central Europe: A first note on the 2006 fieldwork at Willendorf II

Neue Forschungen zum Aurignacien in Zentraleuropa: Eine erste Mitteilung zu den Grabungen 2006 in Willendorf II

Philip R. NIGST^{1*}, Th. Bence VIOLA², Paul HAESAERTS³, Simon BLOCKLEY⁴, Freddy DAMBLON³, Christa FRANK², Markus FUCHS⁵, Michael GÖTZINGER⁶, Ulrich HAMBACH⁵, Carolina MALLOL⁷, Luc MOREAU⁸, Laura NIVEN¹, Michael RICHARDS¹, Daniel RICHTER¹, Ludwig ZÖLLER⁵, Gerhard TRNKA⁹ & Jean-Jacques HUBLIN¹

¹ Max-Planck-Institute for Evolutionary Anthropology, Department of Human Evolution, Deutscher Platz 6, D-04103 Leipzig

² Department of Anthropology, University of Vienna, Althanstr. 14, A-1090 Vienna

³ Institut Royal des Sciences Naturelles, Département de Paléontologie, Rue Vautier, 29, B-1000 Bruxelles

⁴ Research Laboratory for Archaeology and the History of Art, Oxford University, Dyson Perrins Building, South Park Road, Oxford OX1 3QY, UK

⁵ Lehrstuhl für Geomorphologie, Universität Bayreuth, Universitätsstraße 30, D-95447 Bayreuth

⁶ Institut of Mineralogy and Crystallography, University of Vienna, Althanstraße 14, A-1090 Vienna

⁷ CNRS UMR 6636 (E.S.E.P.), Maison Méditerranéenne des Sciences de l'Homme, 5, rue du château de l'horloge, BP 647, F-13494 Aix-en-Provence

⁸ Institut für Ur- und Frühgeschichte und Archäologie des Mittelalters, Abteilung ältere Urgeschichte und Quartärökologie, Universität Tübingen, Schloß, D-72072 Tübingen

⁹ Institut für Ur- und Frühgeschichte, University of Vienna, Franz-Klein-Gasse 1, A-1190 Vienna

ABSTRACT - Willendorf II is a key site for understanding the Middle-to-Upper Palaeolithic transition in the Middle Danube Region due to the presence of well stratified EUP and Early Aurignacian deposits. Here we report on new excavations at this site by the Willendorf Project. The aim of these excavations is to collect samples for dating and other geoarchaeological analyses, as well as to recover well stratified artefacts for technological and typological analysis. Six weeks of excavation in 2006 resulted in the discovery of the northwestern corner of the 1909 excavation, which allows the precise correlation of the old and modern site plans. The Early Aurignacian Layer 3 could be also relocated, and numerous samples for ¹⁴C and OSL dating, as well as for malacological, micromorphology, microtephra and magnetic susceptibility analyses were collected from the entire stratigraphy. The excavations show that find-bearing areas are still preserved throughout the Willendorf II sequence.

ZUSAMMENFASSUNG - Willendorf II ist eine der Schlüsselfundstellen zum Verständnis der Überganges vom Mittel- zum Jungpaläolithikum, da sie eine der sehr wenigen Fundstellen im Mittleren Donauraum mit gut stratifizierten Fundschichten aus dem frühen Jungpaläolithikum und dem frühen Aurignacien ist. Wir berichten hier über neue Ausgrabungen an dieser wichtigen Fundstelle. Das Ziel der neuen Grabungen war in erster Linie die Probennahme für Datierung und geoarchäologische Analysen, sowie Artefakte aus eindeutiger stratigraphischer Position. Im Laufe der sechswöchigen Grabung in 2006 haben wir unter anderem die Nordwestecke der Grabung 1909 freigelegt, was uns eine Korrelation der alten und der neuen Grabungspläne erlaubt. Außerdem wurde die Kulturschicht 3 des frühen Aurignacien wiedergefunden, und zahlreiche Proben für ¹⁴C und OSL-Datierung, sowie für malakologische, mikromorphologische und Mikrotephraanalysen und magnetische Suszeptibilitätsmessungen gesammelt. Die Grabungen zeigen, dass in Willendorf II noch fundführende Bereiche im Großteil der Sequenz erhalten sind.

