ARCHAEOBOTANY IN CZECHIA AND BEYOND

THE PAST AND PRESENT OF THE DISCIPLINE

Jaromír BENEŠ
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The book is a joint work of all co-authors. JB and AP contributed to the foreword, with contributions from PP. Historical chapters and boxes were prepared by MS, AP and JB. In addition to writing the texts, MS searched the archives for important historical documents and photographs. All co-authors, along with other contributors (mentioned by name in the text), contributed to interviews with important figures in the field. The Talking Sites chapter was developed by the individual authors (MP, JB, AP) based on publications in internationally available journals and monographs, always in collaboration with the firsts or corresponding authors of the source publications (see initials for each site). All contributors are listed on page 200.

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On the cover is a flower of Paris quadrifolia (Photo P. Pokorný, 2008) and a desiccated flower of Dianthus from Prague Castle, found in a Vladislav hall vault backfill from the early modern period (Photo J. Beneš, 2022).
↑↑ The picture on the front page is Ctenium elegans grass froman abandoned field in Niokolo Koba National Park, Senegal. Photo T. Majerovičová, 2019.
↓↓ The picture on the next page is a microphotography of Acacia charcoal from Abusir necropolis, Egypt. Photo J. Beneš, 2007.

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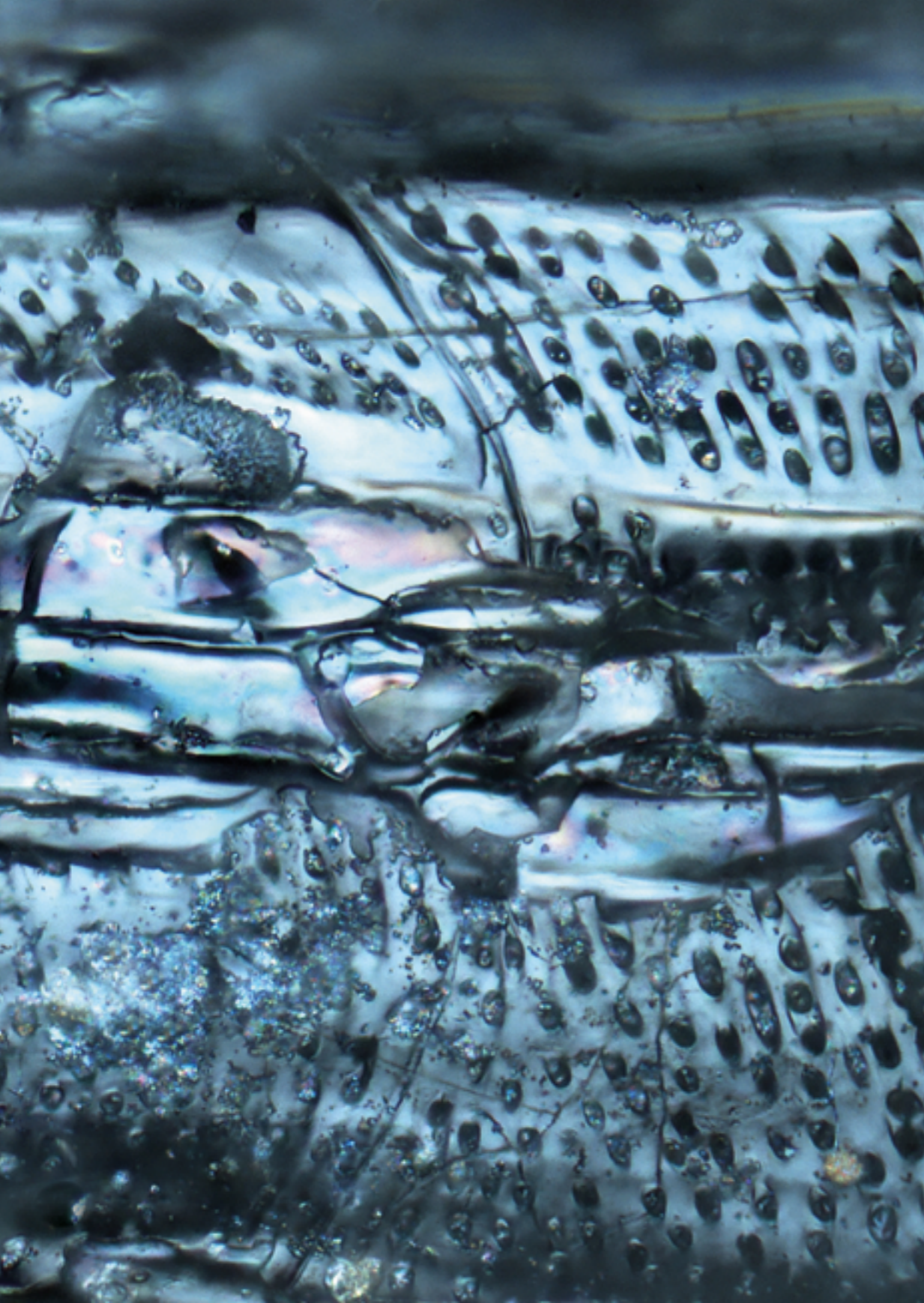

PREFACE

The origin of this book is connected with the 19th conference of IWGP (International Workgroup for Palaeoethnobotany) organised in České Budějovice (the Czech Republic) in June 2022 by home institutions of the authors. This particular conference is special in one aspect – after 54 years from the foundation of IWGP, it is only the 2nd time that the conference takes place in the territory of today's Czech Republic. In 1968, *Internationale Arbeitsgemeinschaft für Paläoethnobotanik* (IAP) was founded at a symposium organized by Zdeněk Tempír in Kačina Castle in former Czechoslovakia. Since 1974, IAP was changed to IWGP and in 1989, the 8th IWGP symposium was organised by Eva Hajnalova in Nitra-Nové Vozokany (former Czechoslovakia) in the territory of today's Slovakia. The 'anniversary' looked like a good opportunity for recapitulation. We asked ourselves, what preceded the foundation of the IWGP, why was the first meeting organized right here, and what did it bring to the field of archaeobotany in our country.

Our original idea was to prepare a brochure providing the participants of the 19th IWGP conference with relevant information about the host country with an emphasis on information about the first symposium in Kačina. First, we contacted Zdeněk Tempír and asked him to share his authentic memories with us. Z. Tempír seemed to be pleased by our interest and finally, our interviews resulted in many hours of audio-records of his memories from childhood, time of studies, his various activities and colleagues, to personal opinions of today. At the same time, we started looking for documents and photographs in archives. Gradually it happened that the more we dealt with the issue, the more we were fascinated and absorbed by it. We ourselves were surprised to find out how closely the history of archaeobotany has been connected to the 'Great history'.

The book you are opening now brings an overview of the history and the current state of the field of archaeobotany in the context of the scientific and social development in the Czech lands from the 19th century to the present. The subject

and geographical range of our portrayal is closely related to the events in the neighbouring countries, mainly in Slovakia but also in Germany and Austria. During the existence of Czechoslovakia (1918–92), archaeobotany developed in relation to the evolution of European and world archaeology, but also in relation to Quaternary palaeoecology. The period between the two World Wars can be characterized by random botanical determinations of archaeological finds of plant material. The expansion of archaeobotany in Czechoslovakia occurred in the 60s when systematic flotation of archaeological sediments was included in many large research excavations with the intention to obtain representative assemblages of plant macroremains.

The development of Czech archaeobotany in the second half of the 20th century was connected mainly with the research centre in Silesian Opava (founded by Emanuel Opravil, later joined by Věra Čulíková) and the Museum of Agriculture (represented by Zdeněk Tempír). E. Opravil and Z. Tempír are considered the fathers of modern archaeobotany in Czechia. Also Vlasta Jankovská and Eliška Rybníčková (the Institute of Botany in Brno), prominent European palaeoecologists, had extraordinary, both direct and indirect, merits in the development of Czech archaeobotany. In Slovakia, a turning point in the development of archaeobotany was marked by the year 1969, when a laboratory of archaeobotany was established by Eva Hajnalová in the Institute of Archaeology of the Slovak Academy of Sciences in Nitra. The present book does not aim to describe all the paths of Slovak archaeobotany, but we have tried to incorporate all important facts from Slovakia reflecting Czech-Slovak collaboration in our field. Friendly relations and mutual cooperation between Czech and Slovak archaeobotanists persisted after the dissolution of Czechoslovakia and the foundation of the independent Czech and Slovak republics (since 1993), and they are still alive. For example, a number of Slovak scholars of the younger generation work in Czechia with excellent research results.

THE BOOK IS DIVIDED INTO THE FOLLOWING PARTS

A COUNTRY IN CENTRAL EUROPE

The introductory chapter shows Czechia (a country, the current borders of which reflect the core of the medieval Lands of the Bohemian Crown) and presents basic facts about its natural conditions, mainly those which have shaped the development traced by the means of archaeology and palaeoecology. The chapter also presents the history of the lands of the Czech crown, through Czechoslovakia to the Czech Republic.

The hill of Říp in centre of the old cultural landscape of Bohemia. Surveying at the beginning of the research of the Eneolithic long barrow in Vražkov (Litoměřice district). Photo J. Turek, 2021.

ARCHAEOBOTANY: PAST AND PRESENT

This part, divided into several sub-chapters according to the stages of the development of the discipline, summarises historical events from the 19th century up to the present with an impact on the establishment and development of botany, archaeology, palaeoecology, and indeed archaeobotany as well. The main text of each chapter contains footnotes and annotations, where the reader can find the most important references. The text is supplemented by numerous thematic boxes offering detailed information on important founding fathers, archaeological sites and, for example, archaeobotanical experiments in Czechia. In the last sub-chapter (Archaeobotany after 1989), we tried to briefly describe the current state of the discipline in our country.

České Budějovice from air. Photo L. Sváček, 2014.

KEY PERSONALITIES: INTERVIEWS

This part contains interviews with four personalities who can be considered the founders of modern Czech and Slovak archaeobotany. Interviews with Věra Čulíková, Vlasta Jankovská, Eva Hajnalová and Zdeněk Tempír are included to explain the personal motivation of the researchers. They describe the courses of their lives, their successes and failures but, first of all, allow a view of the times when Czech and Slovak archaeobotany was born and started to develop. These four interviews have been added artistic portraits by the photographer and archaeologist Tomáš Chlup (and in the case of Eva Hajnalová, by the Slovak photographer Mio Fallen). This part is followed by three interviews with archaeologists who witnessed the time of the introduction of archaeobotany in archaeological practice. Jiří Svoboda, the long-term head of the excavation in the Upper Palaeolithic (Gravettien) sites of Dolní Věstonice and Pavlov, managed to integrate a team of foreign specialists, including archaeobotanists, in the research of the Gravettien sites. The interview with Ivan Pavlů mainly touches upon the introduction of exact methods in the fieldwork at Bylany near Kutná Hora (further referred to as Bylany), where the first flotation station was erected around 1960 to obtain botanical material. The chapter closes with questions addressed to Jaromír Beneš, a co-author of this book, who founded a renowned specialised department at the University of South Bohemia in České Budějovice and is both archaeologist and archaeobotanist by education.

TALKING SITES

The chapter consists of medallions presenting selected archaeological sites, which have been published in scientific journals and other international publications. The goal of this selection was to present an overview of regional (Czech and Slovak) archaeobotany, representative of the current research and based both on international collaboration and on the latest, often very detailed and exact analytical methods. The chapters in this part are arranged chronologically, according to the period to which they relate. Each overview is added with a hypertext quotation which, in most cases, allow the reader to access the original electronic text.

ATTACHMENTS

In the end, we have placed some documents about the IWGP meetings in 1968 and 1989, followed by illustrations and lists, which are intended to better guide the reader in the text, e. g. a time axis of archaeological epochs in Czechia, a map of selected sites mentioned in the text (mainly in the section Talking sites), and a diagram illustrating historical development of archaeobotany in our lands.

A COUNTRY IN CENTRAL EUROPE

NATURAL CONDITIONS AND HISTORICAL OVERVIEW

Czechia or the Czech Republic is situated in Central Europe. It is bordered by Slovakia in the east, by Austria in the south, Germany in the west and Poland in the north. Its capital is Prague.[1] Three historical lands of the Czech Republic (the lands of the Bohemian Crown since the 14th century) correspond with river basins: the Elbe (Czech: Labe) and the Vltava basin for Bohemia, the Morava River basin for Moravia, and the Oder River basin for Czech Silesia (in terms of the Czech territory). The traditional English name 'Bohemia' derives from Latin 'Boiohaemum', which means 'home of the Boii' (Gallic tribe). The current English name Czechia or the Czech Republic comes from the Czech word Čech indicating the Slavic tribe. The etymology of the word Čech can be traced back to the Proto-Slavic root meaning 'member of the people'.

There is a strong historical and biogeographical relation between the Czech and Slovak republics. Between 1918 and 1992, the two countries were united into one state called Czechoslovakia. It means that for most of the 20th century, both countries developed as a unit, therefore, we try to explain many phenomena in joint circumstances. The Czech Republic is situated on the border of two geomorphological constellations. The western and central parts are filled with the Bohemian Massif, dominated mainly by hills and highlands. The eastern part of the Czech Republic and the majority of the Slovak Republic is occupied by the Western Carpathians. The highest Czech mountain (in Krkonoše Mountains) is Sněžka (1,603 m ASL), the highest Slovak mountain (in Tatra Mountains) is Gerlachov Peak (2,654 m ASL).

[1] The city of Prague is the historical centre of the Czech lands. In the chapter Talking sites we report on several Prague locations that are important for archaeobotany.

The Vltava River drains much of the Czech territory into the Baltic Sea. Its valley is largely a canyon. Aerial view of the area south of the village Štěchovice. Photo P. Pokorný, 2017.

Lowlands surrounding large rivers are the most fertile areas: the Labe lowland, the Morava basins, and the Danubian lowland. The territory lies on the border of the oceanic and continental climate, with oceanic climate prevailing in the western part of Bohemia, while the climate is most continental in the lowlands of South Moravia, which are biogeographically related to the Pannonian Basin. The territory of Slovakia falls geographically within the Carpathian-Pannonian area with a higher degree of continentality. Most rainfall occurs in June or July, the least in January or February. The average temperature is between 5.5 °C and 9 °C. January is the coldest month of the year, July the warmest.

During the last ice age, the territory of the Czech Republic was situated outside the area of the continental glacier; nonetheless, 20,200 years ago, the ice edge laid less than 200 km to the north. In view of this, the territory was a part of the periglacial area between the north European continental glacier and the mountain glaciers of the Alps. At least some parts of the territory were covered with permafrost in the

Broumovsko region in northern Bohemia. There are world-unique landscapes characterized by towers of sandstone rocks. The locals refer to them as 'rock cities'. Mesolithic people settled here in particular. Aerial view of the Broumovsko Protected Landscape Area. Photo P. Pokorný, 2016.

glacial periods, from which traces of polygonal soils survived and which led to the development of thermo-karst lakes.[2] The sediments from the glacial period, such as loess and sand dunes, are covering on large surfaces in many parts of the country. One of the most important archaeological sites in Europe is situated in the south-east of the Czech Republic, in Moravia. It is the Upper Palaeolithic agglomeration of Dolní Věstonice – Pavlov (Gravettien; MIS3). The excavations in Věstonice are described by the archaeologist Jiří Svoboda (see interview).[3]

[2] Hošek, J., Prach, J., Křížek, M., Šída, P., Moska, P. & P. Pokorný (2019). Buried Late Weichselian thermokarst landscape discovered in the Czech Republic, Central Europe. *Boreas, 48*, pp. 988–1005. http://dx.doi.org/10.1111/bor.12404.

[3] Svoboda, J., A. (2020). Dolní Věstonice–Pavlov: Explaining Paleolithic settlements in Central Europe. Texas A&M University Press.

Today, the flat South Bohemian basins are covered with many ponds – i. e. artificial water reservoirs of medieval and early modern origin. Palaeoecological research has shown that a number of these ponds were built on the sites of former thermokarst lakes. Aerial view of the Velký Tisý pond in the Třeboňsko Protected Landscape Area. Photo P. Pokorný, 2013.

At the beginning of the Holocene, the Scots pine (*Pinus sylvestris*), birch (*Betula*) and aspen (*Populus tremula*) expanded over the territory, mainly in the moister uplands and in the sub-montane regions. In the lowlands, on the other hand, vast and open steppe-like areas survived. At the end of the Early Holocene, most of the territory was already covered with forest, mainly with oak, mixed forests consisting of elms (*Ulmus*), oaks (*Quercus*), linden (*Tilia*), maple (*Acer*) and ash trees (*Fraxinus*). The fast expansion of thermophilic woody plants prompted speculations on the possible glacial refugia of forests on the territory of the CR or in its vicinity[4] in

[4] Juřičková, L., Horáčková, J. & V. Ložek (2014). Direct evidence of central European forest refugia during the last glacial period based on mollusc fossils. *Quaternary Research,* 82, pp. 222–228. https://doi.org/10.1016/j.yqres.2014.01.015.

Jiří Svoboda, a long-time head of research at Gravettien sites of 'mammoth hunters' in South Moravia. A rescue research in Pavlov, where archaeological situations, associated with the palaeo-soils, are positioned within a massive loess formation that formed during the last glacial. Photo P. Pokorný, 2013.

In situ remnants of a forest from the beginning of the Holocene in a locality in Rynholec, Central Bohemia. Trunks and stumps were discovered during peat mining and examined by dedroecological methods (Šamonil et al. 2018). Jaromír Beneš in the picture. Photo P. Pokorný, 2013.

Slovakia (see Dzerava skala Cave – archaeobotanical research of a Palaeolithic Cave site). For a long time, a question has been discussed, if there still remained forest-free areas before the arrival of the first farmers (in the mid-6th millennium BC), or if the landscape was at that time already forested completely. The existence of primary forest-free areas is supported by the occurrence of species-rich steppe vegetation in the warmer areas, such as in the Central Bohemian Uplands, i. e. in areas without direct contact to the continuous steppe area in Eastern Europe. The answer to this question has long been complicated by the lack of pollen records from the lowlands. However, recent research on the development of the lowland vegetation has confirmed continuity of the forest-free habitats over the whole

Volcanic hills in the Central Bohemia Uplands, overgrown with steppe vegetation, the continuity of which extends at least to the Last Glacial Maximum. Aerial view of mount Raná from the southwest. Photo P. Pokorný, 2016.

Holocene.[5] Archaeological evidence of Mesolithic hunters and gatherers was found in territories with various environments, e. g. in the surroundings of the lakes in the South Bohemian Basin (see Palaeoenvironmental research of the Mesolithic archaeological site at Švarcenberk Lake), in the sandstone rocks of north Bohemia (see Velký Mamuťák: rockshelter site in a forested landscape), and in the Šumava mountains. It seems that in the Mesolithic, the territory was populated rather densely.

In the course of the Middle Holocene, soil acidification has occurred, which led to vast changes in the vegetation. Gradually, European beech (*Fagus sylvatica*)

[5] Pokorný, P., Chytrý, M., Juřičková, L., Sádlo, J., Novák, J. & V. Ložek (2015). Mid-Holocene bottleneck for Central European dry grasslands: Did steppe survive the forest optimum in Northern Bohemia, Czech Republic? *The Holocene, 25*, pp. 716–726. https://doi.org/10.1177%2F0959683614566218.

