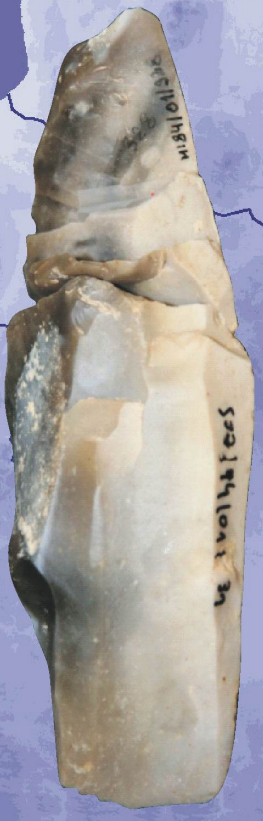
Geoarchaeological Workshop:

Actual stage of the environmental archaeology investigations in southern Poland and northern Czech and their implications for palaeoclimatic changes versus new delimitations of the Quaternary

Adam Mickiewicz University in Poznań
Institute of Geoecology and Geoinformation
25 October 2011



PAGES
PAST GLOBAL CHANGES

STOWARZYSZENIE ARCHEOLOGII ŚRODOWISKOWEJ

INSTYTUT GEOEKOLOGII I GEOINFORMACJI
GIG
UAM POZNAŃ

Geoarchaeological Workshop:
Actual stage of the environmental archaeology investigations in southern Poland and northern Czech and their implications for palaeoclimatic changes versus new delimitations of the Quaternary

Adam Mickiewicz University Poznań,
Collegium Geographicum - Institute of Geoecology and Geoinformation
25 October 2011

Eds. Katarzyna Issmer, Mirosław Makohonienko, Iwona Hildebrandt-Radke & Andrzej Wiśniewski

(cover: fragment of the map of Europe © University of Wrocław)

Rationale and workshop aims

The Geoarchaeological Workshop follows the recent INQUA Loess Commission meeting – *International Workshop, 6th Loess Seminar "Closing the gap – North Carpathian loess traverse in the Eurasian loess belt" – Wrocław 2011.*

The **PAGES-EuroGeoarchaeo** workshop main aim is to initiate scientific discussion on new challenges for geoarchaeology in Central Europe preparing for new working group in range of PAGES. Special attention in this meeting is focused on actual stage of the environmental archaeology investigations in southern Poland and northern Czech and their implications for paleoclimatic changes versus new delimitations of the Quaternary. This workshop refers mainly to the Late Pleistocene and Palaeolithic period – in the next meetings we intend to discuss climatic changes in the context of geoarcheological data in the Central Europe during the last 5ka.

Programme:

Opening (11:00 - 11:15)

Keynote speakers:
Michał Kobusiewicz – ***Challenges in Palaeolithic investigations***
Mirosław Makohonienko – ***Environmental Archaeology – Man and Climate***
Katarzyna Issmer – ***Palaeoclimatic changes versus new delimitation of Quaternary***

SESSION 1: Chairpersons – **Teresa Madeyska & Maria Łanczont**

Lectures:

1. Andrzej Wiśniewski (11:15 - 11:35)
   Late Middle Palaeolithic in southern Poland (MIS5d-3): a new look at old problems
2. Jiri Chlachula (11:35 - 11:55) **Early Palaeolithic Site Distribution of the Dyje/Thaya Basin, Southern Moravia: Geomorphology Implications and Past Landscape Dynamics**
3. Tomasz Kalicki (11:55 - 12:15) **Geoarchaeological studies of man-environment interaction in the upper Vistula river valleys – some examples**
4. Lenka Lisa (12:15 - 12:35) **New results on the palaeoclimate record of the Late Pleistocene cave sediments (Moravian Karst, Czech Republic); the case study based on mineral magnetic properties and facial analyses**
5. Adam Nadachowski, Krzysztof Stefaniak, Piotr Wojtal (12:35 - 12:55)
   Patterns of magafaunal extinctions in southern Poland in the changing environment of Late Pleistocene

Coffee break 12:55 13:10

SESSION 2: Chairpersons – **Adam Nadachowski & Michał Kobusiewicz**

Short poster session:
Maria Łanczont, Teresa Madeyska (13:10 13:25) **Premises of the research project concerning the Palaeolithic oecumene study in pery- and meta-Carpathian region of Poland and Ukraine**

6. Dariusz Bobak (13:25 - 13:45) **Chronology and synchronization of climate data for Middle to Upper Palaeolithic transition**
7. Marta Połtowicz-Bobak (13:45 - 14:05) **Environment of the Final Palaeolithic and Magdalenian peopling of the eastern part of Central Europe**
8. Issmer Katarzyna (14:05 - 14:25) **Palaeoclimatic changes versus new delimitation of Quternary**
9. Iwona Hildebrandt-Radke (14:25 - 14:45) **Spatial analysis of the prehistoric and early historic settlement in the region of the Middle Obra River using GIS methods**

Lunch break (14:45-16:05)

Open discussion (16:05-17:45)
New challenges for geoarchaeology in Central Europe preparing for new working group in PAGES
Moderators: **Katarzyna Issmer, Mirosław Makohonienko, Andrzej Wiśniewski**

Organisers and lecturers

Dr. Dariusz BOBAK
Uniwersytet Rzeszowski, Instytut Archeologii
Zakład Archeologii Epoki Kamienia
ul. Hoffmanowej 8, 35-016 Rzeszów

University of Rzeszów
Institute of Archaeology
Department of Stone Age Archaeology

Doc. PhDr. Jiří CHLACHULA, Ph.D. et Ph.D.
Laboratory for palaeoecology FLKM
Tomas Bata University in Zlin
nam.T.G.M. 5555
CZ 760 01 Zlín,
e-mail: Altay@seznam.cz

Tomas Bata University in Zlin
Laboratory for palaeoecology FLKM

Dr Iwona HILDEBRANDT-RADKE
Uniwersytet im. Adama Mickiewicza
Instytut Geoekologii i Geoinformacji
Zakład Geologii i Paleogeografii Czwartorzędu
ul. Dzięgielowa 27, 61-680 Poznań
e-mail: hilde@amu.edu.pl
tel.: +48-61- 829 6199