KEYWORDS - Middle-to-Upper Palaeolithic transition, Aurignacian, Willendorf II, EUP
Übergang Mittel-Jungpaläolithikum, Aurignacien, Willendorf II, EUP

*corresponding author:
nigst@eva.mpg.de

Introduction

The replacement of Neanderthals by anatomically modern humans during the Middle-to-Upper Palaeolithic transition can be observed during OIS 3. The timing and nature of the Middle-to-Upper Palaeolithic transition in western Eurasia is heavily debated in the scientific community (e.g., Bar-Yosef & Pilbeam 2000; Zilhão & d'Errico 2003; Conard 2006; Hublin & Bailey 2006). The discussion centres on the age of the Early Aurignacian, considered by many as the first technocomplex of modern humans, and its relationship with the transitional and Early Upper Palaeolithic (EUP) industries in various regions of Western Eurasia.

The Middle Danube Region, formed by eastern Austria, Moravia, western Slovakia, and Hungary, is an archaeologically rich landscape. Several reference sites exist here for the OIS 3, among them Willendorf II, Stránská Skála, Vedrovice V, and Mladeč.

The record in the Middle Danube Region is characterised by (1) Early Aurignacian sites, (2) fossil remains of anatomically modern humans from Mladeč, (3) variability of transitional industries (Szeletian and Bohunician), and (4) an apparent coexistence of Early Aurignacian, Bohunician and Szeletian. Therefore, the Middle Danube Area is a crucial region for examining the transition from the Middle to the Upper Palaeolithic in Europe and offers a good test case to verify concepts such as the Danube Corridor Hypothesis (Conard & Bolus 2003), the unidirectional dispersal model (Davies 2001), and a late-appearance model for the Aurignacian (Zilhão & d'Errico 1999).

With the goal of contributing to the understanding of the replacement of Neanderthals by anatomically modern humans and the Middle-to-Upper Palaeolithic transition, P. R. N. and T. B. V. recently initiated The Willendorf Project, focusing on the dating and the depositional context of Willendorf II (Austria), one of the key sites of the (Early) Upper Palaeolithic in Central Europe. Willendorf II is unique because of the presence of several, well stratified EUP and Aurignacian layers.

The general goals of the project are: Palaeoclimatological and environmental reconstruction and understanding site formation. The intensive dating program aims to clarify the age of the Early Aurignacian at this location. Furthermore, a detailed re-examination of the stratigraphy and the site formation is also necessary.

Characterization of human behaviour at the transition from Middle to Upper Palaeolithic through the analysis of existing lithic collections and material from the renewed excavation. The aim is to describe and identify operational sequences, lithic raw material utilization and faunal exploitation patterns in order to define the technological style and behaviour of the first culturally modern humans in Europe.

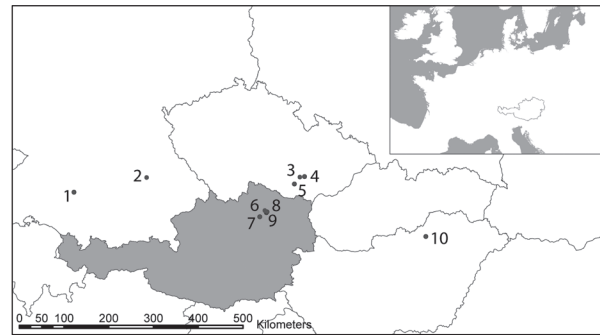


Fig. 1. Map showing the location of Willendorf II and a selection of other EUP sites in the Middle Danube Region: 1 Geißenklösterle, 2 Keilberg-Kirche, 3 Bohunice, 4 Stránská skála, 5 Vedrovice V, 6 Senftenberg, 7 Willendorf II, 8 Stratzing, 9 Krems-Hundssteig, 10 Istállóskö (Graphic: P. R. Nigst).

Abb. 1. Karte der mittleren Donauregion mit Willendorf II und einer Auswahl weiterer frühjungpaläolithischer Fundstellen: 1 Geißenklösterle, 2 Keilberg-Kirche, 3 Bohunice, 4 Stránská skála, 5 Vedrovice V, 6 Senftenberg, 7 Willendorf II, 8 Stratzing, 9 Krems-Hundssteig, 10 Istállóskö (Graphik: P. R. Nigst).