Archaeological research of the interior of the sandstone cave Postojna in the Bohemian Paradise with evidence of its use during the entire Holocene. Dozens of such situations provided a wealth of archaeobotanical and archaeozoological data. Petr Šída in the picture. Photo P. Pokorný, 2017.

and silver fir (*Abies alba*) started to dominate the forests. The highlands and lower mountain habitats saw the development of beech and fir-beech zone, with a zone of montane spruces above them. At the end of this period, the mixed deciduous forests were invaded by the common hornbeam (*Carpinus betulus*). The Middle Holocene was connected with the long development of the human population, defined by archaeological periods between the Early Neolithic (LBK) and the Early Bronze Age. The Neolithic farmers inhabited the warmest parts of the country with fertile soils on loess, whereas hunter-gatherer groups with Mesolithic roots were still present on the rest of the territory.[6] For the Neolithic, we suppose a garden cultivation of emmer (*Triticum dicoccon*), einkorn (*T. monococcum*) and legumes, mainly pea (*Pisum sativum*) and lentil (*Lens culinaria*). Only since the Late Neolithic, the fields began to be cultivated by ploughing, which is indirectly evidenced by the occurrence of some field weeds, such as corn-cockle *(Agrostemma githago*), the summer pheasant's eye (*Adonis aestivalis*) and field chamomile (*Anthemis arvensis*).[7]

[6] Ptáková, M., Pokorný, P., Šída, P., Novák, J., Horáček, I., Juřičková, L., Meduna, P., Bezděk, A., Myšková, E., Walls, M. & P. Poschlod (2021). From Mesolithic hunters to Iron Age herders: A unique record of woodland use from eastern central Europe (Czech Republic). *Vegetation History and Archaeobotany, 30*(2), pp. 269–286. https://doi.org/10.1007/s00334-020-00784-0.

[7] Pokorná, A., Kočár, P., Novák, J., Šálková, T., Žáčková, P., Komárková, V., Vaněček, Z. & J. Sádlo (2018). Ancient and early medieval man-made habitats in the Czech Republic: Colonization history and vegetation changes. *Preslia, 90*(3), pp. 171–193. https://doi.org/10.23855/preslia.2018.171.

Barley (*Hordeum vulgare*) started to be cultivated in the Eneolithic, and later also spelt (*T. spelta*). The most important Neolithic site in Czechia is Bylany,[8] with an ongoing research excavation since the 1950s including the flotation of archaeobotanical finds (see interview with Pavlů). In Bylany, numerous Neolithic longhouses were gradually uncovered. The site was analysed using horizontal stratigraphy and a detailed classification of the pottery fragments, which allowed for the relative dating of the houses. Hrdlovka in northwest Bohemia is another important Neolithic site with a number of Neolithic houses from the late Neolithic (SBK).[9] The Neolithic site of Hrdlovka was situated near the largest post-glacial water surface, the now ceased Komořany lake, which was the subject of a vast archaeological and palaeobotanical research in the 20th century.[10]

Enlarging the assortment of cultivated plants in the Bronze Age enabled to differentiate their composition according to different fertility of soils on nutrition-poor substrates, there was a greater emphasis on growing barley and spelt, whereas in the fertile areas, a greater emphasis was on growing [11]emmer and broomcorn millet (*Panicum miliaceum*). In the Iron Age, the wooden ard plough[12] was replaced by an iron plough, which enabled the expansion of the settlement into areas with by then hardly arable soils. In the Early Iron Age (La Tène period), the prehistoric settlement reached its maximum density and expansion; (see Vladař and Sklářské Valley). However, the following Roman Period saw a decline of the settlement, since

[8] Pavlů, I. (2000). Life on a Neolithic site Bylany: situational analysis of artefacts. Praha: Institute of Archaeology.

[9] Beneš, J., Vondrovský, V., Ptáková, M., Kovačiková, L. & P. Šída (2019). The Neolithic Site of Hrdlovka. Nakladatelství Jihočeské university v Českých Budějovicích.

[10] Bešta, T., Novák, J., Dreslerová, D., Jankovská, V., Bernardová, A., Lisá, L. & D. Valentová (2015). Mid-Holocene history of a Central European lake: Lake Komořany, Czech Republic. *Boreas, 44*(3), pp. 563–574. https://doi.org/10.1111/bor.12119.; Houfková, P., Bešta, T., Bernardová, A., Vondrák, D., Pokorný, P. & J. Novák (2017). Holocene climatic events linked to environmental changes at Lake Komořany basin, Czech Republic. *The Holocene, 27*(8), pp. 1132–1145. http://doi.org/10.1177/0959683616683250.

[11] Kočár, P. & D. Dreslerová (2010). Archeobotanické nálezy pěstovaných rostlin v pravěku České republiky. *Památky archeologické, 101*, pp. 203–242. Šálková, T., Chvojka, O., Hlásek, D., Jiřík, J., John, J., Novák, J., Kovačiková, L. & J. Beneš (2019). Crops along the trade routes? Archaeobotany of the Bronze Age in the region of South Bohemia (Czech Republic) in context with longer distance trade and exchange networks. *Archaeological and Anthropological Sciences, 11*(10), pp. 5569–5590. https://doi.org/10.1007/s12520-019-00893-6.

[12] Kozáková, R. & A. Danielisová (2020). Why did they move to a barren land? Iron Age settlement and the consequences for primary woodlands in the uplands of Southern Bohemia, Czech Republic. *Vegetation History and Archaeobotany, 29*(4), pp. 493–507. https://doi.org/10.1007/s00334-019-00757-y.

The medieval colonization castle of Bezděz lies inside a barren area, the vegetation of which, according to palaeoecological research, is an isolated island of the northern boreal forest (taiga). Aerial view of Bezděz Castle in the Kokořínsko Protected Landscape Area. Photo P. Pokorný, 2017.

the territory was beyond the Roman limes. We can assume a decline in number of inhabitants, which trend continued also in the Migration period.

At the beginning of the Middle Ages (in the mid-6th century), new settlers arrived on the territory. These populations might already have spoken a Slav language. An extraordinary site of the first medieval phase is situated in Roztoky near Prague (see Roztoky). The early medieval hillfort in Mikulčice, an important centre of power and spirituality of the Great Moravian Empire (the Great Moravian Empire was the first principality with dominant Slav language in Central Europe in AD 833–907), represents the largest archaeological complex of its time in the Czech Republic (see Talking site Mikulčice). A number of important Early Medieval settlement complexes are situated in Bohemia. A key site was Prague Castle,[13] but rural settlements are also important, such as Libice (see Libice) in Central

[13] Maříková-Kubková, J. (2020). In the service of Czechoslovakia: Archaeological research into Prague Castle in the 20th century. *Archaeologia Historica, 45*(2), pp. 693–711. http://doi.org/10.5817/AH2020-2-8.

Bohemia and Žatec (North Bohemia).[14] Important crops in the Early Middle Ages were broomcorn millet and naked forms of wheat (*T. aestivum/compactum*), and the importance of rye (*Secale cereale*) and oat (*Avena sativa*) grew gradually.

In the course of the Middle Ages, agriculture developed from the extensive prehistoric system to the intensive three-field system. In the course of the 12th–13th centuries AD, hard-to-reach areas at higher altitudes were colonized. The colonization process created an ethnically mixed society with strong ties to Western Europe. Most of today's historic towns and villages were established at the time. The medieval transformation of the landscape took several centuries during which also the environment developed. In 1004, the princedom of Bohemia became a part of the Holy Roman Empire (*Sacrum Imperium Romanum).* The Golden Bull of Sicily from 1212 confirmed the hereditary right to the Czech crown and other privileges of Přemysl Otakar I, a member of the Přemyslid family. The emperor Charles IV of the house of Luxembourg founded the New Town of Prague in 1348, by which he broadly enlarged the urban territory of the historic Prague (see Prague defence system, see The oldest fishpond). In the same year, the Charles University was founded too. The Bohemian kingdom (*Corona regni Bohemiae*) was then an important political and economic part of the Holy Roman Empire.

At the beginning of the 17th century, Prague became one of the important cultural centres of Central Europe with a rich economic life (see Prague Castle). The Holy Roman Empire lasted until 1806, when Francis II of Habsburg, after having been defeated by Napoleon in the Battle of Austerlitz near Brno, abdicated as Holy Roman Emperor and changed his title to 'Emperor of Austria'. The Kingdom of Bohemia, the core of today's Czech Republic, was then a part of Austro-Hungarian Monarchy.

RECENT HISTORY AND THE PRESENT OF CZECHIA

Czechoslovakia was established in 1918 based on the treaty of Versailles as one of the follower states of the Austro-Hungarian Monarchy. In the ethnic composition of Central Europe, Czechoslovakia was a multi-national state. One of the problems was the incompatibility of the economies and infrastructures between highly-developed industrial Bohemia and the rural territories of eastern Slovakia and Carpathian Ruthenia. There were, moreover, great ethnic and economic differences also within the historic borders of Bohemia and Moravia. Even within the Charles

[14] Kočár, P., Čech, P., Kozáková, R. & R. Kočárová (2010). Environment and economy of the early medieval settlement in Žatec. Interdisciplinaria Archaeologica, 1(1–2), pp. 45–60. http://dx.doi.org/10.1016/j.revpalbo.2015.04.008.

University,[15] national ideologies were posed over scholarly requirements. The exchange of people and ideas between Czech and German Universities in Prague, despite being situated in close proximity, was extremely restricted. The situation escalated after Hitler's takeover. Soon after the occupation (Anschluss) of Austria, the Sudetenland, a territory with a German majority within the historic borders of Bohemia and Moravia, was occupied as well. In 1939, the remains of Czechoslovakia were annexed by the German Reich as the Protectorate of Bohemia and Moravia and the Czech Charles University was closed.

After the liberation of Czechoslovakia by the Red Army from the east and by the Western Allies from the west (1945), the state was renewed within almost the same borders as before the War (except for the easternmost part, which was incorporated into the Soviet Union). The fresh historic experience of the inhabitants of Czechoslovakia soon led to the radicalization of domestic politics, the German population was expelled and all German Universities were abolished (German Charles University in Prague and German Technical Universities in Prague and in Brno). The Communist Party won the 1948 elections which started the 40-years rule of the Communist Party, dictated by Moscow. In the second half of the 1960s, a democracy experiment called Prague Spring took place in Czechoslovakia, which was a period of political liberalization and mass protests. The process was ended in August 1968, when the Soviet Union and other Warsaw Pact members invaded the country to suppress the reforms.

A turning point in the development of Czech and Slovak history (and archaeobotany as well) was the 'Velvet Revolution' in 1989. At that time, the communist regime was overthrown, and the country opened again to its traditional orientation towards the democratic west. In 1992, Czechoslovakia split peacefully into two separate states, the Czech Republic and Slovakia. Both states became part of the European Union and, until the present, they maintain friendly mutual relations.

This short historical overview illustrates the rather complicated situation of Central Europe in the 20th century. However, the broader context shows that in this region, various influences from the east, west, north and south were meeting already in the prehistory and historical periods. The development of archaeobotany in the Czech Republic and Slovakia was affected by these facts too.

[15] Charles University was founded in 1348. In 1654 it was merged with former Jesuit college by the emperor Ferdinand III and new Charles-Ferdinand University was created. In 1882, the University was divided into a German Charles-Ferdinand University (German: Deutsche Karl-Ferdinands-Universität) and a Czech Charles-Ferdinand University (Czech: Česká universita Karlo-Ferdinandova). In 1920, the Czech university was renamed into Charles University, while German university became officially called the German University in Prague (German: Deutsche Universität Prag). In 1939, the German university was renamed German Charles University in Prague (German: Deutsche Karls-Universität in Prag). In the same year, the Czech University was closed, remaining closed until the end of the War. In 1945, the German university was cancelled.

ARCHAEOBOTANY: PAST AND PRESENT

THE BEGINNINGS OF ARCHAEOBOTANY AND PALAEOECOLOGY FROM THE MID-19th CENTURY TO 1918

An explanation of the history of archaeobotany in the Czech lands and partly in Slovakia (then referred to as Upper Hungary) needs to begin with a description of the situation of science in the 19th century, as it was in this period when opinions and knowledge, which initiated the development of modern archaeology, started to be formed. In the second half of the 19th century, both the way of thinking in natural sciences and the overall view of man and the beginnings of his history on earth underwent a profound change. The discipline of archaeology was then divided into two independent fields: art-historically oriented archaeology was a part of the social sciences, whereas the study of fossil plants and animals (also those connected with archaeological contexts) was an integral part of geology. The effort to study the past was then motivated mainly by the aim to understand natural processes and the position of human beings in evolution in general. The question of the beginnings of agriculture was in the 2nd half of the 19th century devoted to human evolution. In Central Europe, the cooperation between archaeologists and botanists was to a high degree influenced by the investigation of prehistoric lake dwellings in the Alps. Botanical material, discovered during their exploration, was studied and published mainly by the Swiss researcher Oswald Heer.[16]

The beginnings of interest in plants from archaeological excavations were connected with the oldest finds of crop remains in the first half of the 19th century. In the archaeology of the 19th – century, the antiquarian approach still prevailed, despite

[16] Heer, O. (1865). Die Pflanzen der Pfahlbauten. Zürich.

the efforts of the first archaeologists in the Royal Bohemian Museum. Many finds were neither recorded nor published and most of them became part of private collections.

The first written evidence of an archaeological find of the remains of agricultural plants in the Czech Lands stems from 1846.[17] Gregorius Wolny, one of the local Benedictine monks (see Box: Gregor Thomas Joseph Wolny), had carried out some digs in Rajhrad and its surroundings. He found carbonised cereal grains probably on the premises of the monastery in Rebešovice in the context of an early medieval cemetery (see Box: The first archaeobotanical find on Czech territory).[18] According to Zdeněk Tempír, caryopses of two-rowed barley (*Hordeum distichon*) and rye (*Secale cereale*) were found in the assemblage.[19] A part of the finds was then placed in the Museum of the Rajhrad Monastery. However, in 1950, in the course of so-called 'Action K' (the name for the illegally forced liquidation of monasteries in communist Czechoslovakia), the Rajhrad monastery was abolished and the exhibits were moved, probably to the National Museum.[20] Samples from these finds were analysed both in the 1930s (by A. Fietz) and at the beginning of the 1960s (by Z. Tempír).

The first Slovak find, which consisted of the remains of carbonised seeds and a small piece of fermented dough, comes from Púchov-Skalka, a site excavated in 1888–90 by the amateur researcher Baron Emil Hoening.[21] The second-oldest find of carbonised remains of cultural plants in Czechia, specifically of carbonised rye (*Secale cereale*), was made by Ludwig Heinrich Jeitteles (see Box: Ludwig Heinrich Jeitteles) in Olomouc in 1864.[22] The excavation was conducted in the Old Town of Olomouc in connection with laying a gas pipeline. The report on the caryopses find was published one year later by the Swiss researcher and the predecessor of modern archaeobotany, Oswald Heer, and in 1871 as 'antiquities' by Jeitteles himself.[23]

The importance of finds of cultural plants for the study of prehistory was stressed already in the 1860s by a famous Czech archaeologist Jan Erazim Vocel, reminding

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[17] Tempír, Z. (1966). Výsledky paleoetnobotanického studia pěstování zemědělských rostlin na území ČSSR. *Vědecké práce Československého zemědělského muzea, 6*, pp. 27–144.

[18] Staňa, Č. (1974): Document M-TX-197400069. Archeologický ústav Brno. Accessible at: https://digiarchiv.aiscr.cz/id/M-TX-197400069.; Staňa, Č. (1976): Document M-TX-197602349. Archeologický ústav Brno. Accessible at: https://digiarchiv.aiscr.cz/id/M-TX-197602348.

[19] Tempír, Z. (1966), pp. 83 and 87.

[20] Vlček, V. (2004): Perzekuce mužských řádů a kongregací komunistickým režimem 1948–1964. Matice cyrilometodějská, Olomouc.

[21] The find was deposited in the Vienna Museum and analysed only 100 years later. It was found in the repositories by Karol Pieta under the designation 'bread, oat and millet'. Hajnalová, E. (1993). Obilie v archeologických nálezech na Slovensku. In Acta interdisciplinaria archaeologica VIII, Nitra.

[22] Tempír, Z. (1966), p. 88.

[23] Jeitteles, L. H. (1871). Die vorgeschichtlichen Alterthümer der Stadt Olmütz und ihrer Umgebung. *Mittheilungen der anthropologischen Gesellschaft in Wien 1* (910)., pp. 217, 238 and 241–242.

of '*carefully removing the fruit stones, kernels and corn seeds hidden in the urns, and to study them in view to obtain knowledge on the forest and fruit trees, and crops of fields and gardens cultivated in prehistory.*' For a long time, however, little attention was paid to similar finds. Scarce mentions on some finds survived[24]only in the surveys of foreign botanists or archaeologists. The find of carbonised caryopses of emmer (*Triticum dicoccum*) from Malé Žernoseky was published by Carl Schröter in 1895, the find of carbonised broomcorn millet *(Panicum miliaceum*) from Děčín and Knovíz was mentioned in an article by Franz Netolitzky in 1914. Seeds of fruit trees were noticed, for example, by Josef Duška (1899) and Josef Švehla (1914). Among Czech botanists, it was mainly Bohumil Němec (see Box: Bohumil Němec), who valued archaeological finds of cultural plants, specifically for their contribution to the history of crops. Unfortunately, not even he pursued a systematic study of agricultural plants.[25]

Palaeoecology developed in Western and Northern Europe as early as the first third of the 19th century, quite independently of the study of plant remains from archaeological excavations.[26] It was first based mainly on studies of macroremains from bog profiles. The first detailed analyses of peatbogs of the territory of Czechia[27] were carried out by František Ladislav Sitenský (see Box: František Ladislav Sitenský), a leading Czech expert on agriculture and teacher. His book [28], published in 1891, was based on the long lasting inventory survey of peat deposits of our territory (since the middle 19th century) and became the basis of later research of Bohemian bog sites. In 1899, a bog camp was established in Hora Svatého Šebestiána (Sebastiansberg) in the Ore Mountains, headed by Hans Schreiber.[29]

At about the same time, the site of former Komořany Lake (see Box: The North Bohemian Brown Coal Basin) began to attract the interest of palaeobotanists, as its sediments were ideal for palaeoenvironmental[30] analyses. Viktor Patzelt,

[24] Tempír, Z. (1966), p. 29.

[25] Němec, B. (1908). Dějiny nejdůležitějších rostlin kulturních. Praha: Dědictví Komenského.

[26] Jacomet, S. & A. Kreuz (1999). Archäobotanik: Aufgaben, Methoden, und Ergebnisse vegetations- und agrargeschichtlicher Forschung. UTB, Stuttgart.

[27] Urbanová, Z. (2006). Flóra a vegetace rašelinišť v oblasti pravobřežního Lipna s ohledem na antropogenní vlivy. [diplomová práce, Masarykova univerzita v Brně]. Archiv závěrečných prací. Accessible at: https://is.muni.cz/th/yj2hj/diplomova_prace.pdf (10 September 2021).

[28] Sitenský, F., L. (1891). Über die Torfmoore Böhmens. Praha.

[29] Hans Schreiber (1859–1936) was an Austrian botanist who studied the bog sites in Austria and the Czech Lands. Pfaffl, F. (2003). Zur Erinnerung. Der Moorforscher Hans Schreiber (1859–1936) im Böhmerwald. *Der Bayerische Wald,* 17(1). Accessible at: https://www.zobodat.at/biografien/Schreiber_Hans_DerBayerischeWald_17_1_0009-0010.pdf (10 September 2021).

[30] The Komořany Lake was situated at the foot of the Ore Mountains near Jezeří Castle. It developed at the end of the last Glacial, in the course of the 19th century, it was gradually dried mainly in connection with surface coal mining. By order of Prince Ferdinand of Lobkowicz, it was dried

Historical idea of the extent of the Lake Komořany on the plan of 1938. PY000194001, ARÚ Prague Archive.

a physician of the city of Most (then Brüx) and an amateur biologist, actively collected samples of the sediments of the lake [31] with then leading Central European botanists, such as Richard Wettstein and Viktor Schiffner. R. Wettstein studied, based on Patzelt's information, a Water caltrop layer (*Trapa natans*) in a section of the Komořany Lake, unearthed by surface mining. The findings were published

completely after 1831. Today, the site is already completely extracted by a surface mine. The last remains of the sediments of the Komořany Lake were situated on the bottom of the Dřínov reservoir, where Vlasta Jankovská took samples still in the 1980s. Houfková, P. (2017). Zaniklé Komořanské jezero a klimatické události holocénu. Accessible at: https://www.prf.jcu.cz/veda/nase-objevy/zanikle-komoranske-jezero-a-klimaticke-udalosti-holocenu.html (2 September 2021).