Adam Mickiewicz University in Poznań
Institute of Geoecology and Geoinformation
Department of Quaternary Geology and Palaeogeography

Dr Katarzyna ISSMER
Uniwersytet im. Adama Mickiewicza
Instytut Geoekologii i Geoinformacji
Zakład Geomorfologii
ul. Dzięgielowa 27, 61-680 Poznań
e-mail: kissmer@amu.edu.pl
tel.: +48-61-829 6203

Adam Mickiewicz University in Poznań
Institute of Geoecology and Geoinformation
Department of Geomorphology

Prof. UJK dr hab. Tomasz KALICKI
Uniwersytet Jana Kochanowskiego w Kielcach
Instytut Geografii
Zakład Geomorfologii, Geoarcheologii i Kształtowania Środowiska
ul. Świętokrzyska 15, 25-406 Kielce
e-mail: tomaszkalicki@ymail.com
tel. +48-41-349-6423

Jan Kochanowski University in Kielce
Institute of Geography
Department of Geomorphology, Geoarchaeology and Environmental Management

Prof. dr hab. Michał KOBUSIEWICZ
Instytut Archeologii i Etnologii PAN
Oddział w Poznaniu
ul. Rubież 46, 61-612 Poznań
e-mail: kobusiewicz@iaepan.poznan.pl
tel. +48-61- 8279 766

Institute of Archaeology and Ethnology
Polish Academy of Sciences

Dr. Lenka LISA
Akademie věd České republiky
Sekce věd o Zemi, Geologický ústav
Rozvojova 269, 165 02 Prague 6 - Lysolaje
E-mail: lisa@gli.cas.cz
Tel.: +420 607 706 585 or +420 233 087 252

Academy of Sciences of the Czech Republic
Institute of Geology

Prof. dr hab. Maria ŁANCZONT
Uniwersytet Marii Curie-Skłodowskiej
Zakład Geoekologii i Paleogeografii
Al. Kraśnicka 2cd, 20-718 Lublin
e-mail: lanczont@biotop.umcs.lublin.pl
tel. 081-537-68-54

Maria Curie-Skłodowska University
Department of Geoecology and Palaeogeography

Prof. dr hab. Teresa MADEYSKA
Instytut Nauk Geologicznych PAN
ul. Twarda 51/55, 00-818 Warszawa
e-mail: tmadeysk@twarda.pan.pl
tel. +48- 22- 697 87 54

Polish Academy of Sciences
Institute of Geological Sciences

Prof. UAM dr hab. Mirosław MAKOHONIENKO
Uniwersytet im. Adama Mickiewicza
Instytut Geoekologii i Geoinformacji
Zakład Geologii i Paleogeografii Czwartorzędu
ul. Dzięgielowa 27, 61-680 Poznań
e-mail: makoho@amu.edu.pl
tel. +48-12- 422 19 01

Adam Mickiewicz University in Poznań
Institute of Geoecology and Geoinformation
Department of Quaternary Geology and Palaeogeography

Prof. dr hab. Adam NADACHOWSKI
Instytut Systematyki i Ewolucji Zwierząt PAN
ul. Sławkowska 17, 31-016 Kraków
e-mail: nadachowski@isez.pan.krakow.pl
tel. +48-61-829 6215

Institute of Systematics and Evolution of Animals
Polish Academy of Sciences

Dr Marta POŁTOWICZ-BOBAK
Uniwersytet Rzeszowski, Instytut Archeologii
Zakład Archeologii Epoki Kamienia
ul. Hoffmanowej 8, 35-016 Rzeszów
e-mail:
tel. +48-17-872 1587

University of Rzeszów
Institute of Archaeology
Department of Stone Age Archaeology

Dr Andrzej WIŚNIEWSKI
Uniwersytet Wrocławski
Instytut Archeologii
Zakład Archeologii Epoki Kamienia
ul. Szewska 48, 50-139 Wrocław
e-mail: andrzej.wisniewski@archeo.uni.wroc.pl
tel. +48-71-3752 724

University of Wrocław
Institute of Archaeology
Department of Stone Age Archaeology

Organising committee of the workshop:

Katarzyna Issmer (AMU-PAGES-SAS)
Mirosław Makohonienko (AMU-PAGES-SAS)
Iwona Hildebrandt-Radke (AMU-SAS)
Andrzej Wiśniewski (Univ. of Wroclaw)

Technical assistance:
Przemysław Szymura, Mirosława Limanówka, Patrycja Kasprolewicz,
Weronika Kulikowska & Katarzyna Kwolek

Geoarchaeological Workshop:

Actual stage of the environmental archaeology investigations in southern Poland and northern Czech and their implications for palaeoclimatic changes versus new delimitations of the Quaternary

ABSTRACTS

Late Middle Palaeolithic in southern Poland (MIS5d-3): new look at old problems

Andrzej Wiśniewski

Department of the Stone Age, Institute of Archeology, The University of Wrocław

Several decades have passed since the comprehensive studies of the late phase of the Middle Palaeolithic (5 d-3 MIS) in Poland have been published (Chmielewski 1969, 1975; Kozłowski, Kozłowski 1977, 1996; Madeyska 1981). In the past two decades we could observe the steady increase in a number of significant archaeological records (Cyrek 2003; Cyrek et al. 2010; Valde-Nowak et al. 2003; Schild 2005; Wiśniewski 2006; Sitlivy et al. 2008, 2009). Recently, some new models of Weichselian climate and environment variability, created for European territories, were accepted. Needless to say, that more consistent picture of behavior and subsistence of pre-modern human has arisen in recent years (Howell 1999; Patou-Mathis, 2000; van Andel, Davies 2003; Gaudzinski 2006; Bocquet-Appel, Tuffreau 2009; Dennell et al. 2010; Gamble et al. 2004). These facts lead us to the new question confronting recent records with traditional picture. In this context, three aspects need to be discussed separately.