The site

The Willendorf site cluster (eight sites: Willendorf I, Willendorf I-Nord, Willendorf II to VII) is located approximately 80 km west of Vienna in the Wachau, a narrow part of the Danube valley (Fig. 1). Willendorf II is the only excavated site of the Willendorf site cluster. It is an open-air site situated on the western slope about 15 m above the river (230 m asl). Initial excavations were conducted between 1908 and 1926 by J. Szombathy, H. Obermaier, and J. Bayer from the Natural History Museum in Vienna. The hallmark of these excavations is the discovery of the Venus figurines. In 1955, parts of the site were excavated by Felgenhauer (1959) and in 1981 and 1993, P. Haesaerts conducted geological and chronostratigraphic research on a newly opened section (Haesaerts 1990; Haesaerts et al. 1996).

The deposits at Willendorf II cover a timespan of > 45 to 23 ka uncal. BP, with a long sequence of EUP, Aurignacian, and Gravettian (Fig. 2). In detail, the archaeological sequence contains, from bottom to top, one layer (1) without specified techno-/typological attribution due to the low number of finds, one EUP layer (2), one early (3) and one classic Aurignacian (4) layer, and five Gravettian layers (5 - 9). The site is most famous for its Venus figurine (from below Layer 9, Gravettian) and its Early Aurignacian lithic industry (Layer 3).

The old collections

Originating from various excavations in the first 60 years of the 20th century, the old collections form the major part of the famous Willendorf collection. The number of lithics from Layer 3 has recently been significantly increased by the discovery of a wooden box of the 1908/09 excavations (Nigst 2004). This box, which

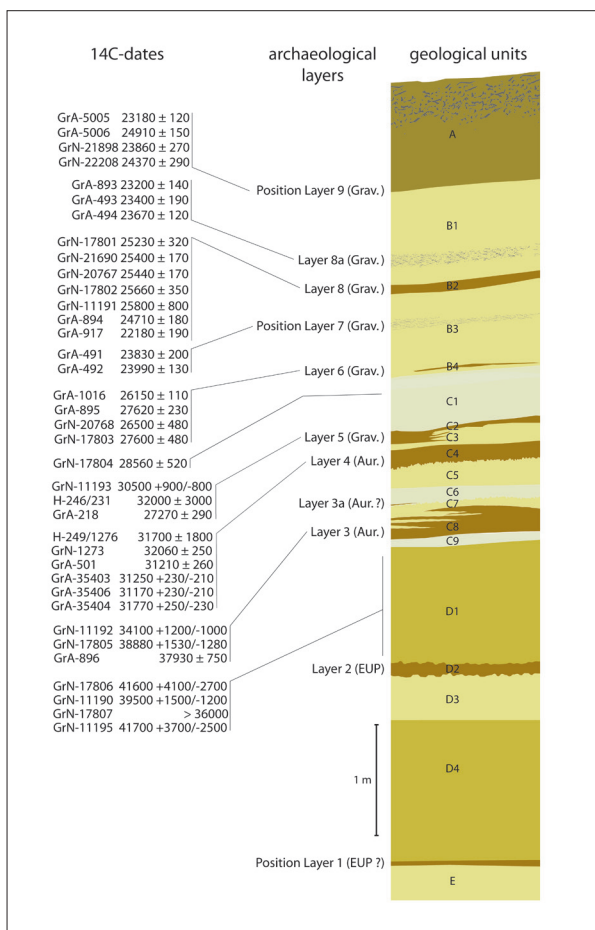


Fig. 2. Willendorf II: Schematic composite section (data from pre-1980s fieldwork campaigns, P. Haesaerts' fieldwork, and 2006 excavation; graphic: P. Haesaerts, T. B. Viola & P. R. Nigst).

Abb. 2. Willendorf II: Schematisches Kompositprofil (Datengrundlage Grabungen vor 1980, Profile von P. Haesaerts und Grabung 2006; Graphik: P. Haesaerts, T. B. Viola & P. R. Nigst).

was stored in the basement of the Natural History Museum in Vienna, contained about 350 lithics. The enlarged assemblage of Layer 3 is characterized by Aurignacian tool types (carinates, Aurignacian blades) and a lithic technology based on two distinct chaînes opératoires for blades (unidirectional core exploitation; Fig. 3) and small bladelets (carinates as cores). Radiocarbon dates on charcoal sampled by P. Haesaerts in 1993 suggest an age of 38/39 ka uncal. BP of this layer (Haesaerts et al. 1996; Nigst 2006).

The new excavations

A topographic survey was conducted before the 2006 excavation resulting in a digital elevation model of the central site area. This forms the base for our geographic information system (GIS) used for the analysis of the site.