[31] MUDr. Viktor Patzelt (1856–1908) was physician, biologist and co-founder of the Most City Museum. He was active in the municipal hospital in Most, in 1900–8 he held the position of chief physician in the General Hospital of Francis Joseph I in Most. R. Wettstein (1863–1931) studied, based on

in 1896. During the inter-war period, many researchers continued the analyses of the sediments of the Komořany Lake, mainly Karl Rudolph and his students (Franz Firbas, Hubert Losert and others). The results of their work have importantly contributed to our knowledge of the prehistoric landscape and the reconstruction of its development (see Box: Karl Rudolph's school and the beginnings of palynology).

KARL RUDOLPH'S SCHOOL AND THE BEGINNINGS OF PALYNOLOGY

Karl Rudolph (1881–1937) was a professor of palaeobotany and phytogeography at the German University in Prague. He was engaged in the study of bog sites. Originally, he determined plant macroremains (seeds, fruit and woods) in bog profiles, as a source of information on the development of the landscape in the past. In 1917, he published *Untersuchungen über den Aufbau böhmischer Moore* (Studies on the structure of Bohemian moors). A turning point occurred in his work with the introduction of pollen analysis. The world's first pollen diagram was published already during the First World War by the Swedish geologist Lennart von Post (1916). However, only the thesis of Gunnar Erdtman, *Pollenanalytische Untersuchungen von Torfmooren und marinen Sedimenten in Südwest-Schweden* (Pollen analysis of peat bogs and marine sediments in southwest Sweden), published in 1921 in German language, popularized the approach outside Scandinavia.

Karl Rudolph. Source Pohl, F. (1937). Karl Rudolph. Natur und Heimat 8, 1–9.

Patzelt's information, a Water caltrop layer (*Trapa natans*) in a section of the Komořany Lake, unearthed by surface mining. The findings were published in an article entitled Über ein subfossiles Vorkommen von *Trapa natans* in Böhmen (1896). In 1899 and 1900, V. Schiffner (1862–1944) collected material for his article thanks to Patzelt. Schiffner, V. (1901). Untersuchungen über Mörckia Flotowiana und über das Verhältnis der Gattungen Mörckia Gott. und Calycularia Mitt. zu einander. *Österreichische Botanische Zeitschrift, 51* (2), pp. 41–51.

Pollen diagram. Karl Rudolph, Untersuchungen des Badehauses IV zwischen Natalienquelle und Langenbruck, 1929. TP198901814, Inheritance of A. Gnirs, ARÚ Prague Archive.

At that time, Karl Rudolph investigated bog sites in the Ore Mountains with Franz Firbas, a then student of the world-famous phycologist Adolf Pascher. Already in December 1921, they carried out the first successful attempt to use pollen analysis in the interpretation of bog profiles. Then, with great enthusiasm, they analysed pollen from many other sites. Already in 1928, K. Rudolph published his extensive work *Die bisherigen Ergebnisse der Botanischen Mooruntersuchungen in Böhmen*, which was based on analyses from 75 bogs. The extent of this work was comparable only to a study published by Lennart von Post for South Sweden. Regarding the knowledge of postglacial development of forest vegetation, Bohemia became the second-best-explored region in Central Europe. Rudolph then contributed unequivocal proof that the Holocene succession of the forest took place also in unglaciated areas of Europe. The biostratigraphic scale of the Central European Holocene, worked out after Rudolph's death by Firbas, has since been the basis of Central European pollen-analytical research and is used to this day.

Karl Rudolph's group of palynology in the German University in Prague educated many good students, however, the outbreak of the Second World War interrupted this promising process. Rudolph died in 1937 and also some of his students became victims of war (as Karl Preis who died in 1941 in Russia), others were expelled from Czechoslovakia after the war because of their German ethnicity (e. g. Hans Schmeidl, who went to Munich), and many of those who stayed did not continue in palynology (e. g. Hubert Losert and Hugo Salaschek, who later worked as secondary school teachers). Franz Firbas (1902–64) was undoubtedly the most important of Rudolph's students in the palynology group. Together with Rudolph, he analysed 25 bog profiles. He graduated in 1924, and until 1928, he worked at the German University in Prague as an assistant. In 1928, he left Prague (first to Frankfurt am Main, later to Göttingen). He addressed – apart from plant sociology, experimental ecology and geobotany – the issue of the relationship between climate and the Quaternary vegetation development; his *Waldgeschichte Mitteleuropas* (1949 and 1952) is still a basic work for Central Europe.

Franz Firbas. Source Lang, G. (1994). Quartäre vegetationsgeschichte Europas: Methoden und Ergebnisse. Springer.

The German palynology school also influenced some Czech researchers, who later continued the discipline (e. g., Marie Puchmajerová and Marie Štěpánová at the Charles University in Prague). Some Czech archaeobotanists also focused, at the beginning of their career, on bog profiles (e. g. Antonín Klečka and Emanuel Opravil), but later they turned to the study of plant macroremains in archaeological contexts. It was already Rudolph, who had tried to connect the knowledge about the reconstructed vegetation with archaeological finds,[32] but only in the 1980s, pollen analysis was for the first time applied intentionally for the interpretation of archaeological contexts (medieval cesspits) by Vlasta Jankovská.

[32] Rudolph, K. (1926). Pollenanalytische Untersuchungen im thermophilen Florengebiet Böhmens: Der ‚Kommerner See' bei Brüx. *Berichte der Deutschen Botanischen Gesellschaft, 4* (44), pp. 239–248.

GREGOR THOMAS JOSEPH WOLNY OSB (1793–1871)

This Benedictine monk, historian, topographer, writer and secondary school teacher was born in a clothier family in Příbor (Freiberg). He started to study at the local Piarist secondary school, but finished his secondary education in Brno. After that, he entered the theological seminary in Olomouc, but soon moved to Brno. On 9 March 1817, he became a novice at the Benedictine Abbey in Rajhrad. After his priestly ordination, he started to administer the parish in Dolní Kounice, but already in 1819, he was named professor of philology and history at the lyceum in Brno. In 1847, he became sub-prior of Rajhrad abbey and soon master of novices. During his time at Rajhrad monastery, he led two archaeological excavations; in 1846, he uncovered tens of graves of a Slav cemetery on a hill in Rebešovice; four years later, he dug in Rajhrad itself.[33]

Rajhrad Monastery. View of the facade of the church of St. Peter and Paul. Available from: https://cs.wikipedia.org/wiki/Kostel_svat%C3%A9ho_Petra_a_Pavla_(Rajhrad).

THE FIRST ARCHAEOBOTANICAL FIND ON CZECH TERRITORY

In the first half of the 19th century, the surroundings of Rajhrad witnessed vigorous building activity, in 1838–1939, the railroad between Vienna and Brno was constructed, in 1848, the Svratka River was regulated and the monastery complex was renovated. As a consequence, many archaeological finds came to light, which were gradually delivered to the monastery museum.

[33] Staňa, Č. (1972). Document M-TX-197400069. Archeologický ústav Brno. Accessible at: https://digiarchiv.aiscr.cz/id/M-TX-197400069; Staňa, Č. (1960). Document M-TX-197602348. Archeologický ústav Brno. Accessible at: https://digiarchiv.aiscr.cz/id/M-TX-197602348.

Josef Skutil, archaeologist at the National Museum in Prague, described in an article on Rajhrad monastery and archaeology in Moravia[34] the circumstances of the excavation in Rebešovice near Rajhrad, where *'back in 1846, during trench-ploughing of a premise on the vineyard, a Slav linear cemetery with inhumation burials was discovered ...'*. Gregor Wolny uncovered more than 40 graves and obtained a large amount of finds.

Rajhrad also yielded another find of carbonised grains, which turned up in the cremation cemetery discovered in 1872 during the construction of the joint-stock malthouse. An eyewitness of the discovery, Beda Dudík,[35] described one of the 18 cremation graves: the grave-pit was *'three-meters deep; and its bottom was filled with many gallons of carbonised corn'*.[36]

LUDWIG HEINRICH JEITTELES (1830–1883)

L. H. Jeitteles was a natural scientist, teacher and amateur archaeologist, who stemmed from an important Prague Jewish-German family. His father was a physician, professor at Olomouc University and later at Vienna University. Jeitteles studied Law and Philosophy in Olomouc (1839–51) and Natural Sciences in Vienna (1851–55). In 1855, he became a secondary school teacher. He used to change his workplaces very often, he was teaching at the German secondary school in Olomouc in 1862–55.

BOHUMIL NĚMEC (1873–1966)

This Czech botanist, mycologist, teacher, freemason, Czechoslovak politician and a candidate for president in 1935 stemmed from a rural family. He studied Natural Sciences at the Faculty of Arts, the Czech Charles-Ferdinand University in Prague, and was first dedicated to zoology, then focused on botany, where he was the first to introduce experimental methods. In 1907, he was named professor. In 1919–20, he was dean of the Faculty of Arts, then rector of the Charles University (1921–22).

[34] Skutil, J. (1940). Rajhradský klášter a moravská archeologie. *Hlídka*, 57(12), pp. 345–357.

[35] Beda Dudík (1815–90), Moravian historiographer and church historian, priest and Benedictine monk at Rajhrad monastery.

[36] Dudík, B. (1875). Předkřesťanská pohřebiště na Moravě. *Časopis Matice moravské, 7*, pp. 9–21.

He gained merits in the foundation of an independent Faculty of Natural Sciences (1920) and participated in the publication of the oldest Czech scientific-popularization journal Vesmír which is published to this day.[37]

Bohumil Němec. Source Sekanina, F. (1927). Album representantů všech oborů veřejného života československého. Praha, s. 82.

FRANTIŠEK LADISLAV SITENSKÝ (1851–1924)

This agricultural specialist, teacher and journalist studied secondary school in Jičín, graduated from Theology in Hradec Králové, Philosophy and Natural Sciences at the Charles-Ferdinand University in Prague. In 1875, he became the assistant of František Ladislav Čelakovský in the botanical department of the Royal Bohemian Museum. Since the 1880s, he was active as a teacher at many economic schools. In 1897, he was named province inspector of economic education. His work focused, apart others, on the study of Czech bog sites from the viewpoint of botany and economy.[38]

František Sitenský. Available from: https://cs.wikisource.org/wiki/Autor:Franti%C5%A1ek_Sitensk%C3%BD

[37] Wikimedia Foundation. (n.d.). *Bohumil Němec*. Accessible at: https://cs.wikipedia.org/wiki/Bohumil_Němec (2 September 2021).

[38] Sitenský, F. (1905). Ottův slovník naučný (1st ed.). Praha: J. Otto.

THE INTER-WAR PERIOD

After the First World War, the focus of the new generation of researchers on migration and ethnic affiliation of human populations, and on the study of newly defined archaeological cultures broke the ideological links to previous evolutionary schemes in archaeology. Natural-scientific questions stepped aside in archeology and with them the interest in palaeobotanical study has declined.[39] Vere Gordon Childe (1892–1957), a character of world archaeology, influenced Central-European archaeologists, as well as historians and linguists with his effort to study the archaeological cultures and origins of nations, the topic which was far from the environment.

At the same time, the research of plants in archaeology was undoubtedly influenced by genetics. The Russian biologist Nikolaj Ivanovič Vavilov (1887–1943) gravely afflicted both biology and agricultural sciences and indirectly influenced also the general consciousness of prehistoric domestication of plants. Vavilov created a concept of global crop domestication and diversity centres.[40] As a leading Soviet scientist, he was allowed to publish and communicate to the Western world. Thanks to him, the unique results of Russian science in the field of crop domestication became widely known as early as the 1930s.[41]

Despite the diversion of archaeology from natural sciences in this period, in particular localities, the interdisciplinary collaboration between archaeology and botany started to develop gradually, in view of the application of modern methods in archaeological research. Nevertheless, both disciplines, archaeology and botany, went their own way. The results of the natural-scientific research (mainly of bog sites) served primarily to receive an image of the vegetation development in the past, while the results of archaeological findings aimed at determining the history of specific (the archaeologists' own) nation. Generally, the connection between both disciplines was weak and occasional. '*Natural sciences received their view of the plant cover in prehistory mostly from their own observations of bog sites and from the study of pollen from bog sites. The obtained results were only of the theoretical value for prehistory, as demonstrated by many contributions, practically, however, only if the*

[39] V. G. Childe searched the roots of prehistoric processes in a specific site and studied the broader geographic area.

[40] Vavilov, N. I. (1935). The phytogeographical basis for plant breeding. Theoretical Basis for Plant Breeding, pp. 117–175. Moscow.
Vavilov, N. I. (1940). The theory of the origin of cultivated plants after Darwin. *Nauka (Science),* 2, pp. 55–75.

[41] The contributions of N. I. Vavilov were published in English, mainly in the Bulletin of Applied Botany already in the 1920s and 30s; a translation of his major work was published in entirety only in 1992 (Vavilov 1992).

material stemmed from layers with confirmed relation to prehistoric layers. However, this was only exceptionally the case … Insufficiencies of this approach can be seen, i. e., in the case of the bog site in Františkovy Lázně or in the Komořany lake.'[42]

Around 1930, the number of pollen profiles from the investigated bog sites reached one hundred (see Box: Karl Rudolph's school and the beginnings of palynology) and the obtained data thus became the basis of the systematic research of prehistoric vegetation on the territory of Czechoslovakia. A synthetic study on the landscape of the Czech Lands during the Neolithic, published by the archaeologist Jan Filip[43] was among the basic works on this subject. Filip described in detail the woodland composition and its supposed changes. He named individual vegetation stages according to prevailing trees and linked these stages to particular archaeological periods.[44] Filip was one of the first archaeologists to point to the necessity of closer collaboration between botanists and prehistorians.[45]

Collaboration between archaeologists and botanists at archaeological excavations gradually intensified, especially in North-western Bohemia, in the area of the Komořany Lake, where archaeologists and palaeobotanists were working together already in the second half of the 1920s. Rescue archaeological excavations, caused mainly by the expansion of open-pit coal mining, included palynological analyses of samples from the sediments of the ceased lake. In this area, the archaeologist Helmut Preidel[46] cooperated with Karl Rudolph and his students, mainly with Hubert Losert.[47] The results were published by Losert in 1940.[48] Among the first botanists who carried out a broad range of archaeobotanical and anthracological analyses was Alois Fietz from Brno (see Box: Alois Fietz). He performed not

[42] Böhm, J. (1937). Rostlinné zbytky a jejich význam pro pravěký výzkum. *Zprávy památkové péče, 7*(1), p. 15.

[43] Jan Filip (1900–81) archaeologist, employee of the State Institute of Archaeology, later director of the Institute of Archaeology of the CSAS in Prague (1963–74).

[44] Dreslerová, D. (2008). Pozdě, ale přece: environmentální archeologie v České republice – Better late than never: environmental archaeology in the Czech Republic. In Beneš, J. & P. Pokorný (eds.). Bioarcheologie v České republice – Bioarchaeology in the Czech Republic, pp. 13–38. České Budějovice – Praha. http://doi.org/10.13140/RG.2.1.1742.8889.

[45] Filip, J. (1930). Porost a podnebí Čech v pravěku. *Památky archeologické, 36*, pp. 169–188.

[46] Helmut Preidel (1900–80), teacher, archaeologist, external collaborator of the State Institute of Archaeology in the Žatec and Chomutov disctricts (Saaz and Komotau in German). He focused on the Roman period and early Middle Ages, and was co-founder of the Sudeta journal.

[47] Hubert Losert was a German botanist, one of the students of K. Rudolph. He engaged mainly in the research of sediments of the former Komořany Lake. After World War II, he was relocated to Germany and became secondary school teacher.

[48] Losert, H. (1940). Beiträge zur spät- und nacheiszeitlichen Vegetationsgeschichte Innerböhmens. I. Der Kommerner See. *Beihefte zum Botanischen Zentralblatt, 60*, pp. 346–394.

only analyses of carbonised wood and cereal caryopses, but also focused on the reconstruction of original plant communities as well as climatic conditions, including interpretation of the use of wood.[49] Fietz collaborated with excellent professional and amateur archaeologists of his time, such as Jaroslav Böhm (see Box: Jaroslav Böhm), Josef Skutil[50] and Karl Schirmeisen.[51]

Despite these first steps in the field of mutual collaboration, at the end of the 1930s, it was still not quite common in archaeology to analyse charred wood and carbonised grain, as J. Böhm complained in his paper on the excavation of the Celtic oppidum in Staré Hradisko.[52] *'One important source, however, was constantly neglected. It was charcoal, a stable accompanying phenomenon in all prehistoric settlements and often in graves. Nevertheless, carbonised wood is conserved by carbonization to such an extent that it can be researched as recent. Systematic collecting of charcoal on the sites and their detailed analysis can contribute extremely interesting results, which have indirect importance also for the evaluation of climatic and other conditions ...'*[53]

In the course of the 1930s, it was also a group of researchers from the Museum of Agriculture in Prague, led by Antonín Klečka, who concentrated on the systematic processing of prehistoric finds of carbonised plant remains. The first results were published by Klečka already in 1934.[54] He collaborated with the archaeologist Jiří Neustupný[55] from the National Museum in Prague and especially with Josef Skutil from the Moravian Museum. Skutil systematically searched for older plant finds from various museum collections in Czechoslovakia and passed them to Klečka to analyze them.[56] Finds from Slovakia, were also analysed and documented.[57] The importance of Klečka's work consisted mainly in his meticulous methodological

[49] Böhm, J. (1937). Rostlinné zbytky a jejich význam pro pravěký výzkum. *Zprávy památkové péče, 7*(1), p. 15.

[50] Josef Skutil (1904–65) was a Czech archaeologist and historician, specialist in palaeolithic.

[51] Karl Schirmeisen (1868–1958) was a German teacher and amateur archaeologist.

[52] The first Czechoslovak research excavation was carried out in the Celtic oppidum of Staré Hradisko (1930–4). Three institutions participated in the excavation: the State Institute of Archaeology, the Moravian Museum and the Prostějov City Museum. Its director was Jaroslav Böhm.

[53] The excavation at Malé Hradisko, Böhm had all finds of charcoals and wood analysed. Based on the results from Fietz, he tried to reconstruct the forest cover in the Drahan Upland in the La Tène period. Böhm, J. (1937). Rostlinné zbytky a jejich význam pro pravěký výzkum. *Zprávy památkové péče, 7*(1), p. 15.

[54] Klečka, A. (1934). Rostlinná produkce v našem pravěkém zemědělství. *Věstník československého zemědělského muzea, 3*, pp. 98–102.

[55] Jiří Neustupný (1905–81), Czechoslovak archaeologist, museologist, teacher.

[56] Simultaneously, J. Skutil collaborated with Fietz also in the analyses of finds from Moravia. Tempír, Z. (1966), p. 30.

[57] E. g., the finds from Cave Domica.

approach to the analyses of agricultural plants and weeds (see Box: Antonín Klečka). His close collaboration with archaeologists ensured, at the same time, a detailed description of the find circumstances and the dating of the finds.[58]

Unfortunately, the successful and productive cooperation of both disciplines was not maintained during World War II. It was not possible, until the 1950s, to build effectively upon the foundations of archaeobotany laid in the inter-war period.

ALOIS FIETZ (1890–1968)

Alois Fietz was an archaeobotanist, mycologist and teacher. After secondary school in Vidnava (Weidenau), he studied Natural Sciences at the Faculty of Arts in Vienna (1909–14). Since 1913, he was employed at the Institute of Botany and Zoology at the German Technical University in Brno. He taught the following subjects: botany, plant raw materials and technical microscopy. In 1942, he was appointed associate professor of botany at the German Technical University in Brno. He taught also at the Higher Technical College of Pomology and Horticulture in Lednice (Eisgrub).[59] In the field of archaeobotany, Fietz was an expert in plant anatomy and microscopy and he excelled also in palaeobotany and palaeodendrology. He processed mainly the finds from archaeological excavations in Moravia and Slovakia. After the end of World War II, he was displaced from Czechoslovakia and settled in southwestern Germany. His last job was at the State Museum of Natural History in Karlsruhe.