Firstly, the absolute dated archaeological sites shed the new light on the chronological framework of human occupation. As it will be argued, the data indicates multimodal distribution of records rather then unimodal one. It seems, that the exploitation of this area in the early and middle Weichselian (MIS 5d-e, the beginning of MIS 4 and MIS 3) by the the pre-modern Middle Palaeolithic hunters and gatherers was rather continuous with only a short break during the second part of 1st Pleniglacial (MIS 4 . Until recently, it was believed that the Middle Palaeolithic people survived here up to the 1st Pleniglacial only (~74 ka MIS 4). Kozłowski (1989, 2000) claimed that from the 1st cold event (59 ka) until the occurrence of so called transitional industries (45–40 ka) we can speak about the settlement hiatus at this area

The second question concerns the climatic and environmental condition and its influence on the dynamic of occupation. On the basis of multiproxy terrestrial data (pollen and isotopic records), marine-ice core records (D/O events) and the general simulations of climatic changes (Barron et al. 2003; van Andel et al. 2003; Huber et al., 2006; Komar at al. 2009) we can conclude that the multimodal distribution of the settlement data is not accidental. On the one hand, the presence of human occupation reflects the wide range of adaptations supported by cultural package, on the other hand it proves the presence of the optimal conditions for subsistence. However, taking into account the great variability of lithic records it seems that the occupation was unstable.

Thirdly, new records reveal more complex settlement systems and subsistence strategies of the Middle Palaeolithic hunters than it was previously thought. North to the Carpathians and Sudetes we can distinguish several clusters of open-air sites,

located at some distance from natural shelters (the middle and upper course of Odra River, the foreland of Holly Cross Mountains) and several clusters where sites were located within or in the closest area of natural shelters prevail (the Częstochowa Upland, Prądnik Valley and Wisła Valley near Kraków) (Kozlowski and Kozlowski, 1996; Wiśniewski, 2006). Taking into account all the evidence, it seems that the data from the early and middle Weichselian derived from the studied area reflects various strategies of the residential habits of pre-modern humans. Short-term camps are known from the cave sites, but also there is some evidence of longer occupation, represented by the abundant amount of stone artefacts, post-consumption waste, hearths and stone constructions (Biśnik Cave, layer 6–5, Cyrek et al., 2010). From open-air sites we have mainly evidence of short-term occupation (Piekary IIa, Sitlivy et al. 2008) and hunting practice (Zwoleń: Schild, 2005), however, single sites confirm also the existence of the base camps (Kraków, Księcia Józefa Str., Layer III: Sitlivy et al. 2009). It seems that the range of tasks and the chronological span of findings discussed above do not differ from those known from the Bohemian Massif or Mittelgebirge in Germany.

References:

Bocquet-Appel, J.-P., Tuffreau, A., 2009. Technological Responses of Neanderthals to macroclimatic variations (240,000–40,000 BP), Human Biology 81, 287–307.

Barron, E., van Andel, T.H., Pollard, D., 2003. Glacial environment II: Reconstruction the climate of Europe in the Late Glaciation. In: van Andel, T.H., Davies, W. (Eds.), Neanderthals and modern humans in the European landscape during the last glaciation: archaeological results of the Stage 3 Project. McDonald Institute for Archaeological Research, Cambridge, pp. 57 – 78.

Chmielewski, W., 1969. Ensembles Micoquo-Prondnikiens en Europe Centrale, Geographia Polonica, 17, 371–386.

Chmielewski, W., 1975. Paleolit środkowy i górny. In Chmielewski W., Hensel W. (Eds), Prahistoria ziem polskich, t. 1: Paleolit i mezolit, Ossolineum, Wrocław – Warszawa, pp. 9–158.

Cyrek, K., 2003. Biśnik Cave: a reconstruction of the site's occupation in the context of environmental changes, Eurasian Prehistory, 1, 5-29.

Cyrek, K., Socha, P., Stefaniak, K., Madeyska, T., Mirosław-Grabowska, J., Sudoł, M., Czyżewski, Ł., 2010. Palaeolithic of Biśnik Cave (Southern Poland) within the environmental background, Quaternary International, 220, 5-30.

Dennell, R.W., Martinón-Torres, M., Bermúdez de Castro, J.M., 2010. Hominin variability, climatic instability and population demography in Middle Pleistocene Europe, Quaternary Science Reviews (in print).

Gamble, C., Davies, W., Pettitt, P., Richards, M.B., 2004. Climate change and evolving human diversity in Europe during the last glacial. Philosophical Transactions of the Royal Society B 359, 243-254.

Gaudzinski, S., 2006. Monospecific or species-dominated faunal assemblages during the Middle Paleolithic in Europe. In: Hovers E., Kuhn S. (Eds.), Transitions before the transition. Evolution and stability in the Middle Paleolithic and Middle Stone Age. Springer, New York pp. 137-147.

Howell, F.C., 1999. Paleo-demes, species clades, and extinctions in the Pleistocene hominin record, Journal of Anthropological Research, 55, 191-243.

Huber, C., Leuenberger, M., Spahni, R., Flückiger, J., Schwander, J., Stocker T.F., Johnsen, S., Landais, A., Jouzel, J. 2006. Isotope calibrated Greenland temperature record over Marine Isotope Stage 3 and its relation to CH4, Earth and Planetary Science Letters 243, pp. 504–519.

Komar, M., Łanczont, M., Madeyska, T., 2009. Spatial vegetation patterns based on palynological records in the loess area between the Dnieper and Odra Rivers during the last interglacial–glacial cycle. Quaternary International 198, 152-172.

Kozłowski, J.K., 1989. La fin du Paléolithique moyen en Pologne. Anthropologie 27, 133-142.

Kozłowski, J.K., 2000. Southern Poland between 50 and 30 kyr B.P., environment and archaeology. In: Orschiedt, J., Weniger, G.-C. (Eds.), Neanderthals and modern humans – Discussing the transition: Central and Eastern Europe from 50.000-30.000. Neanderthal Museum, Mettmann, pp. 76–91.

Kozłowski J.K., Kozłowski S.K., 1977, *Epoka kamienia na ziemiach polskich,* Warszawa: PWN.