The excavation methodology (see McPherron & Dibble 2002; Nigst et al. 2004a, 2004b, in press; McPherron 2005) involves excavating in stratigraphic units which are also geological units. Within each stra-



Fig. 3. Willendorf II: refitting of two blades (Photos: P. R. Nigst, © Prähistorische Abteilung, Naturhistorisches Museum, Vienna).

Abb. 3. Willendorf II: Zusammenpassung von zwei Klingen (Photos: P. R. Nigst, © Prähistorische Abteilung, Naturhistorisches Museum, Wien).

tigraphic unit we are using the *décapage* concept for exposing finds: all objects larger than five millimeters are left in place and recorded individually by a total station, which is connected to a handheld computer running EDM CE software (McPherron & Dibble 2002). During the recording process we measure one point in the centre of the object, although the measurement occurs after its removal because we are interested in the surface on which it rests. Two points are recorded on elongated objects: one point at each end of the longest axis. Larger objects are drawn from rectified photographs. The removed sediment from each quarter square metre is wet sieved using a mesh size of two millimeters.

The first excavation of the Willendorf Project was conducted during six weeks in August and September 2006. After removal of the humic top soil and the backfill of previous excavations, we were able to excavate in three zones (Fig. 4). Zone 01 has been

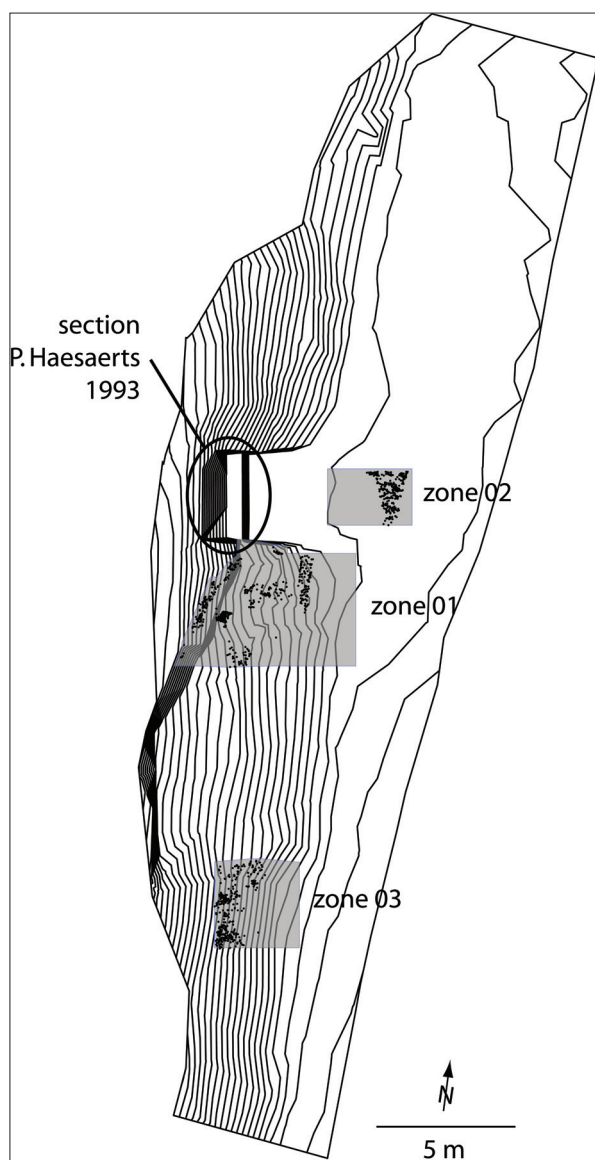


Fig. 4. Willendorf II, excavation 2006: Contour map showing the location of the three excavation zones 01, 02, and 03 (Graphic: P. R. Nigst).

Abb. 4. Willendorf II, Ausgrabung 2006: Hörschichtlinienplan mit Lokalisation der Ausgrabungszonen 01, 02 und 03 (Graphik: P. R. Nigst).

placed exactly south of the 1993 section by Paul Haesaerts' team. This allows us a direct and unquestionable correlation with his stratigraphic units. The main purpose of zone 02 was to test our pre-excavation assumptions, based on old field reports and publications, that in the northern part of the site deposits containing Layers 3 and below are still preserved and accessible. We were able to verify this during the excavations. In zone 02 recent disturbance in the form of an underground power line to a neighbouring weekend house was visible. Finally, zone 03 was placed right in the area of the 1908/1909 main western section in order to connect the new excavations to the reference sequence described by the early excavators.