ANTONÍN KLEČKA (1899–1986)

Antonín Klečka was an agronomist, university teacher, one of the founders of archaeobotany and also the longstanding chairman of the Czechoslovak Academy of Agricultural Sciences in Prague. He studied Agriculture and Forest Management at the Czech Technical University and at the same time Botany at the Faculty of Science of the Charles University in Prague. During his studies, he worked as a demonstrator and later as an assistant of Karel Kavina, professor of botany. After his studies, Klečka worked in the State Research Institute of Agriculture in Prague, where he focused on the forage section. In the 1930s, he taught at the Czech Technical University in Prague.

[58] Tempír, Z. (1966), p. 30.

[59] Biografický slovník. (n. d.). Alois Fietz. Accessible at: http://biography.hiu.cas.cz/Personal/index.php/FIETZ_Alois_10.1.1890-26.12.1968.

In 1946–72, he taught at the Czech University of Agriculture in Prague. He was an active member of the Communist Party of Czechoslovakia.

Klečka published in the field of forage and plant agriculture, as well as studies on meadows and pastures, but he also engaged in the palaeobotanical research of bog sites. He carried out many archaeobotanical analyses of macroremains, mainly in collaboration with the archaeologists J. Neustupný and J. Skutil. His systematic collaboration with archaeologists contributed to the high-quality description of the find circumstances and dating of the finds. Already in 1934, Klečka published the first systematic study of prehistoric finds of carbonised plant remains on the territory of Czechoslovakia. He compared quantitative ratios of seeds of various crops in different archaeological contexts. Besides, he also determined seeds of various crop weeds. He always interpreted the data in such a way as to provide answers even to detailed questions of prehistoric agriculture. Klečka refined the documentation method of the analysed finds by taking photographs of the determined macroremains. This way, he helped many finds to be preserved for future comparison with other material and for verification of their botanical determination. Such a revision was later undertaken by Klečka´s student, Zdeněk Tempír.

Antonín Klečka. Inv. No. 71645, Neg. B5053 NZM Archive.

EMANUEL OPRAVIL (1933–2005)

Emanuel Opravil studied Biology at the Faculty of Science of Masaryk University in Brno (1952–57), specialisation of Geobotany and Systematic botany. His master thesis on pollen analyses on the bog site in Hrubý Jeseník and the low-land bog site near Úvalno (1957) attracted much attention of the experts. Already during his studies, he prepared for a career as archaeobotanist, in cooperation with Josef Poulík, the head of the Institute of Archaeology in Brno. He was working his whole life in Opava, where he founded the first Department of Archaeobotany in

Czechoslovakia. Although the laboratory mostly remained in the same building, the institution changed several times. Opravil was first employed in the Silesian Study Institute (1959–64), then in the local branch of the Geographical Institute in Brno (1965–74), from where he changed to a branch office of the Institute of Archaeology in Brno (1974–93), and finally he worked at the Department of archaeology in the Heritage Institute in Ostrava (1993–97). In 1965, he became Candidate of Sciences (CSc., candidate dissertation on *South Moravian Forests in the Late Holocene*), two years later (1967) he earned the title RNDr.

Emanuel Opravil. Photo private archive V. Čulíková.

Most of his life, E. Opravil was engaged in the analysis of plant macroremains from prehistoric and medieval settlements. Among his most significant results are the determinations of macroremains from prehistoric wells in Mohelnice (Linear Pottery, Funnel Beaker and Tumulus cultures), from prehistoric settlement in Hlinsko u Lipníka nad Bečvou and from the Early Medieval stronghold in Mikulčice. He also examined medieval cesspits in Opava, Ostrava and Uherské Hradiště. He also focused on macroremains finds from High Medieval Period, mainly because the rich sets of waterlogged macroremains allowed him to reconstruct various types of vegetation.

It is a great merit of Emanuel Opravil that archaeobotany (palaeoethnobotany) became an independent scientific discipline in Czechoslovakia. It is also thanks to him that the first Department of Archaeobotany in Czechoslovakia was founded in Opava. Opravil also created a unique reference collection of seeds and fruits. Considering the extent of his work, the number of results and scientific publications, Emanuel Opravil was one of the leading European experts in the field.[60]

[60] Čulíková, V. (2003). K sedmdesátinám RNDr. Emanuela Opravila, CSc.. *Archeologické rozhledy, 55(3)*, pp. 636–649.

FRANTIŠEK KÜHN (1931–1995)

František Kühn. Inv. No. 72443, Neg. a14686, NZM Archive.

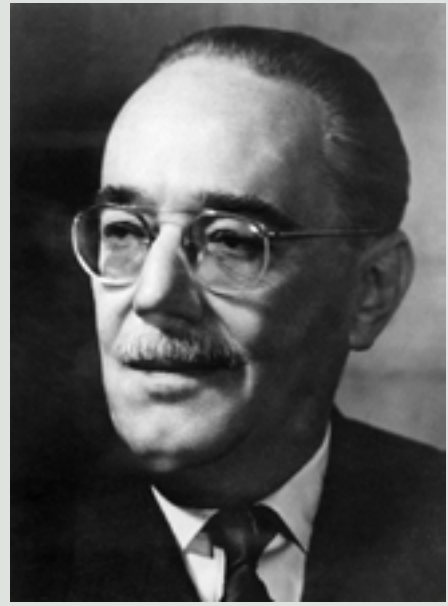
In 1949–53, he studied Botany at the Faculty of Science of Masaryk University in Brno where he received his doctoral degree in 1953 (RNDr.; dissertation on the *Ecology of Crop Weeds*). During his studies, he cooperated with Professor Rudolf Dostál (the University of Agriculture in Brno) in the field of experimental botany. After his studies, he worked in the Department of Botany of the University of Agriculture in Brno as a teacher until 1995. In 1964, he attained the Candidate of Sciences degree (dissertation on the *'Dependence of the occurrence of crop weeds on the soil type'*), three years later, he was appointed associate professor (*docent;* habilitation thesis on the *'Representation of crop weeds in individual crop species'*).

František Kühn focused mainly on the diversity and evolution of cultivated plants. The central subject of his work was the study of the ecology of crop wees and the influence of environmental conditions on the composition of weed vegetation. He developed a method of determining soil type, humidity and quality of the soil according to weed types. In the 1960s, he investigated, along with Zdeněk Tempír, the occurrence of some old races of cultivated plants in Czechoslovakia, mainly in the Carpathians. This field walking (despite cereals they collected other cultivated crops as well) was followed by an expedition of the *Zentralinstitut für Genetik und Kulturpflanzenforschung DAW in Gatersleben*.[61] František Kühn took part in many national and international symposia and conferences, e. g., in the 10th International Botanical Congress in Edinburgh in 1964.

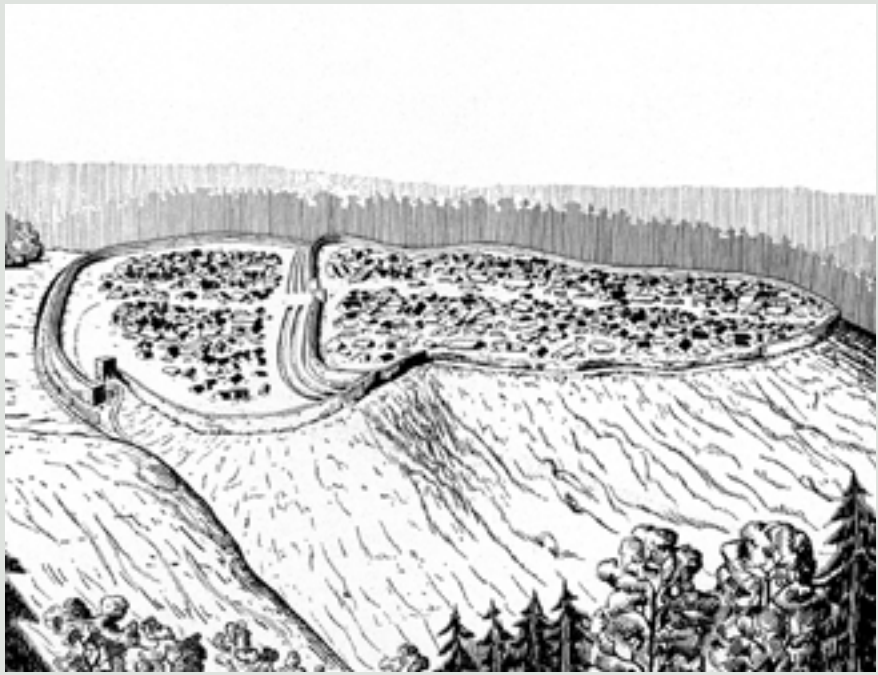
[61] Tempír, Z. (1991). Prof. RNDr. František Kühn, CSc. – 60 let. *Preslia, 63*, pp. 69–77.

JAROSLAV BÖHM (1901–1962)

Jaroslav Böhm was an archaeologist and later the director of the State Institute of Archaeology (later the Institute of Archaeology of the Czechoslovak Academy of Sciences). In the years 1919–23, he studied History, Archaeology and Geography at the Faculty of Arts, Charles University. After his studies, he entered the State Institute of Archaeology; from 1939 to his death, he was the director of this institution. In the inter-war period, he carried out



Jaroslav Böhm, director of the StAÚ in the years 1939–1962. FJ000000574, ARÚ Prague Archive.



Historical drawing reconstruction of the Staré Hradisko oppidum with fortifications and buildings. According to the book by J. Böhm (1946).

a number of archaeological excavations, the vastest of which was dedicated to the oppidum in Staré Hradisko, Moravia (1934–7). In the 1930s, he focused on the methodology of modern excavations of prehistoric settlements, which was to include expert analyses of archaeological finds. In the excavation of Staré Hradisko, Böhm collaborated with Alois Fietz, who carried out the analyses of charcoals. Based on the results of these analyses, they tried to reconstruct the forest vegetation in the area of the oppidum in the La Tène period.[62]

Querns found during the research of the town of Staré Hradisko. Photo J. Böhm. FT000010322, ARÚ Prague Archive.

[62] Fietz, A. (1937). Rostlinné zbytky z galského oppida u Malého Hradiska, okr. Plumlov (Die Pflanzenreste aus dem gallischen Oppidum von Malé Hradisko, Kreis Plumlov in Mähren). *Ročenka Národopisného průmyslového musea města Prostějov a Hané, 14*, pp. 1–19.

THE DEVELOPMENT OF ARCHAEOBOTANY AFTER WORLD WAR II

After the World War II, the discipline, which focused on plant macroremains from archaeological sites, was still subsumed under the collective designation of palaeobotany. The term archeobotany was first used in the 1950s by Hans Helbaeck, but later he preferred palaeoethnobotany.[63] The term palaeobotany, which is used sometimes, should be avoided, because it points far back into geological periods. The 1950s and 60s were the time of vast archaeological expeditions of European researchers, mainly to Greece, Turkey, the Near East and Egypt, many of them with natural-scientific experts involved in the field research. It was by no means just accidental participation of natural scientists in the analytical work. On the contrary, it was a systematic and long-term activity of experts who were familiar with the archaeological context of the sites, and who were equipped with reference collections.[64]

The introduction of radiocarbon dating was undoubtedly a turning point in archaeology. Already in the 1950s, Robert J. Braidwood, the head of the American archaeological expedition to Iraq, obtained the first series of radiocarbon dates from the site of Jarmo, i. e. then one of the oldest known sites from the time of the beginnings of agriculture.[65] In the early 1960s, the use of this method already became a relatively widespread practice in archaeology. It was a fundamental contribution of the natural sciences to archaeology, which demonstrated the need for exact procedures in the neural node of archaeological theory and methodology, i. e. in chronology. Although archaeology at that time focused mainly on questions raised by the then prevailing cultural-historical scheme, it was impossible to neglect this essential natural scientific contribution. It was a challenge for a broader involvement of exact approaches in archaeology in general.

John Grahame Douglas Clark (1907–95) was the key personality of European Archaeology, who enforced the environmental aspect into his theoretical concepts. J. G. D. Clark is mostly known for the excavation of the Mesolithic settlement in Star Carr, which he led in 1949–51. In the fieldwork, he integrated specialists on pollen analysis, plant, animal bones and geology. Clark himself referred to his own concept as bioarchaeology.[66]

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[63] Beneš, J. (2008). Archeologie rostlin – Archaeology of plants. In Beneš, J. & P. Pokorný (eds.). Bioarcheologie v České Republice – Bioarchaeology in the Czech Republic, pp. 39–72. České Budějovice – Praha. https://doi.org/10.13140/RG.2.1.1742.8889.

[64] Braidwood, R. J. & B. Howe (eds.). (1960). Prehistoric Investigations in Iraqi Kurdistan. Oriental Institute Studies in Ancient Oriental Civilization, 31. University of Chicago Press.

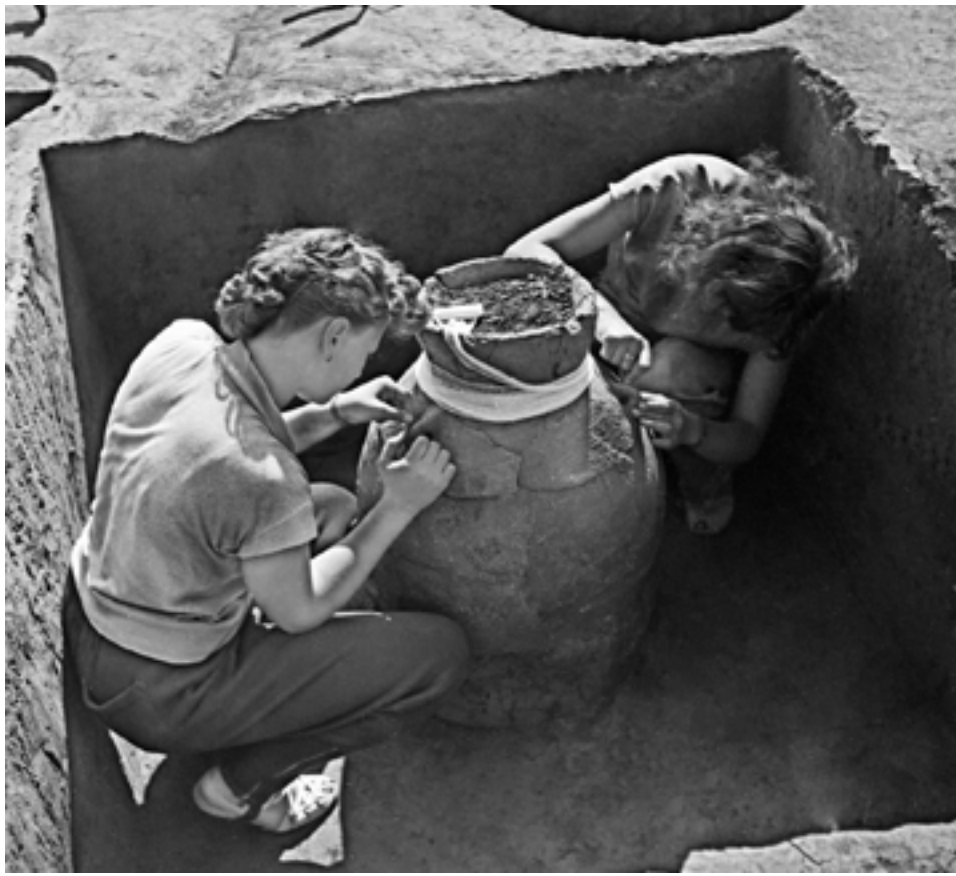
[65] Beneš, J. (2018), pp. 37–38.

Excavation in Bylany near Kutná Hora in 1956 – assembly of workers. FT000014775, ARÚ Prague Archive.

In Czechoslovakia, a period of vast research excavations started immediately after World War II. These excavations were mainly connected with the renewed interest in the Slav past of the country as a reaction to Germanisation during the War. Already in 1947, long-lasting and systematic research excavations started at the early medieval hillforts of Budeč, Libice, Kouřim, Levý Hradec, Klučov and Mikulčice, with the support of the Ministry of Education and National Enlightenment (MŠANO). Many other vast and long-term excavations (e. g. of the Neolithic settlement in Bylany, the Celtic oppidum in Hrazany, the polycultural settlement in Březno), started in the 1950s and were financed by the Czechoslovak Academy of Sciences[67] (CSAS). The generous financial support by the Academy together with high-quality university education and methodical experiences from the inter-war period were the reasons why Czechoslovak

[66] Clark, J. G. D. (1973). Bioarchaeology: Some Extracts on the Theme. *Current Anthropology, 14*(4), pp. 464–470.

[67] On 1 January 1953, the State Institute of Archaeology was incorporated into the CSAS.



Archaeological research in Bylany near Kutná Hora. Granary vessel excavation. FT000024219, ARÚ Prague Archive.

archaeology in the first two post-war decades belonged to the leading countries in archaeology.

In the 1950s, the first specialisations appeared in Czechoslovak archaeology. The experts turned their interest, i. e., on the technologies of ironworking and the related subjects of forging, metallography and experiments. Based on the first revealed early medieval hillforts, the issue of agriculture, economy and demography moved to the centre of the interest,[68] but only a few archaeologists were engaged in the research of prehistoric agriculture, such as, mainly, Jaroslav

[68] Kuna, M., Maříková-Kubková, J. & M. Starcová (2019). Sto let v archeologii, pp. 101–102. Archeologický ústav AV ČR, Praha – Academia.

Kudrnáč (see Box: Jaroslav Kudrnáč), Ivana Pleinerová and Magdalena Beranová in the 1960s.[69] In these innovative fields of research, the archaeologists were able to continue the inter-war collaboration with natural sciences. The beginning of the 1960s brought a gradual decrease in political pressure and a temporary recovery of the social atmosphere. Archaeology started to develop mathematical and statistical methods of data processing and new theories on prehistoric economy and society were formulated.

Within archaeobotany itself, the vast research excavations contributed a vast number of new finds of carbonised plant remains. The results of their analysis were used mainly for the reconstruction of prehistoric agriculture.[70] Interest concentrated on the history of individual crops, on the estimation of their yields and also on the species involved in animal husbandry.[71] The main questions were: which plants and when were cultivated in the territory of Czechoslovakia, and what was their importance in various prehistoric periods. In connection with this, their frequency on sites and quantitative proportions of their seeds were determined. Another task was to reconstruct the cultivation methods. It was A. Klečka, who stressed the necessity to record the occurrence of weeds in the archaeological finds, which could help to determine the degree of weed pollution of the fields. He also determined, with the help of weed species composition, the way of cultivation of various crops (e. g. summer vs. winter crops).

In the 2nd half of the 1950s, Zdeněk Tempír, a research associate of the Czechoslovak Museum of Agriculture (ČsZM) and a student of Antonín Klečka, started a systematic collaboration with the archaeologists. Apart from Z. Tempír, also Zdeněk Dohnal and František Kühn analysed plant material from archaeological contexts.[72] In 1959, the Museum of Agriculture initiated *'The study of archaeological finds of prehistoric agricultural plants on the territory of the Czechoslovak Socialist Republic.'*[73] This project lasted until the 1970, and during that time, the museum collaborated with a number of archaeological departments.[74] Zdeněk Tempír, the head of the project, gathered archaeobotanical samples from a number of archaeological excavations. He further developed Klečka's methodology of the processing of archaeological macroremains and he also engaged in the improvement of the methods of field sampling during

[69] Dreslerová, D. (2008), p. 23.

[70] Tempír, Z. (1966), p. 30.

[71] *Ibid.*

[72] Kočár, P. & D. Dreslerová (2010). Archeobotanické nálezy pěstovaných rostlin v pravěku České republiky. *Památky archeologické, 101*, pp. 203–242.

[73] National Museum of Agriculture, private collection of Zdeněk Tempír, Výroční zpráva o činnosti Zemědělského muzea za rok 1963.

[74] Institutes of archaeology in Prague, Brno and Nitra, National Museum in Prague, Moravian Museum and a number of regional museums.

the excavations, including flotation (see Box: Flotation during archaeological excavations).[75]

In addition to prehistoric archaeobotany, also archaeobotany of Medieval Period developed, even though, with a certain delay, compared to the neighbouring countries. Its beginnings are connected with Emanuel Opravil, who, in the early 1960s, founded a specialised archaeobotanic department at the Silesian Institute of the CSAS.[76] Věra Čulíková later joined E. Opravil in his department, and together with Eva Hajnalová, employed at the Institute of Archaeology in Nitra,[77] E. Opravil made an effort to establish archaeobotanic analyses, besides other natural-scientific methods, as an integral part of comprehensive archaeological research.[78] In his laboratory, he formed the basis of a vast comparative collection of seeds fruits, and he also systematically built both a card index and a specialised library.