Kozlowski J.K., Kozlowski S.K., 1996, *Le Paléolithique en Pologne*, Grenoble: Editions Jérôme Millon.

Madeyska T., 1981. Środowisko człowieka w środkowym i górnym paleolicie na ziemiach polskich, Studia Geologica, S. Plejstocen Polski, 49.

Patou-Mathis, M., 2000. Neanderthal subsistance behaviours in Europe. International Journal of Osteoarchaeology 10, 379-395.

Schild, R., (Ed), 2005. The killing fields of Zwoleń. Middle Paleolithic kill-butchery-site in Central Poland. Institute of Archaeology and Ethnology Polish Academy of Sciences, Warsaw.

Sitlivy, V., Zięba, A., Sobczyk, K., (Eds.), 2008. Middle and Early Upper Palaeolithic of the Krakow region. Piekary IIa. Musées Royaux d'Art et d'Histoire, Bruxelles.

Sitlivy, V., Zięba, A., Sobczyk, K., (Eds.), 2009. Middle and Early Upper Palaeolithic of the Krakow region. Księcia Józefa. Musées Royaux d'Art et d'Histoire, Bruxelles.

Valde-Nowak, P., Nadachowski, A., Madeyska, T., 2003. Obłazowa Cave. Human activity, stratigraphy and palaeoenvironment. Institute of Archaeology and Ethnology Polish Academy of Sciences, Kraków.

Van Andel, T.H., Davies, W. (Eds.) 2003. Neanderthals and modern humans in the European landscape during the last glaciation: archaeological results of the Stage 3 Project. McDonald Institute for Archaeological Research, Cambridge.

Van Andel, T.H., Davies, W., Weninger, B., Jöris, O. 2003. Archaeological dates as proxies for the spatial and temporal human presence in Europe: a discourse on the method. In: van Andel, T.H., Davies, W. (Eds.), Neanderthals and modern humans in the European landscape during the last glaciation: archaeological results of the Stage 3 Project. McDonald Institute for Archaeological Research, Cambridge, pp. 31-56.

Wiśniewski, A., 2006. The Middle Palaeolithic in Odra Valley. Wydawnictwo Uniwersytetu Wrocławskiego, Wrocław (In Polish with English abstract).

Early Palaeolithic Site Distribution of the Dyje/Thaya Basin, Southern Moravia: Geomorphology Implications and Past Landscape Dynamics

Jiri Chlachula

Laboratory for Palaeoecology, T. Bata University in Zlin, Moravia, Czech Republic and Institute of Geoecology and Geoinformation, A. Mickiewicz University, Poznan, Poland

Southern Moravia represents due to its geographic position one of the key loci for documenting the initial human dispersal from the southern European regions into the centre part of the continent. History of the palaeolithic investigations in Moravia has a long tradition going back to the 19th Century in association with the first discoveries of "mammoth-hunters" sites with the Pleistocene (dilluvial) megafauna and cultural remains of prehistoric Man, including the World-famous Upper Palaeolithic localities in loess settings (Pavlov, Dolní Věstonice, Předmostí u Přerova) and the timely preceding Middle Palaeolithic (Neanderthal) cave sites centered in the Moravian Karst with the principal multilayer habitation in the Kůlna Cave. A Late Pleistocene (130-12 ka BP) human settlement became documented in the following decades over most of the Moravian river basins and the adjacent uplands.

Earlier records of the Middle and Early Palaeolithic were reported in the 1980's from the Svratka Basin and the Lower Moravian Basin, and represented by rudimentary "pebble-tool" industries, displaying a typical range of typological inventories of expedient tool types made from local alluvial gravels. Although most of these sites, represented by scatters of humanly flaked cobbles, are exposed on the present surface and geomorphologically associated with the 30-70 m high river terraces and alluvial fans, stratigraphy of some cultural records found *in situ* suggests a pre-Middle Pleistocene age, i.e. > 730 ka BP (Staré Město).

The recent Quaternary geology investigations in the previously unexplored Dyje/Thaya River Basin within a ca. 80 km geographic line between Vranov nad Dyjí in the west and Valtice in the east along the present Moravian-Austrian border performed during the last five years have completed the evidence on the geographic distribution of the Early and Middle Palaeolithic cultural occurrences. The sites (ca. 50) are mapped at patterned geomorphic locations of relics of the old Pleistocene fluvial deposits of the past Dyje River drainage system at elevations 10-80 m above the present river floodplain (with the W-E topographic gradient of 200-150 m asl). The highest concentration of sites is linked with the 30-50 m high terraces built by quartz-dominated sandy gravels overlying the pre-Quaternary sedimentary formations or granitic bedrock. Sorting of the geological clastic materials increases in the central and lower reaches of the fluvial system. The cultural lithics display a uniform mode of anthropogenic working with "chopper", cobble cores and simple cortical flakes being most frequent. Well-elaborated artifacts (bifaces, side-retouched flakes, regular polyhedral cores) are relatively rare what may reflect the abundance of the widely available raw materials. The differential artifact surface abrasion

degree, patination and the technological level of stone-tool working, being the main relative chronological proxy indicators, attest together with the specific geomorphic position of single sites to several stages of human occupation of the investigated area. The most frequent, heavily wind-polished and reddish iron-stained anthropogenic implements presumably relate to early Middle Pleistocene interglacials. Stratigraphy of the exposed and contextually associated fluvial deposits indicates an opened palaeo-valley environment with in-flow shallow lakes and meandering river streams. Distribution of some archaic and strongly abraded palaeolithic collections on the lower terraces (in places only 10-20 m above the present Dyje River plain) attest to a reduced geomorphology dynamics and a low incision rate of the past fluvial system.

Geoarchaeological studies of man-environment interaction in the upper Vistula river valleys – some examples

Tomasz Kalicki

Institute of Geography, Jan Kochanowski University in Kielce, Department of Geomorphology, Geoarchaeology and Environmental Management

The area in the front of Carpathians near Cracow was studied during archaeological rescue research on the A-4 highway undertaken by the Cracow Team for Motorway Survey. There are hills formed by Miocene clays covered by loess and dissected by small valleys. Two sites will be presented.