The location and identification of F. Felgenhauer's 1955 cleaning of the NW corner of the 1909 excavation of Layer 3 in our zone 01 (Fig. 5) is significant because it can be used to show the accuracy of the old field drawings and reports, and that our pre-excavation estimates of the extension of the older excavations were correct. We are therefore now able to locate positions given in the old field drawings on our excavation grid system to an accuracy of about 20 cm. We are currently digitizing the old, unpublished field drawings and site reports and intend to incorporate them in our GIS model of the site. This will allow us to relate find concentrations recorded during the old fieldwork to our grid system.

We collected more than 700 charcoal samples during the 2006 field season. They are currently sorted, cleaned, and if possible, identified to species level by F. Damblon and P. Haesaerts. A first series of high quality *Picea* charcoal has been selected for radiocarbon dating. Several samples from archaeological Layers 4 and 3 have been submitted to the Groningen and Oxford Radiocarbon Laboratories. Some additional samples from the geological unit D are currently being dated in the Oxford Radiocarbon Laboratory using the ABOX method of sample preparation (Bird et al. 1999). For first ¹⁴C-AMS dates for Layer 4 see below.

Optically Stimulated Luminescence (OSL) dating of minerals from sediments allows the determination of the time of sedimentation of the deposits. Most of the archaeological layers are bioturbated and/or show signs of solifluction, and are less suitable for OSL dating. Therefore samples were collected from the layers above and below the archaeological horizons. This will allow us to check the integrity of OSL dating of the overall sequence and to determine post- and antequem ages for the archaeological layers. The following methods will be used: blue stimulated OSL on quartz extracts of the coarse and fine fraction. Polymneral samples without a sufficient quartz component will be dated by Infrared Stimulated Luminescence (IRSL). We collected a total of nine samples for OSL dating.

Soil micromorphology is essential to understand site formation processes. In total 19 soil micromorphology samples were collected from different sections of the 2006 excavation, fifteen of them from the geological units D and C, and four from geological unit B. For enviro- and palaeomagnetic investigation, 204 oriented, discrete samples were taken from the sections of the 2006 excavation. These samples are currently being analysed.

In total, 36 bones, 172 lithics, and 119 stones have been recovered from a stratified context during the 2006 field season. Additional material originates from the backfill of the previous excavations. All finds of lithics, bones, and stones are currently being analysed, but we are able to present some preliminary results.