The results of the post-war research in Czechoslovakia were regularly presented on the international scene, for example on the international exhibitions in Paris (1957) and Brussels (1958). An important milestone in this endeavour was the international Symposium on the European Chalcolithic (1959), organised by the Institute of Archaeology of the CSAS.[79] The results of archaeobotanical research were presented in 1964 at the 7th International Congress of Anthropological and Ethnological Sciences in Moscow, where Zdeněk Tempír reported on the results of his study of archaeological finds of agricultural crops on the territory of Czechoslovakia.[80] The attempts at integrating Czechoslovak archaeology into international collaboration peaked with the 7th Congress of the International Union of Prehistoric and Protohistoric Sciences (UISPP) in 1966 in Prague.[81] The

[75] National Museum of Agriculture, private collection of Zdeněk Tempír, Výroční zpráva o činnosti Zemědělského muzea za rok 1961.

[76] Čulíková, V. (2004). Archeobotanika v české archeologii na prahu 3. tisíciletí. *Archeologické rozhledy, 56*(3), pp. 661–671.

[77] Kočár, P. & D. Dreslerová (2010). Archeobotanické nálezy pěstovaných rostlin v pravěku České republiky. Památky archeologické, 101, pp. 203–242.

[78] Only in the 2nd half of the 1980s, archaeobotanical research was becoming a standard part of the archaeological research in its two complementary components, i. e. macroremains (xylotomic and anthracological) and pollen analysis, besides other natural-scientific disciplines (dendrochronology, malacozoology, osteology, entomology, parasitology, microbiology etc.). Čulíková, V. (2004). Archeobotanika v české archeologii na prahu 3. tisíciletí. Archeologické rozhledy, 56(3), pp. 661–671.

[79] Kuna, M., Mařík̆ová-Kubková, J. & M. Starcová (2019). Sto let v archeologii, p. 103. Archeologický ústav AV ČR, Praha – Academia.

[80] National Museum of Agriculture, private collection of Zdeněk Tempír, Výroční zpráva o činnosti Zemědělského muzea za rok 1964.

[81] The *Union Internationale des Sciences Préhistoriques et Protohistoriques* (UISPP) is the largest and oldest international association of archaeologists and archaeological institutions, the main aim

congress was organised by the Institute of Archaeology of the CSAS and its director, Jan Filip, was the chair of the congress.[82]

At the UISPP congress, papers on palaeo- and agrobotany were presented (e. g. Maria Hopf, Maria Follieri, Zdeněk Tempír and Emanuel Opravil), and the meeting of foreign and Czechoslovak experts led to negotiations about a joint approach towards establishing an international platform for issues of archaeobotanical research.[83] The first international symposium of archaeobotanists was organised two years later (1968) by Zdeněk Tempír at Kačina Castle and led to the foundation of the International Work Group for Palaeoethnobotany (IWGP; see below).

BYLANY

This large-scale research excavation was initiated by the archaeologist Bohumil Soudský, who wanted to *'enlighten the archaeological reflection of the society of the first Central European farmers'* and was looking for a site suited for this aim.[84] The site in Bylany was discovered by accident in the course of agricultural activities in 1952 by the local cooperative (JZD).[85] In 1955, the rescue excavation turned into a research excavation led by Soudský, who started a systematic uncovering of large surfaces using heavy machines. The way of conducting this archaeological excavation, along with subsequent processing of formalized data, were brand-new innovations at that time. The excavation in Bylany continued in this way for the next 15 seasons with other experts participating, such as archaeologists Marie Zápotocká and

of which is the support of archaeology and related sciences taking part in the study of the oldest history of man. It was established in 1931 in Bern. Starcová, M. (2019). Na mezinárodním poli. In Kuna, M., Starcová, M. & J. Maříková-Kubková (eds.). *Sto let v archeologii* (p. 136). Archeologický ústav AV ČR, Praha – Academia.

[82] The congress took place in 21–27 August 1966. Its main initiator and president of the congress, the director of the Institute of Archaeology of the CSAS, Jaroslav Böhm, did not live to participate. He died at the end of 1962, therefore the most part of the preparations and the chairmanship passed to his successor, Jan Filip. *Ibid.*

[83] VII[e] Congrès International des Sciences Préhistoriques et Protohistoriques (1966): Programme. Praha, pp. 62–3.

[84] Končelová, M. & P. Květina (2018). Bylany – klíč k archeologii neolitu. Minulost a současnost výzkumu a jeho popularizace. *Živá archeologie – REA, 20*, pp. 38–44.

[85] JZD – *Jednotné zemědělské družstvo* (unified agricultural cooperative); JZDs were established after 1948 following the example of Soviet collective farms (*kolkhoz*) with the aim to increase the extent of arable surfaces. The farmers were forced to give up their property and to become members.

Ivan Pavlů. In 1958, an expedition house with laboratory, drawing room, repository and terrain mechanization was erected.[86] The main large-scale excavation lasted until 1967; smaller excavations are still ongoing.[87] In Bylany, Zdeněk Tempír analysed macroremains of crops. According to his design, a flotation station was erected at the site accelerating the processing of archaeobotanical samples (BOX Flotation).

JAROSLAV KUDRNÁČ (1922–2008) AND HIS INVESTIGATION OF STORAGE VESSELS IN KLUČOV

Jaroslav Kudrnáč, an archaeologist from the Institute of Archaeology, led in 1950–8 the research excavation of the early medieval hillfort of Klučov.[88] The finds fostered his interest in the study of the landscape, specifically, in agricultural production in the 8th–9th centuries. He understood agriculture as the most important precondition of

Archaeological research in Klučov. Reconstruction of the pit – granary No. 1 (designed by J. Kudrnáč by sculptor František Provecký). FP000038808, ARÚ Prague Archive.

[86] Končelová, M. & P. Květina (2018). Bylany – klíč k archeologii neolitu. Minulost a současnost výzkumu a jeho popularizace. *Živá archeologie – REA, 20*, pp. 38–44.

[87] In 1977–80, 1990, 1993 and 2004.

[88] Jaroslav Kudrnáč (1922–2008), research associate at the State Institute of Archaeology and later Institute of Archaeology of the CSAS, engaged in the research of early medieval hillforts and focused on the economy and society of the early Middle Ages including the reconstruction of the way of their lives and the natural conditions. He was a pioneer of montane archaeology in

Archaeological research in Klučov in 1952. Trench 53, a tray for roasting grains assembled from the daub. FT000008592, ARÚ Prague Archive.

social development which influenced the population density and the character of the landscape.

The typically shaped grain pits (silos) from Klučov were used by J. Kudrnáč as a key to the understanding the early medieval economy. The grain pits were subterranean features, intended for storing grain for the sowing. The grain was stored after the harvest in the grain pits which were sealed in order to be safe from moisture and mould, therefore the grain survived until the next spring. Kudrnáč estimated the number of people who could have survived from this amount of sowing grain, based on the volume of some of these pits. He also tried to estimate the area of the fields, in which the grain was cultivated. The analyses of carbonised remains of crops and weeds were used for a reconstruction of the way the fields were cultivated.[89]

Czechoslovakia. Starcová, M. (2020). Jaroslav Kudrnáč. Accessible at: https://www.arup.cas.cz/kontakty/personalia/emeritni-pracovnici/kudrnac-jaroslav/ (20 September 2021).

[89] Dreslerová, D. (2019). Klíč k ekonomice raného středověku. In Kuna, M., Starcová, M. & J. Maříková-Kubková (eds.). *Sto let v archeologii*, pp. 106–107. Archeologický ústav AV ČR, Praha – Academia.

SEZIMOVO ÚSTÍ

This extraordinary archaeological site is connected with an exceptional historical event. The Medieval town of Sezimovo Ústí was abandoned on 30 March 1420, when the inhabitants moved to the newly founded town and left their burnt and dismantled houses behind.[90] These people were followers of Jan Hus and they decided to found a Hussite community of Tábor (named after Mount Tabor near Nazareth in today's Israel) which was intended to be a 'community of the righteous' who rejected human law and wanted to live according to God's law only.

Archaeological research in Sezimovo Ústí. Storage vessel in trench 9. FT000038337A, ARÚ Prague Archive.

The archaeological excavation of the former artisan quarter of Sezimovo Ústí started in 1962.[91] This long-lasting project was a part of the perspective plan of the Institute of Archaeology already since 1950, within the programme to investigate the so-called Hussite localities.[92] Three archaeologists from the Institute of Archaeology (Miroslav Richter, Ladislav Hrdlička and Zdeněk Smetánka) took part and were entrusted with special tasks. In 1983, however, for capacity reasons, the research was taken over by the Tábor Museum. From the suburb of

[90] Klápště, J. (2019). Zaostřeno na předměstí. In Kuna, M., Starcová M. & J. Maříková-Kubková (eds.). *Sto let v archeologii*, pp. 184–185. Archeologický ústav AV ČR, Praha – Academia.

[91] In the course of the reconstruction of a football field in the spring of 1962, acummulations of stones, daub, ceramic fragments and slag were found. *'This find was reported to the Institute of Archaeology of the CSAS in Prague by Karel Sezima, trustee of the museum hall in Sezimovo Ústí.'* Hrdlička, L., Richter, M. & Z. Smetánka (1966). Výzkum v Sezimově Ústí v roce 1965. *Archeologické rozhledy, 18*, pp. 663–680.

[92] *'From the discussion about our museums, we have learned that the public and the museums are concerned with the insufficient documentation of the Hussite movement. Rightly, they are urged to present exhibitions corresponding in a dignified manner to the collective heroism of our people.'* Denkstein, V. (1951). O archeologický výzkum husitských lokalit. *Časopis Národního muzea, 120*(2), p. 107.

Archaeological research in Sezimovo Ústí in 1964. General view from the south of the excavated area. FT000034901, ARÚ Prague Archive.

ceased Sezimovo Ústí, a surface of 1.5 ha was uncovered. At the time of its abandonment, 20 homesteads stood in the suburb in two parallel rows, of which archaeologist have so far excavated sixteen. In the case of twelve of these homesteads, it was possible to determine the production activity of the inhabitants.[93]

In the excavation of Sezimovo Ústí, modern and by then unconventional methods were applied. The whole excavated area was divided by a grid into cells of 100×100 m, which facilitated and improved the recording of finds and the clarity of the documentation. At the beginning of the excavation, photogrammetry was used for the first time in measuring the surface.[94] Experts in natural scientific disciplines also participated in the research (archaebotany and geophysics). The site was, among many other things, exceptionally for its extraordinary state of preservation of plant

[93] Klápště, J. (2019).

[94] Under ing. Miloslav Šimana, the head of the Technical Documentation Division – Útvar technické dokumentace – photogrammetric measurements were first carried out using a ledder structure. Later, a constructions called Swedish tower (švédská věž) were used.; Richter, M. & Krajíc, R. (2001). Sezimovo Ústí. Archeologie středověkého poddanského města 2. levobřežní předměstí – archeologický výzkum 1962–1988. Prácheňské nakladatelství.

Archaeological research in Sezimovo Ústí with the water regulation facility. FT000046268B, ARÚ Prague Archive.

macroremains. Samples were taken during the fieldwork from wells and other features with the aim to find small artefacts and 'ecofacts' in order to reconstruct environment and to supplement the knowledge of the economic profile of the settlement.[95] However, sampling of some contexts, especially of the backfill of the wells, caused technical problems. In collaboration with the workshop of the Institute of Archaeology, a special well pulley was erected, with a ramp to allow the excavators to descend into the well and to collect samples above the investigated layers without damage.[96] Subsequent flotation of the samples took place both at the site and in laboratories (see Box: Flotation during archaeological excavations).

The research of Sezimovo Ústí was for many years a flagship of the archaeology of the Late Middle Ages. This exceptional site, investigated in the most modern way, provided exceptional results. However, a complete overview of all findings has, unfortunately, not yet been published.

[95] Richter, M. & R. Krajíc (2001), p. 13.

[96] Hrdlička, L., Richter, M. & Z. Smetánka (1966). Výzkum v Sezimově Ústí v roce 1965. *Archeologické rozhledy, 18*, pp. 663-680.

[97] Activity report of flotation station. Inheritance of B. Soudský, ARÚ Prague Archive.

FLOTATION DURING ARCHAEOLOGICAL EXCAVATIONS

The first experiments on the flotation of the backfills of the archaeological features (storage and waste pits, cesspits, wells, cultural layers etc.) were undertaken around 1960 in collaboration with the research associates of the Czechoslovak Museum of Agriculture in Prague. The attempts focused on the separation of small archaeological finds or their fragments, but also of carbonised plant macroremains including charred wood. The first flotation experiments took place in Bylany in 1959. Hand flotation, however, proved to be time-consuming, which is why Zdeněk Tempír constructed a flotation station. The facility was put into operation on 1 August 1962, however, it was limited by a lack of water. *'The main operation started in August, however, since the beginning of September, the operation had to be restricted after an agreement with the water management service since the channel supplying water to the device also supplied the pond, in which carps were kept. With insufficient water, these had started to die.'*[97]

Archaeological research in Březno in 1965. Flotation of plant macroremains. FT000037081, ARÚ Prague Archive.

Archaeological research in Hrádek near Manětín in 1973. Flotation in action. FT000046461, ARÚ Prague Archive.

In the archaeological site of Sezimovo Ústí (see Box: Sezimovo Ústí), flotation was practised since 1965, immediately within the excavated area. The majority of the samples processed this way stemmed from wells, cesspits and pits. The archaeologist Bohumil Soudský recommended, based on his previous experience from Bylany, to use a honey strainer with two different mesh sizes. The employees of the Institute of Archaeology designed later a flotation box with a system of three variously dense meshes. The facility yielded good results; apart from organic remains, it also allowed recovering small pottery fragments, little bronze and glass fragments etc.[98]

Březno near Louny (a multi-cultural settlement and cemetery, referred to as Březno) was another archaeological site where a flotation machine was used. Z. Tempír and his colleagues from the Czechoslovak Museum of Agriculture installed the device.[99] Preliminary experiments with manual flotation of a part of the backfill of randomly

[98] Hrdlička, L., Richter, M. & Z. Smetánka (1966). Výzkum v Sezimově Ústí v roce 1965. *Archeologické rozhledy, 18*, pp. 663–680.

[99] Pleinerová, I. (1964). Document C-TX-196404405. Archeologický ústav Praha. Accessible at: https://digiarchiv.aiscr.cz/id/C-TX-196404405.

Bylany by Kutna Hora. Remains of the flotation station from 1966. Photo I. Pavlů, 2021.

selected features were undertaken in Březno.[100] In July 1964, negotiations on the installation of a flotation machine took place; a water pipe was laid to the site and in September 1964, systematic flotation of the samples from the backfill started.[101]

In the 2nd half of the 1960s, the floating method was used in several archaeological excavations. It was practiced mainly directly on the investigated sites, for example in Bylany, in Sezimovo Ústí, in Březno, and in a Hallstatt-period cremation cemetery in Hrádek near Manětín directed by Eva Soudská.[102] Systematic flotation proved to be useful and soon became widespread. Today, this method is a standard part of archaeological research.

[100] Pleinerová, I. (1965). Výzkum osady z doby stěhování národů a z doby slovanské v Březně u Loun. *Archeologické rozhledy, 17*, p. 496.

[101] Pleinerová, I. (1964). Document C-TX-196405342. Archeologický ústav Praha. Accessible at: https://digiarchiv.aiscr.cz/id/C-TX-196405342.

[102] Soudská, E. (1973). Document C-TX-197306541. Archeologický ústav Praha. Accessible at: https://digiarchiv.aiscr.cz/id/C-TX-197306541.; Soudská, E. (1973). Document C-TX-197304237. Archeologický ústav Praha. Accessible at: https://digiarchiv.aiscr.cz/id/C-TX-197304237.; Soudská, E. (1971). Document C-TX-197105167. Archeologický ústav Praha. Accessible at: https://digiarchiv.aiscr.cz/id/C-TX-197105167.; Soudská, E. (1970). Document C-TX-197001356. Archeologický ústav Praha. Accessible at: https://digiarchiv.aiscr.cz/id/C-TX-197001356.; Soudská, E. (1968). Document C-TX-196805371. Archeologický ústav Praha. Accessible at: https://digiarchiv.aiscr.cz/id/C-TX-196805371.

THE FIRST IAP (LATER IWGP) MEETING IN KAČINA IN 1968, CZECHOSLOVAKIA

In 1968, a symposium was convened in Czechoslovakia with the aim to coordinate the work of international community of archaeobotanists. Because at that time German was mainly used for communication in archaeobotany, the group was called *Internationale Arbeitsgemeinschaft für Paläoethnobotanik* (IAP). Starting with the meeting in Krakow the name was changed to the International Workgroup of Palaeoethnobotany (IWGP). It was established in Empire-style Kačina Castle near Kutná Hora.[103] An exchange of experiences in the field of the history of cultivated plants and a discussion of methodological questions was on the agenda. The aim was to coordinate the work of European researchers in the field of palaeoethnobotany. 11 participants from 5 countries took place and Zdeněk Tempír, the then director of the National Museum of Agriculture, was entrusted with the organization.

The idea for such a work group was launched on the occasion of the 7th International Archaeological Congress in Prague in 1966, by Maria Hopf (Germany) and her colleagues K. D. Jäger (Germany), M. Follieri (Italy), E. Opravil and Z. Tempír (Czechoslovakia), A. Patay (Hungary), and J. Renfrew (UK). It was then further discussed by correspondence with F. C. Bachteev and M. M. Jakubciner (USSR) as well as with W. van Zeist (The Netherlands).[104] The date of the first meeting of the workgroup was set at 14 to 18 October 1968. However, the timing was not quite perfect. After a period of political liberalization in 1960s, the attempt to grant additional rights to the citizens of Czechoslovakia culminated in 1968 in so-called Prague Spring. Reforms were called for partial decentralization of the economy and democratization, as well as for the freedoms granted including a loosening of restrictions on the media, speech and travel. The period of Prague Spring was terminated by the Warsaw Pact invasion of Czechoslovakia on the night of 20–21 August 1968. Approximately 500,000 troops under the leading of Russia attacked Czechoslovakia that night. After the invasion, almost all of the reforms were reversed and Czechoslovakia entered a period known as Normalisation. This situation could be the reason, why so many invited IWGP participants had to apologize for not coming.

A couple of subjects were discussed: sharing scientific literature, creating maps of the distribution of selected botanical species in the past, the use of literature

[103] Kačina Castle is still the seat of the Czech Rural Museum, branch of the National Museum of Agriculture.

[104] Van Zeist, W., Wasylikowa, K. & K.-E. Behre (1991). Progress in old world paleoethnobotany: A retrospective view on the occasion of 20 years of the International Work Group for palaeoethnobotany. A. A. Balkema.

The facade of the Kačina chateau. Photo A. Pokorná, 2021.

for determination, unification of nomenclature, creation of national archives and sending circular letters. For each point, tasks were assigned to specific people, deadlines were set and it was described in detail what the result was to look like. The IWGP organization was established and the way of its future operation was arranged. In order to achieve the fullest possible overview of all palaeoethnobotanical publications, the following regulations were implemented: The bibliography should include macroremain determinations of cultivated plants and their products, as well as weeds on arable land and all collected and wild plants examined in connection with archaeological excavations. Reports were to be sent to K. D. Jäger.[105]

J. J. Hémardinquer (Paris) sent to the symposium several maps for a projected atlas on the history of the dispersal of the most important cultivated plants

[105] A list of responsible persons from individual countries follows with Opravil representing Czechoslovakia.