Targowisko site is located in the Raba valley, tributary of the Vistula river, about 30 km to ESE from Cracow (Kalicki et all. 2006). Large palaeomeander of the Raba river cut the loess upland, part of the Carpathians Foreland. This abandoned channel filled with organic sediments which were covered by colluvial fan. "Penninsula" of the loess upland have been settled first time in the Upper Palaeolithic (Epigravettian group about 14 800 BP). According to the pollen data macromeander at Targowisko-Przedewsie was cut off in the end of Alleröd. Oxbow lake with silty sedimenation had existed during Younger Dryas. Organic accumulation started in the beginning of the Holocene (10 280±60 BP cal. 10 450-9850 BC). Very unstable conditions of sedimentation (calcerous gyttja with peat layers, geochemical data) had occurred in the palaeomeander during Eo- and Mesoholocene (7760±40 BP cal. 6650-6480 BC). Pollen was significantly damaged or completely destroyed in these sediments. Therefore lack of pollen data about intensive settlement (some houses and cultural layer) of Linear Band Pottery Culture and later Malice Culture developed in the top of the "penninsula" since beginning of Neolithic. Traces of Lengyel-Polgar Culture Cycle population were also discovered there. Peats with small intercalations of calcerous gyttja accumulated during the Subboreal. These changes reflected probably more humid and drier climatic conditions. First anthropogenic species (i.e. *Secale, Centaurea cyanus, Odontites, Fossombronia*) occurred in the pollen diagram. Older colluvial fan could be accumulated in the end of the Subboreal (after 3300±30 BP cal. 1670-1500 BC) and a beginning of the Subatlantic (before 1915±30 BP cal. 20-140 AD). According to archaeological data Targowisko site was a large settlement of the late period of the Mierzanowice Culture characterized by more than 100 trapezium-shaped pits functioning as cellars. After hiatus (some hundred years) two sites of Lusatian Culture (1300-800 BC) with large graveyard (more 600 graves) developed. On the contrary only small settlement (some dwellings and aboveground buildings) occurred there during early Roman period. Therefore the development of the colluvial fan should be connected with the first dating - end of the Subboreal and peat spreading with humid climate of Roman period. Afterwards organic accumulation took place until 600±30 BP cal. 1290-1410 AD when younger fan, reflected in morphology, was developed. It should rather be connected with the period of development of medieval village Targowisko (located somewhere on the area of the present village) than the early

medieval settlement revealed in the neighborhood through the excavations (more than 70 pits from 11th to 13th c.).

Early Medieval settlement at Brzezie (site 20) is located on slopes and bottom of a small valley (tributary of Tusznica river, Raba river catchment basin). The area of approximately 260 acres was excavated there, and over 600 archaeological structures were discovered (dwellings, a bath, wells, bloomery furnaces, hearths, ovens used for different purposes and storage pits). On the basis of the pottery material analysis they can be dated back to the 8th-11th century (these assumptions were verified by the dates obtained from the discovered wooden elements, from the year 752 AD to the youngest from 1039 AD). A system of three palaeomeanders from different time periods was discovered on the bottom of the valley occupied by the settlement. The youngest seems to coincide with the period when the early medieval settlement functioned there. In the layers filling the older river beds no movable artefacts were found. Two main series could be distinguished in the palaeochannel fill. Lower member is homogeny and was deposited in Early Medieval time. Upper one is heterogenic with intercalations of silts (loess layer C) and organic silts (layer A of soil). These deposits was accumulated by flash floods during Late Middle Ages and later. Distinct post-Medieval accretion phase was connected probably with anthropogenic deforestation and soil erosion triggered by land use changes and clustering of catastrophic events (flash floods) during Little Ice Age. Similar increase of accumulation rate could be observed in the same time on some sites in the neighbourhood.

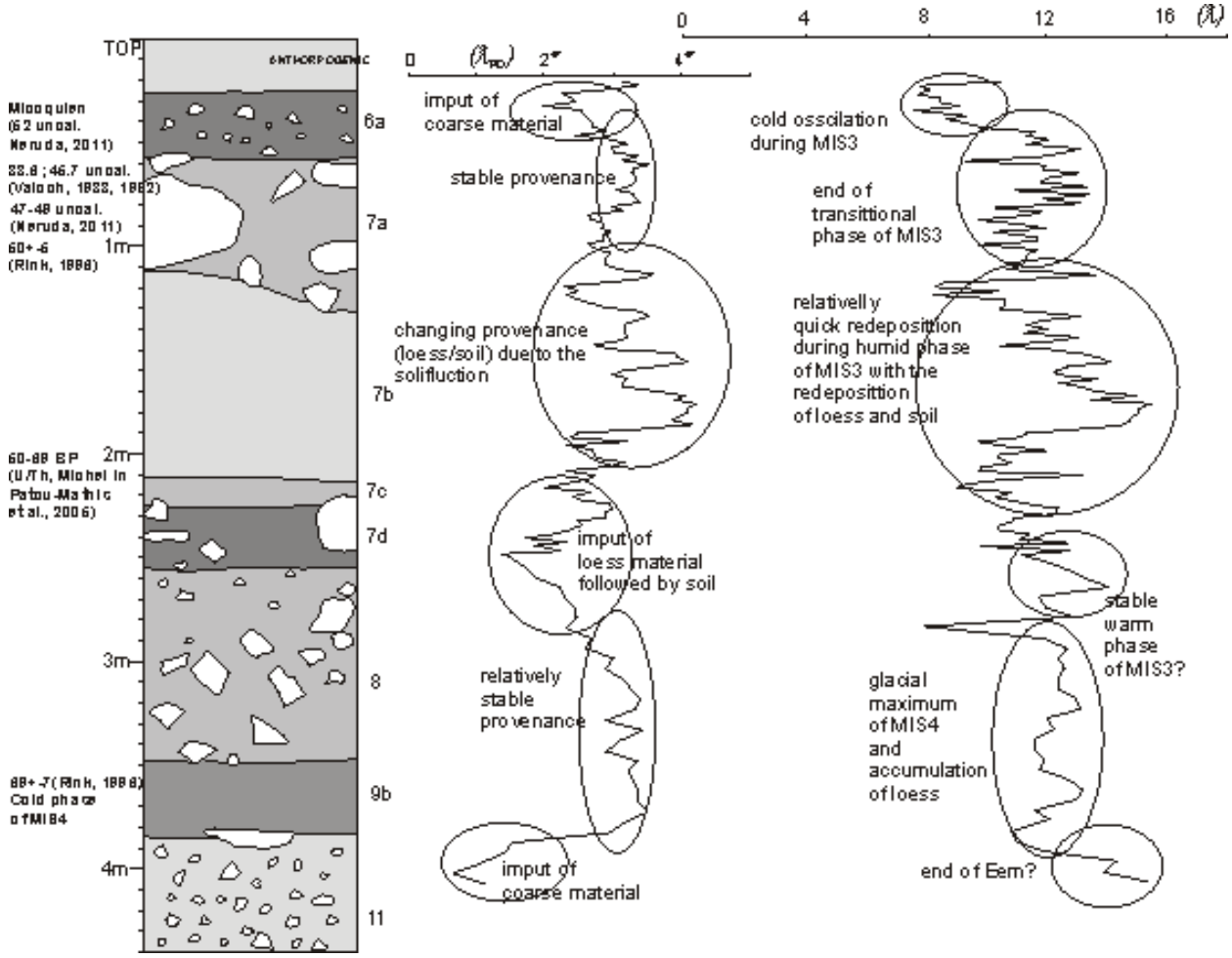
New results on the palaeoclimate record of the Late Pleistocene cave sediments (Moravian Karst, Czech Republic); the case study based on mineral magnetic properties and facial analyses