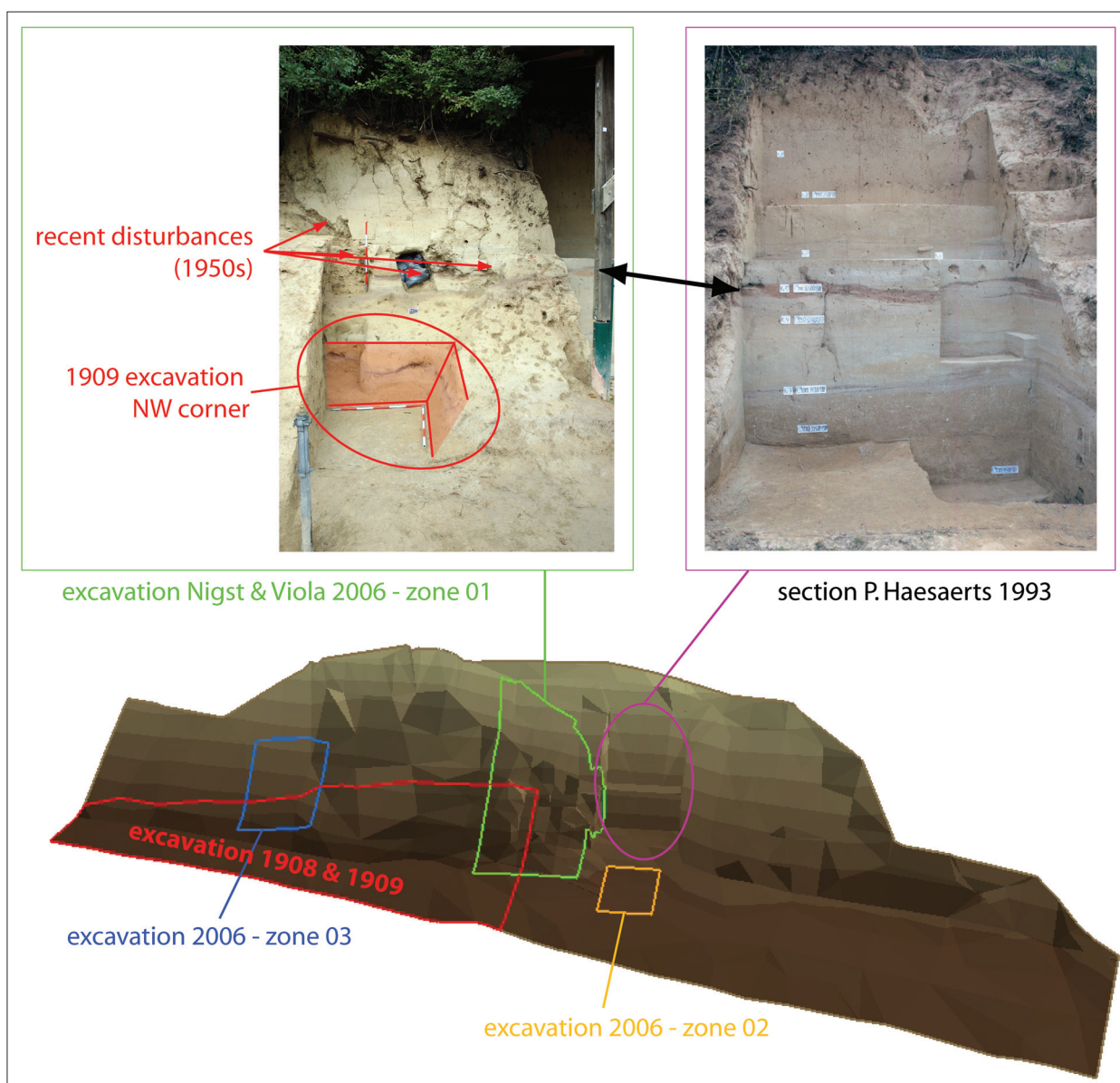


Fig. 5. Willendorf II: Digital elevation model of the site showing the location of the previous fieldwork and the three trenches of the 2006 campaign. Upper right inset shows P. Haesaerts' section from 1993. Upper left inset shows part of the 2006 excavation after removing the backfill of the previous fieldwork (Graphic: P. R. Nigst; photos: G. Trnka and T. B. Viola).

Abb. 5. Willendorf II: Digitales Geländemodell der Fundstelle mit Markierung der Altgrabungen und der drei Schnitte der Grabung 2006. Rechts oben P. Haesaerts' Profil aus dem Jahr 1993, links oben Teil der Grabung 2006 nach Entfernung der Aufschüttung der Altgrabungen (Graphik: P. R. Nigst; Photos: G. Trnka und T. B. Viola).

Most remarkable overall is the small number of excavated finds. These low quantities are due to the small area excavated and correspond well to the find densities of the old excavations. Especially for the lower levels, the lithic density is reported to have been about one to two pieces per square metre in the 1908/09 excavations. Additionally, they seem to have been deposited in concentrations with very few or no artefacts outside these concentrations. This is quite consistent with our observations; e.g. in Layer 3 only one lithic artifact was recorded during the 2006 field season. This lithic artifact is a partial core tablet made from a raw material that is a fine-grained, greyish hornstone with smooth yellowish/beige cortex. The cortex hints at a secondary deposit as the raw material pro-

curement location, most probably the nearby Danube gravels. This raw material type has been recorded during the analysis of the old collections. In the old collections this raw material type seems to represent

lab. no.	¹⁴ C age	1 σ (sigma)	material
GrA-35403	31 250	+230/-210	charcoal: <i>Picea/Larix</i>
GrA-35406	31 170	+230/-210	charcoal: <i>Picea/Larix</i>
GrA-35404	31 770	+250/-230	charcoal: <i>Picea/Larix</i>

Fig. 6. Willendorf II, AH 4: new radiocarbon dates (2006 fieldwork).

Abb. 6. Willendorf II, AH 4: neue Radiokarbonaten (Grabung 2006).

three raw material nodules. The 2006 find can be attributed to one of these three nodules due to details of colour, structure, cortex thickness, and cortex structuring, as well as overall size.