Participants of the first IWGP meeting, from the left: unknown, H. H. Knörzer, W. van Zeist, W. Gizbert, Z. Tempír, A. Patay, K.-E. Behre, M. Hopf, H. Przesławska, Madam van Zeist, M. Klichowska, U. Willerding. Photo J. Jaroš, 1968. Photo archive K.-E. Behre.

with a request for comments. There was general agreement that, for scientific purposes, new maps should be made on a larger scale and with individual find signatures. The symposium of participants suggested that such maps should first be prepared for all areas of Europe (some were then already in the works: for Poland, Czechoslovakia, Hungary, and Germany).[106] As an attachment to the maps; the following information is essential: information on the plant species, location (including county or district), quantity (number, weight, percentage according to the number), date (culture, time of the find and date of a record), author of determination and references to literature.

In order to achieve the greatest possible certainty and uniformity in the determination of the individual species in the future, it was suggested that individual colleagues should determine the essential characteristics of the seeds/fruits of those plant species which were most familiar to them. The information, which must be based on

[106] Followed by a list of responsible persons for a map individual (including non-European) countries.

Participants of the first IWGP meeting, from the left: W. Gizbert, K.-E. Behre, U. Willerding, Z. Tempír. Photo J. Jaroš, 1968. Photo archive K.-E. Behre.

Participants of the first IWGP meeting, from the left: K.-E. Behre, A. Patay, W. Gizbert, M. Hopf, H. H. Knörzer, Madam van Zeist, F. Kühn. Photo J. Jaroš, 1968. Photo archive K.-E. Behre.

the author's experience as well as include the available literature, should primarily be suitable for the determination of waterlogged and charred seeds/fruits.[107]

It was also recommended to set up central palaeoethnobotanical archives for the individual countries, possibly also for smaller territorial units. These archives were intended to collect evidence in the form of images, data and publications. The creation of photo files for as many plants finds as possible, especially as far as they

[107] Again followed by a list of persons responsible for individual species and deadlines.

Participants of the first IWGP meeting, from the left: Z. Tempír, W. Gizbert, U. Willerding, A. Patay, W. van Zeist, M. Klichowska, M. Hopf, K. H. Knörzer, F. Kühn, K.-E. Behre, H. Przesławska. Photo J. Jaroš, 1968. Photo archive K.-E. Behre.

are unpublished, was seen as particularly important.[108] Circulars were to be sent to all scientists being active in the field of palaeoethnobotany, including those who couldn't participate in the symposium. The circulars should inform them about the progress and results of the discussions and should ask them to collaborate on the tasks discussed.

There was a full unanimity among the symposium participants to maintain mutual contacts and regular meetings in the form carried out as the International Working Group for Palaeoethnobotany (IWGP). This loose working group has no registered members and no president; it is not to be affiliated with any other organization for the time being. The meetings and their topics should be arranged from one meeting to the next as required and, if possible, change from country to country. The host country provides the secretary to conduct the necessary business.

(Based on a document signed by Behre, Hopf, and van Zeist, for more details see Documents in the Attachment).

[108] It was explicitly stated that Tempír, Patay and Hopf are already working on such archives.

The IWGP conference after Kačina took place every three years and gradually became the world's most important event in the field of archaeobotany. Conferences did not return to Czechoslovakia until 1989, when it was held in Nitra-Nové Vozokany, Slovakia.

PAPERS PRESENTED IN THE FIRST IWGP

Arpád Patay (Budapest, Hungary): Archäobotanischer Samen- und Fruchtfundekatalog in Ungarn und Archäobotanische Forschungen im Ungarischen Landwirtschaftlichen Museum (Archaeobotanical catalogue of seeds and fruits in Hungary and archaeo-botanical research in the Hungarian Agricultural Museum)

Ulrich Willerding (Göttingen, West Germany): Beiträge zu einer synthetischen Bearbeitung prähistorischer Kulturpflanzenreste Mitteleuropas – Aufgaben und Probleme (Contributions to a synthetic treatment of prehistoric crop remains of Central Europe – tasks and problems)

František Kühn (Brno, Czechoslovakia): Beitrag zur Morphologie von Ähre und Korn bei prähistorischen Weizen (Contribution to the morphology of the ear and grain of prehistoric wheat)

Karl-Heinz Knörzer (Neuss, West Germany): Genutzte Wildpflanzen in vorgeschichtlicher Zeit (Wild plants used in prehistoric times)

Zdeněk Tempír (Prague, Czechoslovakia): Vorschlag der wichtigsten Kriterien bei den Analysen der archäologischen Funde von Resten landwirtschaftliche Fruchtarten und Unkräuter und bei der Erfassung von bisherigen Fundes (Proposal of the most important criteria for the analysis of the archaeological finds of the remains of agricultural crops and weeds and for the recording of previous finds)

Melania Klichowska (Poznań, Poland): Kurzer Bericht über die palaeoethnobotanische Forschung in Polen (Brief report on palaeoethnobotanical research in Poland)

Willem van Zeist (Groningen, the Netherlands): A few remarks with respect to practical problems

Karl-Ernst Behre (Wilhelmshaven, West Germany): Botanische Untersuchungen von archäologischen Grabungen im norddeutschen Küstengebiet (Botanical investigations of archaeological excavations in the north German coastal area)

Maria Hopf (Mainz, West Germany): Vicia faba L.

František Kühn (Brno, Czechoslovakia): Ein Fund von verkohlten Samen in der Ackerkrume (A find of charred seeds in the topsoil)

Maria Follieri (Rome, Italy): Botanical study of wood as an aid to the Archaeology

INSTITUTIONALIZATION OF ARCHAEOBOTANY IN CZECHOSLOVAKIA AS A DISCIPLINE (THE 1960s–80s)

The 1960s and 70s represent a turning point in both archaeology and botany. The methods of exact sciences became an integral part of archaeobotany under the new concept of Processual Archaeology.[109] One of the basic principles was (and still is) to build arguments on a careful analysis of the data from archaeological excavations and on a systematic knowledge of cultural anthropology and ethnology. Radiocarbon dating became an available method; its introduction stressed the role of organic material from archaeological excavations, which was favourable for the new disciplines of archaeobotany and archaeozoology that ensured acquiring verified environmental data. Processual archaeology was a minor theoretical movement, yet it was practiced by important personalities who worked with exact data. The field of botany was, at that time, dominated by phytocoenology (also known as phytosociology), which describes plant communities (groups of plant species usually growing together) and their role in the landscape of a given territory. Palaeobotany, on the other hand, focused on obtaining more detailed data from bog sites and other sediments.

By the end of the 1960s, Czechoslovak archaeology maintained a high professional level. As an example, we can mention archaeologist Evžen Neustupný and physicist Václav Bucha, who recognised among the first fluctuations of ^{14}C activity in the atmosphere and the need for calibration.[110] The fieldwork at the Neolithic site of Bylany made substantial progress and became the boast of Czechoslovak prehistoric archaeology. However, after the Soviet occupation in 1968, the political situation and social atmosphere in Czechoslovakia changed substantially. The so-called Normalisation period had a deep impact on society as a whole and no less on archaeology. After political clearances around 1970 and a major reduction in foreign relations, a number of promising international cooperation projects were interrupted.[111]

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[109] Brothwell, D. & E. S. Higgs (eds.). (1963). Science in Archaeology. Cambridge University Press.; Clarke, D. (1968). Analytical archaeology. London (Methuen).

[110] Bucha, V. & E. Neustupný (1967). Changes of the Earth's Magnetic Field and Radiocarbon Dating. *Nature, 215*, pp. 261–263.

[111] After 1971, the 'Act on the Protection of State Sectrets' came into force, which restricted contacts with colleagues in foreign countries. All abroad connections were monitored, correspondence was controlled and recorded, publishing abroad had to be allowed by the director of the Institute of Archaeology. Foreign trips were permitted only to certified employees, preceded by an interview by the director and exact travel plans; after arrival, the employees had to submit a written report

Experimental plowing at the Research Institute of Plant Production in Prague – Ruzyně in 1982. V. Müller, Z. Tempír. Photo V. Jílková. FP000078401, ARÚ Prague Archive.

The earlier research excavations (Bylany, Březno, Závist and Sezimovo Ústí) continued, as well as investigations of prehistoric metallurgy and agriculture. The research activities, however, were bound and restricted by a state plan, in numerous Brigades of Socialist Labour and Rationalization Committees, which, among others, led to looking for further specializations, in view to eliminate mutual concurrence between the researchers. Investigation of medieval settlements (abandoned towns, ceased villages and monasteries), montane archaeology (mines and panning sites) developed at the time of the Normalisation. Experimental archaeology flourished too (for example, the establishment of archaeological parks, experimental burning of pottery, melting, ploughing and harvesting of prehistoric grain types). New natural scientific methods were increasingly applied.[112]

on all personal contacts including the subjects of their conversations. Kuna, M., Maříková-Kubková, J. & M. Starcová (2019). pp. 104–105.

[112] Since the 1970s, chemical and phosphate analyses, geophysical measurements, neutron activation analyses of the finds as well as archaeobotanical analyses of the finds of cultivated plants started to occur more often within the excavations.

Partial adaptation of archaeology to rescue activities, mainly in areas of surface mining of brown coal in north-western Bohemia, meant a shift in theory and method of the field excavations. The branch office of the Institute of Archaeology in Most was established already in 1953.[113] Ten years later (1963), a specialised Department of Rescue Excavations was founded. The District of Most in north-western Bohemia became the touchstone of rescue archaeology. Rapidly progressing surface mining of brown coal meant huge surface outcrops, but the capacity of archaeologists could not be enough for it. Completely different fieldwork priorities brought new perspectives on the tasks and methods of archaeology. A number of progressive approaches were applied, e. g., the targeted study of regions, sampling principles, non-destructive surveys etc.[114]

In the 1970s and 80s, the process of the development of archaeobotany from mere recording of finds to a modern scientific discipline was completed. Bohumil Soudský, the head of the excavation of the Neolithic site in Bylany, was in 1960 one of the first in Europe to erect a flotation station at the base of the excavation site (see interview with Pavlů). Zdeněk Tempír analysed the recovered archaeobotanical material and Emanuel Opravil continued systematic revision of museum finds (see preceding chapter) and he also created a complete bibliography of plant finds in Czechoslovakia (based on conclusions of the first IWGP in Kačina).[115] Regardless of the unfavourable political situation, personal contacts with the IWGP community were maintained. Thanks to this collaboration, the results of Czechoslovak archaeobotany became part of published international syntheses. [116]

The most important shift in archaeobotany at that time was the rapid development of the flotation methods[117] and increasing interdisciplinarity of research. The collaboration between archaeologists and botanists became a common practice,

[113] There were more reasons to establish branch offices: Changes in the agricultural management (deep ploughing and heavy mechanisation) together with 'Socialist construction projects' (power lines, supply lines, mines and quarries). In North-Western Bohemia, an enormous amount of archaeological monuments at once was endangered and the capacities of the Institute of Archaeology were insufficient to conduct complete rescue archaeology. The reason to establish additional two branch offices, in Opava (1955) and Pilsen (1956), was the same.

[114] Kuna, M., Maříková-Kubková, J. & M. Starcová (2019), p. 156.

[115] Opravil, E. (1973). Bibliographie der Tschechoslowakischen Quartärpaläobotanik (bis 1970). *Acta museorum agriculturae, 8*(1), pp. 15–67.

[116] Zeist, W., Wasylikowa, K. & K.-E. Behre (1991). Progress in old world paleoethnobotany: A retrospective view on the occasion of 20 years of the International Work Group for Palaeoethnobotany. A. A. Balkema.; Zohary, D. & M. Hopf (1993). Domestication of plants in the Old World: The origin and spread of cultivated plants in West Asia, Europe and the Nile Valley. Oxford university press.

[117] On selected sites (see Box: Flotation during archaeological excavations), thousands of litres of sediments were floated, esp. In the case of medieval Most (Čulíková 1995) and Mikulčice (Opravil 2003).

with archaeobotany being practiced mainly by professionals: E. Opravil, E. Hajnalová and V. Čulíková (to a lower extent also Z. Tempír, Z. Dohnal, F. Kühn and F. Holý). Opravil focused on the systematic study of historical centres of towns and smaller medieval settlements. He focused on plant macroremains from waterlogged situations, which often provide a much wider range of species, compared to charred material. His emphasis on the study of wild-growing plant species allowed him to reconstruct various types of vegetation.[118] Based on the so-called diagnostic species found in macroremain assemblages (in the sense of phytocoenology), he tried to reconstruct the past phytocoenological vegetation types.

The first pollen analysis which shows the history of settlement and agriculture at a Medieval locality did Eliška Rybníčková (the Institute of Botany of the CAS in Brno) in Pfaffenschlag (Rybníčková & Rybníček 1975). In the first half of the 1980s, Vlasta Jankovská (the Institute of Botany of the CAS in Brno) carried out the first experimental pollen analysis of anthropogenetic sediments from the backfill of a well in the historical centre of Most.[119] In the following years, she analysed and interpreted pollen spectra in many archaeological sites, mainly from wells and cesspits. Since the mid-1980s, other disciplines have become an integral part of analyzes at archaeological sites, e. g. dendrochronology, malacology, osteology entomology, parasitology, microbiology and others.[120]

EXPERIMENTS

Experimental archaeology is popular not only among experts, but also among the general public. Czechoslovak archaeology started to experiment already in the 1960s. At first, it was experimenting with iron-melting furnaces, burning of ceramic vessels, the production of stone tools and using them. In the 1980s, archaeological parks

[118] Opravil, E. (1969). 'Synantropní rostliny dvou středověkých objektů ze SZ Čech'. *Preslia, 41*, pp. 248–257.; Opravil, E. (1972). 'Synantropní rostliny ze středověku Sezimova Ústí (Jižní Čechy)'. *Preslia, 44*, pp. 37–46.; Opravil, E. (1978). 'Synanthrope Pflanzengesellschaften aus der Burgwallzeit (8.–10. Jh.) in der Tschechoslowakei'. *Berichte der Deutschen botanischen Gesellschaft, 91*(1), pp. 97–106.; Opravil, E. (1980). 'Z historie synantropní vegetace 1–6'. *Živa, 28*, pp. 4–5, 53–5, 88–90, 130–1, 167–8, 206–7.; Opravil, E. (1994). 'Synantropní vegetace ze středověku a z počátku novověku města Olomouce'. *Zprávy České botanické společnosti, 11*, pp. 15–36.

[119] Jankovská, V. (1983). Výsledky pylové analýzy sedimentu ze středověké studny v Mostě. *Památky archeologické, 74*, pp. 519–523.

[120] Čulíková, V. (2004). Archeobotanika v české archeologii na prahu 3. tisíciletí. Archeologické rozhledy, 56(3), pp. 661–671.

Experimental harvest of emmer wheat at the Research Institute of Plant Production in Prague – Ruzyně in 1981. Z. Tempír – work with a bronze sickle. Photo V. Jílková. FP000078374, ARÚ Prague Archive.

were founded (Březno and Kosmonosy). According to Radomír Pleiner,[121] who in 1964 conducted the first experimental melting of iron in the course of the excavation in Březno,[122] *'The main aims of experiment in archaeology are: finding effective tools and facilities, interpreting artefacts of unknown function, reconstructing possible production processes, and the studying of their reflection in the material of the artefacts.'*[123]

For a long time, the history of agriculture was only a peripheral research interest. The beginnings of the research of the possibilities of prehistoric and early medieval agriculture are connected with the name of Magdalena Beranová from the Institute

[121] Starcová, M. (2020). Radomír Pleiner. Archeologický ústav AV ČR. Accessible at: https://www.arup.cas.cz/kontakty/personalia/emeritni-pracovnici/pleiner-radomir/.

[122] Pleiner, R. (1969). Experimental smelting of steel in early medieval furnaces. *Památky archeologické, 60*(2), pp. 458–487.

[123] Kapustka, K. (2019). Vyzkoušet minulost. In Kuna, M., Starcová, M. & J. Maříková-Kubková (eds.). *Sto let v archeologii*, p. 142. Archeologický ústav AV ČR, Praha – Academia.

of Archaeology in Prague.[124] The impetus came, among others, from the research excavation of the Neolithic settlement in Bylany and the Slav hillforts Klučov and Kouřim. Beranová summarised her findings in the book *Zemědělství starých Slovanů* (Agriculture of the Old Slavs, 1980).

The first attempts at cultivating and harvesting prehistoric species of cereals were undertaken in the first half of the 1980s. In 1981–86, the Research Institute of Plant Production (VÚRV) in Prague-Ruzyně carried out experiments with the cultivation and harvest of emmer (*Triticum dicoccon*), experimental ploughing with prehistoric ploughs, grinding wheat with stone mills from various periods and even baking bread from the obtained flour.[125] Emmer was used because it was the prevailing prehistoric cereal. Samples of emmer, which Z. Tempír and F. Kühn found in modern fields in Slovakia, were preserved and cultivated in the VÚRV. For the harvest, replicas of knives and sickles from various periods of prehistory and the Middle Ages as well as tools borrowed from the Ethnographic Museum were used.[126]

Experimental harvest of emmer wheat at the Research Institute of Plant Production in Prague – Ruzyně in 1981. E. Kazdová – work with a sickle. FP00078385, ARÚ Prague Archive.

Experiments on the cultivation of prehistoric cereal species are still on-going in the archaeological park in Březno.

[124] Starcová, M. (2020). Magdalena Beranová. Archeologický ústav AVČR. Accessible at: https://www.arup.cas.cz/kontakty/personalia/emeritni-pracovnici/beranova-magdalena/.

[125] At the Institute of Archaeology, Magdalena Beranová was entrusted with experimental archaeology; she collaborated with the experts from the Czechoslovak Museum of Agriculture (Z. Tempír, V. Müller), the Research Institute for Plant Production (I. Bareš and J. Sehnalová) and the Department of Archaeology and Museology of the Faculty of Arts of J. E. Purkyně University in Brno (E. Kazdová). Zemědělské pokusy 1981. TP-198501374, Archive of the Institute of Archaeology in Prague.

[126] The reports from the experiments are stored in the Archive of the Institute of Archaeology of the CAS in Prague, TP198501374, TP198501782, TP198501783, TP198502949 and TP198603580.

THE NORTH BOHEMIAN BROWN COAL BASIN, THE TOWN OF MOST AND ARCHAEOBOTANY

The North Bohemian Basin, also referred to as the Most Basin is situated in north-western Bohemia at the foot of the Ore Mountains and was continuously settled since the Mesolithic. An important element of this fertile landscape was the Komořany Lake, the largest natural lake on the territory of the Czech Republic. Its sediments preserved the palaeo-environmental record from the last glacial almost to the present. In the Middle Ages, the town of Most[127] was founded nearby the remains of this lake, on a trade route connecting Prague and Central Bohemia with Freiberg in Saxony.

The Most Basin belongs among the richest brown coal deposits in Europe. The coal seams are 25–45-m thick and situated close beneath the surface, which favours surface mining. The exploitation started in the second half of the 19th century, but only in the 1950s, it reached apocalyptic dimensions. Most of this fertile landscape does not exist anymore; the sediments of the Komořany Lake have completely vanished (Vlasta Jankovská collected the last samples with the diggers behind her

North Bohemian Brown Coal Basin. Aerial view of a transformed landscape, furrowed by opencast lignite mining. Photo P. Pokorný, 2016.

[127] The place name Most means 'bridge'. The town was named after a system of bridges that crossed the swamps in this area in the 10th century. The German name for Most is Brüx (from Brücke).

The former building of the branch of the Archaeological Institute of the Czechoslovak Academy of Sciences in Most, originally a commandery of the Order of the Crusaders of the Red Star. Photo R. Podzemný, 1958. FT000021286, ARÚ Prague Archive.

back). As a consequence of the coal mining, tens of villages have disappeared in the 1970s and 80s as well as the royal town of Most with many valuable architectural monuments.[128] Between 1965 and 1987, the whole town was demolished and the inhabitants (almost 20,000 people) had to move to a newly constructed modern town (the today's Most), built in the modern style of prefab estates. Ironically, at the same time, the archaeological excavation of the suburb of Sezimovo Ústí took place (see Box: Sezimovo Ústí), a medieval town in South Bohemia, which was abandoned in 1420 in connection with the Hussite movement (and was renewed only in the 19th century). The communist regime subscribed to the ideals of the Hussite 'Christian communism', i. e. the voluntary share of the property without private ownership. This was one of the reasons why the archaeological excavation in Sezimovo Ústí was so generously supported, while the investments in the archaeological research of vanishing Most and the surrounding landscape did

[128] In the summer of 1968, the Hollywood film 'The Bridge at Remagen' was shot in Most making use of the demolitions for the war scenes.

not correspond with the extent and speed of its destruction. A comparison of both towns is also interesting in another respect: the remains of Sezimovo Ústí, abandoned at once, provided, many centuries later, valuable information on the life in a medieval town. The remains of deserted town of Most, on the other hand, were completely destroyed by coal mining.