Lenka Lisá[1], Zdeňka Nerudová[2], Petr Neruda[2], Martin Chadima[1,3] and Aleš Bajer[4]

[1] *Institute of Geology ASCR, v. v. i., Rozvojová 269, Prague 6, 165 00, CZ*
[2] *Moravian Museum, Zelný Trh 2, Brno, 602 00, CZ*
[3] Agico, Inc., Ječná 29a, 621 00 Brno, CZ chadima@sci.muni.cz
[4] *Faculty of Forestry and Wood Technology, Mendel University, Zemědělská 3, Brno, 613 00, CZ*

Kůlna Cave is a classical Neanderthal cave locality, situated in the northern part of Moravian Karst a relatively small karstic area northerly from Brno, eastern part of the Czech Republic. The cave itself is situated on lower part of the valley slope in the altitude of 464 m a.s.l. The cave infilling was well archaeologically studied by K. Valoch during 1961-1976 (*Valoch 1988*) years and 1995-1997 years (*Valoch 2002*). Stratigraphically continuous sequence was described in the entrance part of the cave (sector D) where more than 14 metres of sediments was exposed. In this part of the cave was during the 2011 exposed more than 4 meters of sediments which were included in this study.

According to today accepted chronostratigraphy of Kůlna, the sedimentary sequence in the entrance part covers the time spam of MIS6/5 - MIS2 (*Valoch 2002*): the oldest findings (layer 14) of Kůlna sequence, interpreted as Mousterian with Levallois method, are correlated with MIS 6/5. Second archaeological unit is represented by Taubachian findings of layers 11 and 10. According to biostratigraphy are those layers dated as the end of last Interglacial (Eem, MIS 5e), but the OSL dating of layer 11 indicated different chronological position around 70 ka BP (*Nejman et al. 2011*). The most complex upper 4 meters of exposed sediments with the complicated stratigraphy and with the rich findings were devoted to Micoquian culture (layers 9 – 6a). Layer 9b is correlated to Interstadial Odderade, layer 7c to Glinde, and layer 7a to Moershoofd (*Valoch 2002*). Only ESR dating of layer 9b (*Rink et al. 1996*) was accepted as well as results for layer 7a because calibrated ^{14}C data (*Mook 1988; Neruda – Nerudová*) are comparable with ESR ones (*Rink et al. 1996*). For a long time the position of layer 6a was unknown. The result of ^{14}C dating for the youngest Micoquian layer is older than data for layer 7a (*Neruda – Nerudová*). The key question is the chronostratigraphic position of layer 7b that was correlated with MIS 4 due to absence of archaeological finds, but this problem should be solved in future because of the datation of the first glacial maximum and layers 9b and 7a (*Neruda – Nerudová ; Neruda – Láznicková-Galetová – Dreslerová 2011*). Analyses of magnetic susceptibility (*Šroubek et al. 2001*) compared the layer 9, central part of layer 8 and layer 7b to the warmer climatic oscillations, which doesn´t correspond to the archaeological interpretations.



Tab.1 – the chronostratigraphy of Kůlna Cave sediments based on magnetic proxy and facial interpretations; The indexes used are: λ_{FD} – magnetic susceptibility, λ – frequency-dependent magnetic susceptibility.

In this paper we would like to concern to the importance of magnetic and non magnetic proxy. It seems that an alternative chronostratigraphy of Micoquian layers (11-6a) can be suggested. Our chronological conception is based mainly on the available dating and magnetic proxy compared with the facial and microfacial analyses. It seems, that while the layer 11 is the relict of warm period (probably Eemian Interglacial), the layers 9b and 8 are typical by the continuous stable input of provenance material with no signs of warming. This period could be the record of Glacial maximum of MIS4 developed inside the cave. Simultaneously a loess dune was accumulated close to the entrance. Layers 7d, 7c, 7b, 7a and 6a should be devoted to the MIS3 period with the warmer phase at the base (layers 7d and 7c) and the record of the transitional phase above. At the end of warm phase of MIS3, relatively quick redeposition of loess dune (which aggraded during the end of MIS4) infilled the space in the entrance of the cave. The result of this redeposition is thick loess like layer 7b with the lenses of redeposited soil. High magnetic susceptibility peaks reflects redeposited soil lenses, the low magnetic susceptibility reflect the lenses of coarse quartz grains sorted during the loess

redeposition. The end of this transitional phase is probably reflected by the layer 7a. The uppermost sediments in the entrance part of the cave were redeposited during some colder phase of the transitional phase of MIS3. Younger sediments corresponding to the Visla interpleniglacial and to the end of MIS3 period are missing.