The excavation of Layer 4 resulted in a large collection of charcoal and observations on the formation of the geological unit C4. A first set of radiocarbon dates is available (Fig. 6). The dated material was collected in the upper part of geological unit C4 during the fieldwork. The charcoal has been cleaned, sorted (see Damblon et al. 1996 for details) and identified as *Piceal/Larix*.

The lowermost Gravettian layer in zone 03 yielded the richest lithic assemblage of the 2006 excavations. About 50% of the 78 lithics are made on high quality hornstone. The other raw materials represented are low quality hornstone, radiolarite, and quartzite. The blank types belong to the phases of decortification/raw material testing, core preparation, and blank production. Proximal ends show the use of a soft mineral hammer and antler percussion in the knapping process. Among the retouched pieces are one fragmented backed piece, one endscraper, and one microgravette point. This layer can't be connected to the main stratigraphic sequence due to excavation progress, but we think that it corresponds to Layer 5.

Faunal remains are scarce among the finds of the 2006 excavation. Layers 6 and 8 (Gravettian) yielded the majority of fauna. The overall preservation of bone is poor, with extensive root etching and weathering of bone surfaces and a high rate of fragmentation in the form of ancient dry breakage. These factors together with the small size of the bone fragments limits recognition of anthropogenic modifications; in fact, no cut marks or hammerstone impacts have been observed. The only signatures of human involvement include two burned bones and two examples of fresh (green) fractures. From Layer 8 one metatarsal II of *Canis lupus* has to be mentioned, as wolves are common in the Gravettian archaeofaunas of Central Europe (Antl & Fladerer 2003; Musil 1994). Other fauna represented are of mammoth size (most probably *Mammuthus primigenius*) and cervid or horse size (most probably *Rangifer tarandus*). Identification to species was strongly hindered by the poor preservation of bone.

Conclusion

This initial excavation campaign showed the potential of what remains at Willendorf II. Among the most important results of the 2006 field season are (1) the identification of the NW-corner of the 1909-excavation, (2) the re-location of Layer 3 indicating that there are still unexplored and accessible deposits, (3) abundant piece-plotted charcoal samples for ¹⁴C-AMS dating from Layer 3 to Layer 6, (4) multiple samples for OSL-dating, soil micromorphology, malacology, microtephra analysis, palaeomagnetism and susceptibility analysis, and (5) recovery of lithics and faunal

remains. Regarding our goals outlined at the beginning, we were able to collect numerous samples for dating and site formation studies in order to establish a better geoarchaeological and chronostratigraphic framework for the site. Data from the 2006 excavation for human behaviour analysis is limited, but ongoing work will enlarge the sample. Excavations were continued in the summer of 2007.

ACKNOWLEDGEMENTS: We want to acknowledge financial support from the Hugo Obermaier-Gesellschaft (Hugo Obermaier-Förderpreis 2006 awarded to P. R. N.), the Leakey Foundation (San Francisco, USA), Department of Human Evolution (Max-Planck-Institute for Evolutionary Anthropology, Leipzig), Department of Anthropology (University of Vienna), and the Institute for Prehistory (University of Vienna). P. R. N. and T. B. V. are very thankful to Shannon McPherron for his great help with setting up to the site's coordinate system, his advises in recording issues, and for comments on this paper. The fieldwork was further supported with equipment by the Department of Prehistory (Walpurga Antl-Weiser and Anton Kern, Museum Natural History, Vienna). We would like to thank the municipality of Aggsbach-Willendorf (Mayor H. Gerstbauer) and the Museumsverein Willendorf for their practical support, especially K. Kappelmüller for providing us with laboratory and storage space. P. R. N. is supported by a PhD grant of the Max-Planck-Society in the framework of the IMPRS The Leipzig School of Human Origins. T. B. V.'s research is supported by the Austrian Federal Ministry of Education, Science and Culture, Grant No. GZ 200.093/1-v/2004 (PI Horst Seidler).