As Jan Klápště, an archaeologist working then in the Most region, said: 'We have lost a part of our landscape, which can be compared to a book with an immense amount of diverse information, from which we ourselves at this moment are able to perceive only a part. It is not only us, but also all following generations who have lost the opportunity to open this imaginary book again and again and to read it in their own way'.[129] It was impossible to record everything and necessary to set priorities and focus the available capacities on them. It was exactly this situation and the effort of specific archaeologists that contributed to the fact that the district of Most saw the beginnings of a top-class research in landscape archaeology (completed after 1989). Archaeobotany was also used in Most (Věra Čulíková) and the very first pollen analysis of cesspits was performed there (Vlasta Jankovská). The samples for pollen analysis stemmed from a well. Jan Klápště remembers that nobody believed that there would be anything at all, but, apart from pollen, Vlasta Jankovská found also egg shells of intestinal parasites. After that, V. Jankovská analysed a number of other contexts from the medieval town, for example, from the centre of Prague. Only in the 1990s, however, it became a standard procedure to research contexts simultaneously using various methods (macroremains, pollen, charcoal, bones and others) and to evaluate the results as a whole.[130]

Vessels at the bottom of a cesspit No. 6, Horova street No. 26 in Most. According to the book by J. Klápště (1976).

[129] Štefan, I. (2018). Čí je ta krajina? Rozhovory s Janem Klápště o středověku a našem světě. Nakladatelství Lidové noviny.

[130] Čulíková, V. (2008). Ovoce, koření a léčiva z raně novověké jímky hradčanského špitálu. [Fruits, spices and medicaments from the post-Medieval cesspit of hospital at Prague-Hradčany]. *Archeologické*

ARCHAEOBOTANY AFTER 1989

After the 'Velvet Revolution' in 1989 in Czechoslovakia, which overthrew the Communist regime and led the Czechs and Slovaks back on the track of the democratic world, travelling abroad and direct contact with foreign colleagues became possible again. At the beginning of the 1990s, archaeology was still influenced by traditional typological streams, which did not much use archaeobotany. A number of researchers, especially those from the Prague Institute of Archaeology of the CAS, were working with the (exact) methods of processual archaeology. Besides this, elements of the post-processual theory began to influence Czechoslovak archaeology. The search for new streams in archaeology after 1989 was connected with the development of landscape archaeology, which integrated exact methods with elements of the phenomenology of the landscape,[131] an approach, which apart from excavations, made use of aerial archaeology, which was developed mainly by Martin Gojda.[132]

rozhledy, 60 (1–2), p. 229.; Čulíková, V. (2012). Rostlinné zbytky ze zaniklé studny: svědci historie Jiřského náměstí na Pražském hradu ve 13. století. [Vegetal macro-remains from the defunct well: witness the Jiřské Square history at the Prague Castle in the 13th century]. *Archeologické rozhledy, 64*, pp. 479–502.; Jankovská, V. (2011). The Middle Ages in pollen-analytical research on the territory of the Czech Republic. *Bulletin of Geography. Physical Geography Series*, 4, pp. 47–70. http://doi.org/10.2478/bgeo-2011-0003.; Kočár, P., Čech, P., Kozáková, R. & R. Kočárová (2010). Environment and economy of the early medieval settlement in Žatec. *Interdiscip Archaeol, 1*, pp. 45–60.; Preusz, M., Beneš, J., Kovačiková, L., Kočár, P. & J. Kaštovský (2014). What did they eat, what did they drink, and from what? An interdisciplinary window into everyday life of the early modern burgher's household in Český Krumlov (Czech Republic). *Interdisciplinaria Archaeologica, Natural Sciences in Archaeology*, 5(*1*), pp. 59–77. http://doi.org/10.24916/iansa.2014.1.5.; Šálková, T., Houfková, P., Jiřík, J., Kovačiková, L., Novák, J., Pták, M., Bešta, T., Čejková, A. & E. Myšková (2015). Economy and environment of a medieval town reflected in wells backfill in Písek, Bakaláře square (South Bohemia, Czech Republic). *Interdisciplinaria Archaeologica,* 6(1), pp. 63–82.; Rybníčková, E., Rybníček, K. (1975): Ergebnisse einer paläogeobotanischen Erforschung der mittelalterlichen Wüstung Pfaffenschlag (Tschechoslowakei). – In: Nekuda, V. et al.: *Pfaffenschlag, zaniklá středověká ves*, Brno.; Houfková, P., Horák, J., Pokorná, A., Bešta, T., Pravcová, I., Novák, J. & T. Klír (2019). The dynamics of a non-forested stand in the Krušné Mts.: the effect of a short-lived medieval village on the local environment. *Vegetation History and Archaeobotany, 28*(6), pp. 607–621.

131 Gojda, M. (1993). Bohemia from the air: Seven decades after Crawford. *Antiquity, 67*(257), pp. 869–875. https://doi.org/10.1017/S0003598X00063870; Zvelebil, M. & J. Beneš (1997). Theorising landscapes: the concept of the historical interactive landscape. In Chapman, J. & P. Dolukhanow (eds.). Lanscape in flux. Central and Eastern Europe in Antiquity. *Colloquia Pontica 3.*, pp. 23–40. Oxbow Books.

132 Gojda, M. (1997). The contribution of aerial archaeology to European landscape studies: Past achievements, recent developments and future perspectives. *Journal of European Archaeology*, *5*(2), pp. 91–104.

A unique find of wooden cistern structures that served as a source of water in an outer bailey of the Vladař hillfort. Its content served as a source of palaeoenvironmental data. Photo P. Pokorný, 2010.

In his Czech monograph, Martin Gojda summarized the whole 1990s a commented extensively also on the development of archaeobotany.[133] Already at beginning of the 1990s, he collaborated with landscape archaeologists such as the botanist Jiří Sádlo, whose studies on the landscape as an organism contributed importantly on linking Bohemian botany and archaeology.[134]

Another phenomenon after 1989 was the relaxing of the rigid institutional structures, which now offered more freedom to the research, the search for new ways and approaches or the possibility to develop approaches that started earlier. An example is offered by the development of landscape archaeology. Large-scale total destruction of the landscape in the brown coal basin at the foot of the Ore Mountains already in the 1980s led some researchers to the effort to capture and study whole segments of the landscape in detail. Important was the

[133] Gojda, M. (2000). Archeologie krajiny (Archaeology of landscape). Academia.

[134] Sádlo, J. (1994). Krajina jako interpretovaný text (Landscape as the interpreted text). In Beneš, J. & V. Brůna (eds.). Archeologie a krajinná ekologie (Archaeology and Landscape Ecology). Nadace Projekt Sever.

Coring at the locality Hrabanovská černava for palaeoecological analysis. From the left: Miloš Kaplan, Petr Kuneš and Libor Petr. Photo P. Pokorný, 2003.

post-revolutionary workshop on *'Archaeology and Landscape Ecology'*, which was published in 1994 under the same name.[135] Landscape archaeology was later (and still is) practised at the Institute of Archaeology in Prague, especially by Dagmar Dreslerová and other colleagues (e. g. Martin Kuna,[136] see Box: The Institute of Archaeology in Prague).

In the preceding decades, freedom of travel was unthinkable. In the 1990s, the only restrictions were of a financial nature.[137] For many Czechoslovak researchers, the opportunity to visits institutions abroad was a big inspiration (see interview with Jaromír Beneš, further, e. g. the visit of young palynologists such as Petr

[135] Beneš, J. & V. Brůna (1994).

[136] Kuna, M. & D. Dreslerová (2016). Landscape archaeology and 'community areas' in the archaeology of central Europe. In Hicks, D., McAtackney, L. & G. Fairclough (eds.). Envisioning Landscape, pp. 146–171. Walnut Creek: Left Coast Press.

[137] In 1998, J. Beneš organised a joint transportation of students and other colleagues (e. g. of V. Jankovská to the 11th IWGP in Toulouse, France). The following IWGP meetings were already attended by Czech and Slovak archaeobotanists on a regularly basis.

Pokorný and Petr Kuneš at Bern University, which helped to develop palynology). It became soon possible to develop personal contacts with foreign colleagues on the institutional level. The first large international project focusing on landscape archaeology was initiated by a British archaeologist of Czech origin, Marek Zvelebil from Sheffield University, who together with Martin Kuna and Jaromír Beneš from the Institute of Archaeology in Prague and the British Academy realized the *'Ancient landscape reconstruction in northern Bohemia'* project (ALRNB) together with Sheffield University.[138] The contacts with Sheffield were extremely important for Czech archaeology. Apart from work on the project itself, which was connected with the palynologist Simon Butler, also the archaeozoologist Mark Beech started to work in Czechoslovakia together with Lubomír Pešek from the Institute of Archaeology of the CSAS on a number of interesting sites. All mentioned collaborators contributed strong elements of environmental archaeology. By then, Sheffield was one of the best archaeological institutions in the UK active in landscape and environmental archaeology, including archaeobotany. The ALRNB immediately followed the research of the vanishing landscape in the land of Most (see Box The North Bohemian Brown Coal Basin in the preceding chapter).

The long-term work with archaeobotanical material from the town of Most culminated in a PhD thesis by Věra Čulíková, which included the processing of a large amount of archaeobotanical data from medieval layers and features. Her work on the vegetation of medieval Most[139] was essential and ground-breaking for Czech archaeobotany. Similarly ground-breaking for the development of botany, especially for the study of the history of synanthropic vegetation and agricultural plants in later years, was Věra Čulíková's occupation with the reconstruction of the plant component and the natural environment based on analyses of plant macro-remains mainly from medieval sites.[140] V. Čulíková demonstrated the possibilities of the identification of many specific species from archaeological finds. She captured an extraordinarily high number of botanical species and described the appearance and character of the plant environment of a town. She continued the work of her older colleague Emanuel Opravil, who had worked on synanthropic

[138] Zvelebil, M., Beneš, J. & M. Kuna (1993). Ancient landscape reconstruction in north Bohemia, Landscape and settlement programme – Projekty rekonstrukce krajiny v severních Čechách – Krajina a sídla, *Památky archeologické, 84*, pp. 93–95.

[139] Čulíková, V. (1994). Rekonstrukce synantropní vegetace středověkého města Mostu (Reconstruction of the synanthropic vegetation of the medieval town of Most). Památky archeologické. Suppl. 2, *Mediaevalia Archaeologica Bohemica* 1993. 1994, pp. 85, 181–204.

[140] Čulíková, V. (2000). Assortment of the Plants in the Medieval Diet in Czech Countries (based on archaeobotanical finds). *Acta Universitatis Carolinae Medica, 41*, pp. 105–118.
Čulíková, V. (2002). Archeobotanika – Archäobotanik. In *Archeologie středověkého domu v Mostě (čp. 226)*, Praha: Mediaevalia archaeologica, pp. 136–157.

Archaeological research of the Neolithic settlement in Radčice with total sampling of the sunken feature. Photo M. Pták, 2015.

vegetation since the 1960s (see preceding chapter). In the 1990s, also the results of Emanuel Opravil's systematic archaeobotanical research of the deserted medieval town of Sezimovo Ústí were published (see Box: Sezimovo Ústí).[141]

In the 1990s, the massive reconstruction of the – for a long time neglected – centres of historical towns and the construction of motorways and other line constructions started. Intensive building activities necessitated intensive archaeological rescue excavations. It was the 1990s, when the number of analysed archaeological sites compared to the preceding period multiplied several times. Excavations in the centres of historical towns enabled the bloom of the archaeobotany of the Middle Ages. The type of financing research in the 1990s, led to the commercialisation also of archaeobotanical research, which allowed many students to gain experience in archaeobotany and archaeozoology both by having sufficient material for the analyses and by being able to earn enough money by conducting research in their own discipline. In 1999, Petr Kočár and Romana Kočárová left České Budějovice

[141] Opravil, E. (1997). Vegetační poměry Sezimova Ústí a jeho okolí ve středověku. In Kubková, J., Klápště, J., Ježek, M. & P. Meduna (eds.). Život v archeologii středověku, pp. 498–506. Praha: Peres.

Býčí skála cave sanctuary is the central site of the Hallstatt Period in Moravia. Thanks to the burials and accompanying sacrifices deposited in the cave, an abnormally large amount of grain has been preserved. Research by M. Golec and Z. Golec Mírová. Photo J. Beneš, 2022.

for Pilsen; they started to offer archaeobotanical services on a commercial basis, first as freelancers, then in collaboration with the West-Bohemian Institute for Heritage Resource Management (ZIP), which had been established in 2002 as a non-governmental research institute. Apart from archaeological research, it engages especially in archaeobotany and archaeozoology. Around 2002, three independent institutions started to be active in the field of archaeobotany: Archeos, ZIP and the Institute of Archaeology in Prague.[142]

[142] Dreslerová, D. (2008). Pozdě, ale přece: environmentální archeologie v České republice – Better late than never: environmental archaeology in the Czech Republic. In Beneš, J. & P. Pokorný (eds.). Bioarcheologie v České republice – Bioarchaeology in the Czech Republic, pp. 13–38. České Budějovice – Praha. http://doi.org/10.13140/RG.2.1.1742.8889.

An important phenomenon of this era was the development of interdisciplinarity, which manifested both in the processing of specific excavations[143] and in the structure of traditional and newly founded institutions. As an example, we can mention the Department of Natural Sciences and Archaeometry of the Institute of Archaeology in Prague, where, i. e., the palynologists Miloš Kaplan and Petr Pokorný were employed, who carried out ground-breaking palynological analyses used to answer archaeobotanical questions. Completely new institutions came into being as well, such as the University of South Bohemia in České Budějovice founded in 1991. Here, archaeobotany was included in the education of students of botany in 1996 in the course of lectures on the Development of Central European Landscape (Jaromír Beneš), Nature and Man in the Holocene (Petr Pokorný) and in a practical course on palynology (Vlasta Jankovská). Soon a group of young botanists gathered around Jaromír Beneš and started intensive work. As a whole, the group participated in the IWGP in Toulouse, France. In 2002, The Laboratory of Archaeobotany and Palaeoecology (LAPE) was established. Since the beginnings, its founder, Jaromír Beneš, collaborated there with the botanist Veronika Komárková, Jan Novák (anthracology) and his wife Kateřina Nováková, which focused on the analyses of pollen and cladocera (see Box: The Laboratory of Archaeobotany and Palaeoecology).

Continuing the earlier research of Emanuel Opravil and Věra Čulíková, new people appeared in the 1990s, and even more at the beginning of the 21st century and engaged in the discipline (e. g., in connection with education). The role of Petr Kočár was important; he carried out a number of high-quality analyses on a commercial basis and similarly Romana Kočárová in the area of anthracology. Petr Pokorný (a student of Vlasta Jankovská) concentrated on pollen analyses since the mid-1990s and carried out a number of innovative research projects with the participation of foreign archaeobotanists (e. g., Nicol Boenke), i. e., at the Iron-Age hillfort of Vladař near Žlutice or at the vanished South-Bohemian Švarcenberk Lake (see Talking sites Švarcenberk Lake and Vladař). Later, Radka Kozáková (a student of Petr Pokorný) wrote her contributions on pollen analysis from archaeological contexts.[144] The activity of anthracologist Jan Novák was essential in the CR for

[143] Šálková, T., Houfková, P., Jiřík, J., Kovačiková, L., Novák, J., Pták, M., Bešta, T., Čejková, A. & E. Myšková (2015). Economy and environment of a medieval town reflected in wells backfill in Písek, Bakaláře square (South Bohemia, Czech Republic). *Interdisciplinaria Archaeologica*, *6*(1), pp. 63–82.

[144] Kozáková, R., Pokorný, P., Havrda, J. & V. Jankovská (2009). The potential of pollen analyses from urban deposits: multivariate statistical analysis of a data set from the medieval city of Prague, Czech Republic. *Vegetation history and archaeobotany*, *18*(6), pp. 477–488. http://doi.org/10.1007/s00334-009-0217-7.; Kozáková, R., Pokorný, P., Mařík, J., Čulíková, V., Boháčová, I. & A. Pokorná (2014). Early to high medieval colonization and alluvial landscape transformation of the Labe valley (Czech Republic): evaluation of archaeological, pollen and macrofossil evidence. *Vegetation history and archaeobotany*, *23*(6), pp. 701–718. http://doi.org/10.1007/s00334-014-0447-1.

the development of non-pollen palaeoecology.[145] Around 2010, the pollen analyst Petra Houfková-Marešová and the analysts of plant macroremains, Alexandra Bernardová and Jitka Kosňovská-Irmišová start started their work. At that time, Adéla Pokorná turns to archaeobotany, first at the LAPE, later in the course of her PhD studies at the Botany Department of the Faculty of Science of the Charles University in Prague.

The situation in Slovakia was relatively clear since only one institution carried out archaeobotanical research under the direction of Eva Hajnalová, who specialised mainly in the support of prehistoric archaeology. The success of this Slovak department within the Institute of Archaeology of the SAV in Nitra was crowned with the organization of the IWGP in 1989. Eva Hajnalová motivated her daughter Mária, who gradually started to help her mother with the research. After a complicated development, the Institute of Archaeology in Nitra restricted the archaeobotanical department and Mária Hajnalová moved the newly founded Constantine the Philosopher University in Nitra. At the local Faculty of Arts, Mária Hajnalová continues the work of her mother. The split of Czechoslovakia into a Czech and a Slovak Republic in 1993 did not have impact on the collaboration between a couple of Czech institutions and the Slovak one. Among archaeobotanists on both sides, strong personal ties exist on both sides of the new borders. In 2014, Michaela Látková, a student of Mária Hajnalová, and in 2019 Jana Apiar (J. Hlavatá), both students of Mária Hajnalová from Nitra started to work at the Institute of Archaeology in Brno, where they continue Emanuel Opravil's work (not only) on early medieval Mikulčice.

The development of the field also depended on technological progress, which not only provided access to foreign literature but also introduced new approaches, such as a multi-dimensional data analysis, models,[146] the creation of databases[147]

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[145] Novák, J., Kočárová, R., Kočár, P. & V. Abraham (2021). Long–term history of woodland under human impact, archaeoanthracological synthesis for lowlands in Czech Republic. *Quaternary International*, *593*, pp. 195–203. https://doi.org/10.1016/j.quaint.2020.10.054.

[146] Dreslerová, D. (1996). Modelování přírodních podmínek mikroregionu na základě archeologických dat. *Archeologické rozhledy*, *48*(4), pp. 605–614; Demján, P. & D. Dreslerová (2016). Modelling distribution of archaeological settlement evidence based on heterogeneous spatial and temporal data. *Journal of Archaeological Science*, *69*, pp. 100–109. https://doi.org/10.1016/j.jas.2016.04.003. Dreslerová, D. & P. Demján (2019). Modelling prehistoric settlement activities based on surface and subsurface surveys. *Archaeological and Anthropological Sciences*, *11*(10), pp. 5513–5537. https://doi.org/10.1007/s12520-019-00884-7.

[147] Pokorná, A., Dreslerová, D. & D. Křivánková (2011). Plant macro-remains from archaeological contexts in the Czech Republic. An interim report about a new archaeobotanical database in progress. *Interdisciplinaria Archaeologica: Natural Sciences in Archaeology, 1*(2), pp. 49–53. Dreslerová, D. & A. Pokorná (2015). Archaeobotanical Database of the Czech Republic. In Kuna, M. (ed.). Structuring archaeological

Digging a probe in a former lake littoral in the Švarcenberk site. The moment that started a series of groundbreaking archaeological, archaeobotanical and palaeoecological findings in this locality. Pictured is Vlasta Jankovská and Adéla Pokorná (back). Photo P. Pokorný, 1996.

and a summarizing evaluation of large data sets. Thanks to these approaches, it was possible to continue, i. e., much earlier begun published overviews of important fruits in prehistory and the Middle Ages. In 2010,[148] a work summarizing the cultivation of fruit in the territory of the CR in prehistory was published, and others summarizing publications on the same subject followed.[149] Apart from overviews of the history of cultural plants, overviews of the history of wild-growing plants[150]

evidence. The Archaeological Map of the Czech Republic and related information systems (129–134), Institute of Archaeology, Prague.