The data presented doesn´t correspond in every aspects to the recently accepted chronostratigraphy of the Kůlna cave deposits and must be further studied and compared with additional data from the paleoecological analyses and dating.

Acknowledgement: This research is financed from the funds granted by the Academy of Sciences of the Czech Republic (P405/110406) and institutional projects No. Z30130516 (Institute of Geology ASCR, v. v. i.) and MK00009486202 (Moravian Museum).

References:

Mook, W. G. 1988: Radiocarbon-Daten aus der Kůlna-Höhle. In: Valoch, K., ed, Die Erforschung der Kůlna-Höhle 1961-1976., 24 (N.S. 16), Brno, 285-286.

Nejman, L. et al. 2011: New Chronological Evidence for the Middle to Upper Palaeolithic Transition in the Czech Republic and Slovakia: New Optically Stimulated Luminiscence Dating Results. Archaeometry, 53, 5, 1044-1066.

Neruda, P. – Nerudová, Z. The Middle-Upper Palaeolithic transition in Moravia in the context of the Middle Danube region. Quaternary International, available online 27 August 2011, ISSN 1040-6182, DOI: 10.1016/j.quaint.2011.08.035. .

Neruda, P. – Láznicková-Galetová, M. – Dreslerová, D., 2011: Retušéry a kosti s rýhami z jeskyně Kůlny v Moravském krasu. Interdisciplinární analýza tvrdých živočišných materiálů ze středopaleolitických horizontů (Retouchers and Bones with Grooves from the Kůlna Cave in the Moravian Karst. Interdisciplinary Analysis of Hard Animal Material from Middle Palaeolithic Horizons). Anthropos, Brno.

Patou-Mathis, M. et al. 2005: Les occupations du Paléolithique moyen de la grotte de Kůlna (Moravie, République Tchèque): nouvelles approches, nouveaux résultats. In: Tuffreau, A., ed, Peuplements humains et variations environnementales au Quaternaire. Colloque de Poitiers, 18-20 septembre 2000. B.A.R. International Series 1352, Poitier, 69-94.

Rink, W. J. et al. 1996: ESR Dating of Micoquian Industry and Neanderthal Remains at Kůlna Cave, Czech Republic. Journal of Archaeological Science, 23, 6, 889-901.

Šroubek, P. et al. 2001: A Late Pleistocene palaeoclimate record based on mineral magnetic properties of the entrance facies sediments of Kulna Cave, Czech Republic. Geophysical Journal International, 147, 2, 247-262.

Valoch, K., 1988: Die Erforschung der Kůlna-Höhle 1961-1976. Anthropos 24 (N.S. 16), Brno.

Valoch, K., 2002: Eine Notgrabung in der Kůlna-Höhle im mährischen Karst. Acta Musei Moraviae, Sci. soc., 87, 3-34.

Patterns of megafaunal extinctions in southern Poland in the changing environment of Late Pleistocene

Adam Nadachowski[1,2], Krzysztof Stefaniak[2], Piotr Wojtal[1]

[1]*Institute of Systematics and Evolution of Animals, Polish Academy of Sciences, Kraków*
[2]*Department of Palaeozoology, Zoological Institute, Wrocław University, Wrocław*

Formerly most of Late Pleistocene megafaunal extinctions in Europe and northern Asia were thought to have occurred before the end of the Pleistocene ca. 10 ka (10,000 radiocarbon years BP, ca. 11,600 calendar years), but it is now clear that many of large mammals become extinct before the Last Glacial Maximum (LGM) (e.g. cave hyena and cave bear) or in the Holocene (e.g. woolly mammoth and giant deer). Establishing a reliable chronology for extinct magafaunal species was possible due to increasing amount of direct radiocarbon dated remains of particular species. During the past decade, as data continue to accumulate, the patterns and processes of extinctions appear increasingly complex. There is also strong evidence that the pattern and timing of extinctions was very different in each zoogeographical region. The crucial question of cause or causes of extinctions remains unsolved. Recent studies of Late Quaternary extinctions in Poland confirm the general picture of these processes with important regional differences. Our project used both new direct dates and dates available in the literature (almost 200 conventional and AMS ^{14}C dates). The principal extinct species investigated were: woolly mammoth (*Mammuthus primigenius*), cave bear (*Ursus spelaeus*), woolly rhinoceros (*Coelodonta antiquitatis*) and giant deer (*Megaloceros giganteus*). The Late Pleistocene survivors studied were: reindeer (*Rangifer tarandus*), saiga antelope (*Saiga tatarica*), arctic fox (*Vulpes lagopus*) and brown bear (*Ursus arctos*) as well as Holocene newcomers e.g. Eurasian elk (*Alces alces*) and wildcat (*Felis silvestris*). A number of authors have suggested a combination of so-called "overkill" hypothesis and environmental change, in which extinctions resulted from human hunting of last, sparse megafaunal populations, especially herbivorous mammals, subject to habitat fragmentation and the stress of climatic and vegetational changes. Tempo and pattern of woolly mammoth (*Mammuthus primigenius*) extinction in southern Poland seems to agree with mentioned hypothesis. These studies also confirmed that Late Pleistocene animal large mammal communities in southern Poland were acting on abrupt climatic changes not as communities but as individual species.

Premises of the research project concerning the Palaeolithic oecumene study in pery- and meta-Carpathian region of Poland and Ukraine

Maria Łanczont[1], Teresa Madeyska[2]

[1] *Maria Curie-Skłodowska University, Department of Geoecology and Palaeogeography*
[2] *Polish Academy of Sciences, Institute of Geological Sciences*

Polish-Ukrainian joint projects concerning Pleistocene environments, and stratigraphy of Palaeolithic sites in Podolia nad Dniester Basin were realized during the last 15 years. Many scientists participated in the cooperation from Polish and Ukrainian institutions. Rich material shows similarities and differences between the sites of Podolia and Dniester Basin from one site and Przemyśl Area, Polish Jura and Podhale from the other site. Differences resulted from diverse paleogeographical and geological situation of the sites as well as methodological variations of investigations. The idea of joint Polish-Ukrainian research project arises for solving problems of correlation of the sites and obtains a complex picture of the Palaeolithic occupation history on the background of natural environment changes in time and space.