Literature cited

- Antl, W. & Fladerer, F. A. (2003). Outlook to the east: The 25 ky BP Gravettian Grub/Kranawetberg campsite (Lower Austria). In: J. Svoboda & L. Sedláčková (Eds.) *The Gravettian along the Danube*. Proceedings of the Mikulov Conference, 20.-21. November, 2002. The Dolní Vestonice Studies 11. Institute of Archaeology AS CR, Brno, 116-130.
- Bar-Yosef, O. & Pilbeam, D. (Eds.) (2000). *The geography of Neanderthals and Modern Humans in Europe and the Greater Mediterranean*. Peabody Museum Bulletin 8. Harvard University, Cambridge.
- Bird, M. I., Ayliffe, L. K., Fifield, L. K., Turney, C. S. M., Cresswell, R. G., Barrows, T. T. & David, B. (1999). Radiocarbon dating of "old" charcoal using a wet oxidation, stepped-combustion procedure. *Radiocarbon* 41(2): 127-140.
- Conard, N. J. (Ed.) (2006). *When Neanderthals and modern humans met*. Kerns Verlag, Tübingen.
- Conard, N. J. & Bolus, M. (2003). Radiocarbon dating the appearance of modern humans and timing of cultural innovations in Europe: new results and new challenges. *Journal of Human Evolution* 44: 331-371.
- Davies, W. (2001). A very model of a modern human industry: new perspectives on the origins and spread of the Aurignacian in Europe. *Proceedings of the Prehistoric Society* 67: 195-217.
- Felgenhauer, F. (1959). *Willendorf in der Wachau. Monographie der Paläolith-Fundstellen I-VII*. Mitteilungen der Prähistorischen Kommission VIII + IX. Rohrerer, Vienna.
- Haesaerts, P. (1990). Nouvelles recherches au gisement de Willendorf (Basse Autriche). *Bulletin de l'Institut Royal des Sciences Naturelles de Belgique, Sciences de la Terre* 60: 203-218.
- Haesaerts, P., Damblon, F., Trnka, G. & Bachner, M. (1996). Revised stratigraphy and chronology of the Willendorf II sequence, Lower Austria. *Archaeologia Austriaca* 80: 25-42.

- Hublin, J.-J. & Bailey, S. E. (2006).** Revisiting the last Neanderthals. In: N. J. Conard (Ed.) *When Neanderthals and modern humans met*. Kerns Verlag, Tübingen, 105-128.
- McPherron, S. P. (2005).** Artifact orientations and site formation processes from total station proveniences. *Journal of Archaeological Science* 32: 1003-1014.
- McPherron, S. P. & Dibble, H. (2002).** *Using computers in archaeology: A practical guide*. McGraw Hill, New York.
- Musil, R. (1994).** Hunting game of the cultural layer of Pavlov. In: J. Svoboda (Ed.) *Pavlov I: Excavations 1952-1953*. The Dolní Vestonice Studies 2 / ERAUL 66. Université de Liège, Liège, 183-201.
- Nigst, P. R. (2004).** «Neue» alte Funde aus Willendorf II, Schicht 3. *Archäologie Österreichs* 15(1): 23-25.
- Nigst, P. R. (2006).** The first modern humans in the Middle Danube Area? New evidence from Willendorf II (Eastern Austria). In: N. J. Conard (Ed.) *When Neanderthals and modern humans met*. Kerns Verlag, Tübingen, 269-304.
- Nigst, P. R., Viola, T. B., Doneus, M. & Antl-Weiser W. (2004a).** Digitale Dokumentation paläolithischer Grabungen. *Archäologie Österreichs* 15(1): 36-48.
- Nigst, P. R., Viola, T. B., Doneus, M. & Antl-Weiser W. (2004b).** GRUPS and ArcGRIMP: A new system for digital excavation documentation and importing recorded data to a GIS. In: *Enter the Past*. Proceedings of the CAA 2003. BAR International Series 1227 (CD-ROM Publication). Archaeopress, Oxford.
- Nigst, P. R., Viola, T. B. & Antl-Weiser W. (in press).** Digital documentation of Palaeolithic excavations: A case study. In: C. Neugebauer-Maresch (Ed.) *Aktuelle Aspekte des mittel- und osteuropäischen Jungpaläolithikums – Methoden, Chronologie, Technologie und Subsistenz / New Aspects concerning the Middle and Eastern European Upper Paleolithic – methods, chronology, technology and subsistence*. Verlag der österreichischen Akademie der Wissenschaften, Vienna.
- Zilhão, J. & d'Errico, F. (1999).** The chronology and taphonomy of the earliest Aurignacian and its implications for the understanding of Neanderthal extinction. *Journal of World Prehistory* 13(1): 1-68.
- Zilhão, J. & d'Errico, F. (Eds.) (2003).** *The chronology of the Aurignacian and of the transitional technocomplexes: dating, stratigraphies, cultural implications*. Trabalhos de Arqueologia 33. Instituto Português de Arqueologia, Lisbon.