The title of the Ministry of Sciences and Higher Education project is ”Palaeolithic oecumene of the pery- and meta-carpathian region- a study of environment changes of Western Ukraine and South-Eastern Poland in Pleistocene and their influence on primeval settlement and migration pattern (basing on loess and cave sites)”. UMCS (Maria Łanczont) is the project coordinator, participants are: Institute of Geological Science PAS (Teresa Madeyska), Institute of Systematic and Evolution of Animals PAS (Adam Nadachowski), Institute of Archaeology Jagiellonian University (Paweł Valde-Nowak). As cooperators from Ukrainian site are: Geographical Faculty of Ivan Franko National University in Lviv (Andrey Bogucki), Ivan Krypiakevich Institute of Ukrainian Studies (Oleksandr Sytnyk), National Academy of Sciences of Ukraine (Maryna Komar). Such wide ranges of institution enable to realize a real multi-proxy research.

First step in the project is construction and infilling of a batabase of Palaeolithic sites in which all the geographical, geological, zoological, botanical, chronological and archaeological information will be included as well as information about the history of investigation. The supplementary excavation in known sites will be provided followed by laboratory investigations. Looking for new sites will be the next step of research. Application of differentiated methods is planned:

- geophysical methods will be used for fixing the range of the sites,
- physical methods will be used for dating sediments and archaeological materials,
- lithological and geochemical analysis of sediments including stable isotope composition of carbonates and organic markers will be used for collecting information concerning the past environment and weathering degree,
- palaeopedological analysis: chemical and micromorphological will be a source of palaeosoils characteristic

- pollen analysis for reconstruction the vegetation composition,
- taxonomy of animal remnants – for characteristic of animal assemblages composition,
- taphonomy for study of the natural changes of bones and traces of using by man,
- typological analysis of archaeological assemblages and its cultural classification.

All the mentioned methods will serve the establish chronology and geographical range of particular cultures, and the reconstruction of regional environment differentiation in course of climatic changes sequence.

Spatial analysis of the prehistoric and early historic settlement in the region of the Middle Obra River using GIS methods

Iwona Hildebrandt-Radke

Adam Mickiewicz University, Institutevof Geoecology and Geoinformation

Question concerning the archaeological sites arrangement in the prehistoric landscape, is not a new one in the archaeological research. Factors that decide on the settlement preferences regarding the individual landscape elements have been pondered over. The dominant view in the literature states that the archaeological sites pattern in natural space is not random. Both settlement studies and the geomorphologic ones show that the archaeological sites location depends on many natural determinants such as: elevation, slopes angle or distance from water bodies. Before the introduction of GIS techniques into the archaeological studies, conclusions about the influence of environmental preferences were intuitive and usually generalized. That problem was particularly noticeable on the areas of the European Plain, where the archaeological sites are common and the natural features are hardly diversified. GIS software made it possible to examine quantitative relations as well as to test statistically the meaning of differences between environmental characteristics and the archaeological sites pattern.

Site locations encountered in any areas often manifest themselves in the form of point patterns in two-dimensional space. Data observed in respect of such phenomena consist of the objects of study — archaeological remnants of different scale. In most cases the manner in which these points are arranged contain useful information of the settlement process and its dynamics during the time as well as information about external factors affecting settlement process. This information is subtle as well as difficult to detect, to extract and to quantify.

Archaeological traces are mapped usually in sparse form. Statistical methods used to investigate the settlement pattern transform a sparse data into the continuous surface. Three spatial statistic methods have been used to investigate the settlement changes on Lower Obra region in prehistory and the Middle Ages: 1) Trend analysis to investigate more generalised process of settlement pattern formation, 2) Kernel density estimation to find existing clusters of settlements, 3) Multivariate analysis to investigate relationships between natural landscape properties and settlement preferences.

At the beginning of the analysis process, the sites were tested, in k-estimate Monte Carlo test, if their pattern is not random.

The settlement dynamics in prehistory and the Middle Ages in the Obra region

Results presented above show relatively stable settlement pattern along all archaeological periods. The sites tend to concentrate in the northern part of the area. Better settlement suitability of that region might have resulted from better soils and

small landscape differences. The only exception of that rule is the Early Medieval Age, when the settlement centre shifts to the south of the area. That shift was probably caused by the early Polish statehood. In the Late Medieval period there was visible decrease in the site concentration in valleys bottom and increase on the plateaus, toward the centre. This process can be explained by the deterioration of climatic conditions at the break between the Early and Late Medieval Ages, manifested mainly by the decrease in temperatures and increase in precipitation. The temporarily settled sites tend to scatter all over the area, except for the Neolithic period, when the settlement pattern for both the temporarily and permanently settled sites was almost the same. It can be caused both by inadequacy of the PARP (Polish Archaeological Record Project) methods in distinguishing the temporarily and permanently settled sites in the Neolithic as well as by real fluidity of these terms for that period of prehistory.

Membership database:

The database (available on web-site http://www.geoinfo.amu.edu.pl/sas/) is constructed as the first step to organized new Working Group under auspices' PAGES connected with Environmental Archaeology in northern part of Eurasia. In this group we intend to discuss palaeoclimatic changes in the context of geoarchaeological data in this part of Eurasia. We would be organized in small thematic groups in each group should be **leader person** who would be coordinate activity of this small group eg Palaeolithic group etc.

The **PAGES-EuroGeoarchaeo** first workshop main aim is to initiate scientific discussion on new challenges for geoarchaeology in Central Europe preparing for new working group in range of PAGES. Special attention in this meeting is focused on actual stage of the environmental archaeology investigations in southern Poland and northern Czech and their implications for palaeoclimatic changes versus new delimitations of the Quaternary.

(*Katarzyna Issmer*)