148 Kočár, P. & D. Dreslerová (2010). Archeobotanické nálezy pěstovaných rostlin v pravěku České republiky. *Památky archeologické, 101*, pp. 203–242.

149 Dreslerová, D. & P. Kočár (2013). Trends in cereal cultivation in the Czech Republic from the Neolithic to the Migration period (5500 BC–AD 580). *Vegetation history and archaeobotany, 22*(3), pp. 257–268. https://doi.org/10.1007/s00334-012-0377-8.

150 Pokorná, A., Kočár, P., Novák, J., Šálková, T., Žáčková, P., Komárková, V., Vaněček, Z. & J. Sádlo (2018). Ancient and early medieval man-made habitats in Czech Republic: colonization history and vegetation changes. *Preslia, 90*(3), pp. 171–193. https://doi.org/10.23855/preslia.2018.171.

Sampling of plants for reference collection in Gedaref region, Sudan. From the left: Fakhri Hassan, Adéla Pokorná, Kristýna Hošková. Photo P. Pokorný, 2014.

based on archaeobotanical finds were written earlier and are being continuously updated. Another shift in these syntheses has come about with new approaches, such as the research of trends in the composition of agricultural plants in connection with the conditions of the natural environment (various publications of D. Dreslerová's team).[151]

[151] Dreslerová, D., Kočár, P., Chuman, T., Šefrna, L. & Š. Poništiak (2013). Variety in cereal cultivation in the Late Bronze and Early Iron Ages in relation to environmental conditions. *Journal of Archaeological Science*, *40*(4), pp. 1988–2000. https://doi.org/10.1016/j.jas.2012.12.010; Dreslerová, D., Kočár, P., Chuman, T. & A. Pokorná (2017). Cultivation with deliberation: cereals and their growing conditions in prehistory. *Vegetation History and Archaeobotany*, *26*(5), pp. 513–526. https://doi.org/10.1007/s00334-017-0609-z.

In about 2015, the trend to include a number of new microscopy methods into the basic archaeobotanical research got stronger, which mainly concerns the analyses of phytoliths (recently, Kristýna Budilová from LAPE and Kristýna Hošková are active in this field)[152]. Since 2018, we have encountered collaboration between archaeobotanists and chemical research, mainly in the development of archaeobotanical analyses in archaeology.

With the new millennium, another phenomenon appeared. It is the trips of archaeobotanists to archaeological expeditions abroad. Czech activities in Egypt were already looking back on a long tradition, therefore it is understandable, that archaeobotanists were first heading for the Egyptian Western Desert. Already before, some egyptologists had their archaeobotanical finds from Abusir analysed for their monographs.[153] The further development of the collaboration of archaeobotanists in the Czech excavations in Egypt, however, is connected only with the initiative of Miroslav Bárta, who started to invite a number of Czech archaeobotanists to the expedition in Abusir in 2005. The research focused then on the character of an alleged Abusir Lake;[154] later, many other questions arose in connection with archaeobotanical analyses of individual important graves.[155]

Dreslerová, D., Hajnalová, M., Trubač, J., Chuman, T., Kočár, P., Kunzová, E. & L. Šefrna (2021). Maintaining soil productivity as the key factor in European prehistoric and Medieval farming. *Journal of Archaeological Science: Reports*, *35*(11), pp. 102–633. https://doi.org/10.1016/j.jasrep.2020.102633.

[152] Hošková, K., Pokorná, A., Neustupa, J. & P. Pokorný (2021). Inter-and intraspecific variation in grass phytolith shape and size: a geometric morphometrics perspective. *Annals of botany, 127*(2), pp. 191–201. https://doi.org/10.1093/aob/mcaa102.; Kovárník, J. & J. Beneš (2018). Microscopic Analysis of Starch Grains and its Applications in the Archaeology of the Stone Age, *Interdisciplinaria Archaeologica. Natural Sciences in Archaeology, 9*(1), pp. 83–93. https://doi.org/10.24916/iansa.2018.1.6.

[153] Březinová, D. & B. Hurda (1993). Xylotomic analysis. In Strouhal, E., Bareš, L. Secondary cemetery in the mastaba of Ptahshepses at Abusir. Charles University Prague, pp. 61–63, pl. 36–37.

[154] Cílek, V., Bárta, M., Lisá, L., Pokorná, A., Juříčková, L., Brůna, V., . . . Beneš, J. (2012). Diachronic development of the lake of Abusir during the third millennium BC, Cairo, Egypt. *Quaternary International, 266*, pp. 14–24. https://doi.org/10.1016/j.quaint.2011.12.025.

[155] Beneš, J. (2011). Xylotomic analysis of wooden objects from the embalmer's depozit of the shaft tomb of Menekhibnekau. In. Bareš, L. & K. Smoláriková (eds.). The Shaft Tomb of Menekhibnekau. Vol. I: Archaeology. Abusir XXV, pp. 182–184, 356. Charles University in Prague; Beneš, J. (2011): Analysis of wooden finds from the burial shafts of AS 38,). In Vymazalová, H. et al. (eds.). The tomb of Kaiemtjenenet (AS 38) and the surrounding structures (AS 57–60). Abusir XXII, pp. 168–171, 194–195. Charles University in Prague.; Krejčí, J., Arias, K., Vymazalová, H., Pokorná, A. and Beneš, J. (2014). The Mastaba of Werkaure, Volume 1, Tombs AC 26 and 32 – Old Kingdom strata, Prague: Czech Institute of Egyptology, Faculty of Arts, Charles University in Prague, pp. 303.

Drilling for soil sampling at the archaeological site Sphinx in Sabaloka, Sudan. From left: Ladislav Varadzin, Lenka Varadzinová and Jan Novák. Photo P. Pokorný, 2014.

Research in Egypt also touched the question of anthropic vegetation remains in the landscape of the Western Desert.[156]

The interdisciplinary research in Sudan was initiated by Miroslav Bárta, and Lenka Suková-Varadzinová, then a PhD student of Egyptology, vehemently seized the opportunity. In 2010, the Egyptological Institute in Prague was granted a concession on the rescue excavation in the surroundings of the Sixth Cataract of the Nile in the Sabaloka mountains, in an area endangered by a dam project. The fieldwork proved a settlement already in the Mesolithic period. Interdisciplinary research, including experts from the Czech Republic, focused mainly on the subsistence and the economy of the Mesolithic and Neolithic populations.[157]

[156] Pokorný, P. & A. Pokorná (2013). "Agoul landscapes" in the oases of the Western Desert in Egypt: Ecology and Palaeoecology of vegetation mounds in ElHayz, Southern Bahriya. In Dospěl, M. & L. Suková (eds.). Bahriya Oasis. Recent Research into the Past of an Egyptial Oasis, pp. 113–130. Charles University Prague.

[157] Varadzinová, L. & L. Varadzin (2017). Sabaloka (West Bank) Research Project. Exploration of the site of Sphinx (SBK. W-60): Findings of the 2014 and 2015 field seasons. *Sudan & Nubia, 21*, pp. 23–33.

Drilling on the shore of Lake Ohrid, North Macedonia. From left: Kristýna Hošková (standing), Ivana Šitnerová, Tereza Majerovičová and Martina Vasiľová. Photo J. Beneš, 2019.

Botanists, zoologists, anthropologists and geologists took regularly part in the research. The archaeobotanic research is complicated by the highly unfavourable conditions for the preservation of plant remains (pollen as well as macroremains including charcoal).[158] In the analysis, we are hoping for phytoliths; Kristýna Hošková carried out some pilot analyses, which indicate promising results. Since 2020, another interdisciplinary project is taking place directed by Ladislav Varadzin from the Institute of Archaeology in Prague. The research focuses on the site of Shaqadud, also with evidence of Mesolithic and Neolithic settlements. According to the results of research, which took place in the 1980s, we can hope for material with plant remains.

Another foreign project important for the development of archaeobotany, has been *Papaver* of the South-Bohemian University, which since 2013 has combined

[158] Suková, L. V., Varadzin, L., Bajer, A., Lisá, L., Pacina, J. & P. Pokorný (2015). Tracing post-depositional processes at Mesolithic occupation sites in central Sudan: view from the site of Sphinx (SBK. W-60) at Jebel Sabaloka. *Interdisciplinaria Archaeologica* 6(2), pp. 133–150. https://doi.org/10.24916/iansa.2015.2.1.

A group of Czech and Senegalese scientists in the village of Tambanoumouya in Senegal. From left: Jan Novák, Tereza Majerovičová, Ladislav Šmejda and Idrissa Manka. Photo J. Beneš, 2019.

archaeobotany, archaeology and palaeoecology and has created a international network of experts.[159] The events in connection with *Papaver* led to the establishment of a small archaeobotanical project in Santa Severa, Italy, where Czech archaeobotanists were participating in the excavation of an Etruscan well beneath the level of the Mediterranean.[160] In 2015, a group of Czech palaeoecologists and archaeobotanists for the first time visited North Macedonia. Since 2016, a South-Bohemian group is collaborating in an excavation of a Neolithic site in Pelagonia, integrating, apart from traditional archaeobotany, many methods of botanical micro-features.[161] Since 2018, the number of Czech institutions active in North

[159] Beneš, J, Pokorná, A., Bernardová, A., Divišová, M., Houfková, P., Chvojka, O., Kodýdková, K., Komárková, V., Paclíková, K., Prach, K., Preusz, M., Lencová, K., Novák, J. & T. Šálková (2015). PAPAVER. Centre for human and plant studies of postglacial Europe and Northern Africa, 2013–2015. *Interdisciplinaria Archaeologica, 6*(1), pp. 113–123. https://doi.org/10.24916/iansa.2015.1.8.

[160] Kodýdková, K., Beneš, J., Komárková, V. & K. Paclíková (2013). Pilot archaeobotanical analysis of the sediment the well 112 in Pyrgi, Santa Severa. *ARCHAEOLOGIA MARITIMA MEDITERRANEA – An International Journal on Underwater Archaeology, 10*, pp. 181–188.

[161] Beneš, J., Naumov, G., Majerovičová, T., Budilová, K., Bumerl, J., Komárková, V., Kovárník, J., Vychronová, M. & L. Juřičková (2018). An Archaeobotanical Onsite Approach to the Neolithic Settlements in Southern Regions of the Balkans: The Case of Vrbjanska Čuka, a Tell Site in Pelagonia, Republic of Macedonia. *Interdisciplinaria Archaeologica, 9*(2), pp. 121–145. https://doi.org/10.24916/iansa.2018.2.1.

Ethnobotanical survey of a Senegalese village in 2019. From left: the Head of village, Idrissa Manka and Jaromír Beneš. Photo T. Majerovičová, 2019.

Macedonia has increased. The activities of Marek Verčík from the Institute of Classical Archaeology, Faculty of Arts of Charles University in Prague, led to the participation of archaeobotanists and also of the Quaternary geologist Jan Hošek from the Czech Geological Survey in the research of the prehistoric and classical periods around Ohrid Lake. This activity required the application of archaeobotanical microscopy (starch, phytoliths, pollen grains and non-pollen objects) and chemical research. The current methods, combining chemical analyses and archaeobotany, are promising for archaeobotany in the new decade.[162] Using a combination of chemistry and analyses of plant and animal macroremains, the Czech-Macedonian-Italian team was able to determine the function of ceramic vessels from the Neolithic around the Macedonian Ohrid Lake.[163] Archaeobotany and palaeoecology have also contributed to the discovery and interpretation of

[162] Bednář, P. & L. Kučera (2021). Moderní chemická analýza v archeologii, I. díl (Modern chemical analyses in archaeology, I.volume). Olomouc.

[163] Beneš, J., Todoroska, V., Budilová, K., Kovárník, J., Pavelka, J., Atanasoska, N., … & L. Kučera (2021). What about dinner? Chemical and microresidue analysis reveals the function of late neolithic ceramic pans. *Molecules, 26*(11). https://doi.org/10.3390/molecules26113391.

Taking a drill core on the shore of Lake Ohrid, North Macedonia. From left: Jiří Bumerl, Jaromír Beneš and Libor Vobejda. Photo M. Vasiľova, 2019.

a settlement on the bank of this lake, which was buried in an earthquake shortly before 1200 BC.[164] The combination with palaeoecology is typical for current archaeobotany, as in the case of archaeobotany of the Czech Mesolithic, which did not exist before.[165] These are the trends of current research, which will shape the image and character of archaeobotany in the following decade.

[164] Hošek, J., Verčík, M., Pokorný, P., Beneš, J., Komárková, V., Radoměřský, T., Atanasoska, N., Todoroska, V. & P. Ardjanliev (2021). Geoarchaeological evidence on a Late Bronze Age earthquake, Ohrid basin (North Macedonia). *Journal of Quaternary Science, 36*(6), pp. 1003–1012. https://doi.org/10.1002/jqs.3325.

[165] Ptáková, M., Pokorný, P., Šída, P., Novák, J., Horáček, I., Juřičková, L., Meduna, P., Bezdek, A., Myšková, E., Walls, M. & P. Poschlod (2021). From Mesolithic hunters to Iron Age herders: A unique record of woodland use from eastern Central Europe (Czech Republic). *Vegetation History and Archaeobotany, 30*(2), pp. 269–286. https://doi.org/10.1007/s00334-020-00784-0.

THE INSTITUTE OF ARCHAEOLOGY IN PRAGUE

The Institute of Archaeology of the Czech Academy of Sciences of the CR in Prague focuses on the research of the human past not only in the Czech Republic but also abroad. Potentially, it engages in all fields of the study of archaeological sources, beginning with fieldwork, the analyses of the material remains, up to the creation of models and concepts of past societies, including their relation to a number of cultural, biological and environmental variables. Apart from basic research, the activities of the research teams of the Institute also concentrate on the care of archaeological heritage and communication with the broad public using exhibitions, promoting publications, lectures, web applications or volunteer programmes. In addition, the Institute of Archaeology in Prague operates the largest archaeological library in the Czech Republic, which is open not only for professional archaeologist but also to students and the non-expert public.

The State Institute of Archaeology (StAÚ) in Prague was founded on 12 November 1919. The aim of the institute was the broad research of the national past based on vast research excavations and at the same time gathering information on the archaeological heritage of the whole territory of the state.[166] The development of this institution was interrupted by World War II when it was subject to the Germanisation concept and at the same time dispersed.[167] After the war, the StAÚ was able to consolidate and to continue its inter-war activities. On 1 January 1953, the StAÚ was incorporated into the CSAS (the Czechoslovak Academy of Sciences), and, thanks to generous support by the then communist regime, it was possible to increase the number of research associates and to start a number of long-term research excavations of prominent sites (see chapter on the Post-war development). The development of the institution was interrupted in 1968 as a consequence of the occupation by the armies of the Soviet Union and the Warsaw pact. The following twenty years are referred to as Normalisation (1970s–80s) and are characterised by the development of specialised research subjects (experimental and montane archaeology, research of old agriculture etc.) and on-going research and rescue excavations. All foreign contacts and possibilities to read and to publish in foreign publications, however, were restricted.

After 1989, the Institute of Archaeology underwent deep changes. Almost immediately, ineffective research excavations were stopped, rescue excavation and

[166] Starcová, M. (2020). S touhou odkrývat… *Archaeologia historica, 45*(2), pp. 599–608. https://doi.org/10.5817/AH2020-2-3.

[167] In 1939, the Slovak State was proclaimed, and an independent Slovak Institute of Archaeology was called into being. In 1942, the Moravian branch office of the State Institute of Archaeology in Brno was established.

Institute of Archaeology of the Czech Academy of Sciences, Prague, view from the Letenská street. FJ000000259, ARÚ Prague Archive.

non-destructive research methods started to be preferred. At the same time, processing of the field documentation according to the principle *'rescue excavations can also contribute essential findings on the past'* started to be stressed.[168] In 1993, in the course of the restructuring of the CSAS, individual branch offices split from the Institute of Archaeology in Prague and the total number of employees sank.[169]

Immediately after 1989, the Institute of Archaeology in Prague contacted foreign archaeological institutions, especially those in anglophone countries. Foreign researchers took part in joint fieldwork projects and held lectures; institutions started to take part in a number of international activities.[170] The research included a broad range of subjects; teams shaped and the Institute of Archaeology

[168] Kuna, M., Maříková-Kubková, J. & M. Starcová (2019), p. 189.

[169] The branch office in Most was transformed into an independent Institute of the Institute of Archaeology and Heritage Care of North-Western Bohemia; the branch office in Pilsen became a stable part of the West-Bohemian Museum in Pilsen and the Opava branch office for some time ceased to exist, but was renewed as branch offices of the Institute of Archaeology in Brno.

[170] The Institute of Archaeology collaborated, e. g., with British universities (Sheffield, Durham and Edinburgh) and took part in the formation of the European Archaeological Association (EAA) in 1994.

chose the subjects to focus on. One of the subjects was the processing of vast data sets from the Neolithic site at Bylany, various aspects of the economy of the La Tène period, the research of early medieval hillforts, castles, towns and monasteries. Landscape archaeology became established and continued the theory of settlement areas and the research of microregions.[171] In this respect, especially non-destructive research methods were applied (aerial archaeology, surface surveys, sampling and geophysical measurements).[172]

An essential modernisation was caused by a natural catastrophe in 2002.[173] After the indispensable reconstruction, in the Institute of Archaeology changed almost everything, the quality of the building, the laboratory equipment, some old organisation schemes

Sampling of vessel content for analysis (K. Mrkvičková) in the laboratory of the Institute of Archaeology in Prague. Photo P. Pokorný, 2021.

[171] See, e. g.: Dreslerová, D. & P. Demján (2019). Modelling prehistoric settlement activities based on surface and subsurface surveys. *Archaeological and Anthropological Sciences*, *11*(10), pp. 5513–5537.; Křivánek, R. (2017). Comparison study to the use of geophysical methods at archaeological sites observed by various remote sensing techniques in the Czech Republic. *Geosciences*, *7*(3), p. 81.; Kuna, M. & D. Dreslerová (2016). Landscape archaeology and 'community areas' in the archaeology of central Europe. In *Envisioning Landscape,* pp. 146–171. Routledge.; Demján, P. & D. Dreslerová (2016). Modelling distribution of archaeological settlement evidence based on heterogeneous spatial and temporal data. *Journal of Archaeological Science*, *69*, pp. 100–109.; Gojda, M. (1997). The contribution of aerial archaeology to European landscape studies: Past achievements, recent developments and future perspectives. *Journal of European Archaeology*, *5*(2), pp. 91–104.; Dreslerová, D. (1996). Modelování přírodních podmínek mikroregionu na základě archeologických dat. *Archeologické rozhledy*, *48*(4), pp. 605–614.

[172] Kuna, M., Maříková-Kubková, J. & M. Starcová (2019). Archeologie v demokratickém světě. In Kuna, M., Starcová, M. & J. Maříková-Kubková (eds.). *Sto let v archeologii*, pp. 190–191. Archeologický ústav AV ČR, Praha – Academia.

[173] The 500-year flood in August 2002 hit the Institute of Archaeology in Prague extremely hard. The water, at a level of about 280 cm above the ground-level, flooded the whole ground-floor, where

(for example, an open-access library was created) and digitalisation advanced considerably. The activities of the Institute of Archaeology included, apart from excavations and non-destructive archaeology also spatial analyses aided with computer systems and integrated natural sciences.[174] In the second decade of the 21st century, archaeobiology became a stable component of the department of landscape archaeology and natural sciences. Six years later, the Department of Natural Sciences and Anthropometry was founded (2017). Currently, three research teams are at work there: the environmental (archaeobotany and palynology, physical anthropology and archaeozoology, and pedology), archaeogenetic and material (archaeometry) teams.

Within the Institute of Archaeology, an important group of natural-scientific disciplines are being applied, not only in collaboration with archaeology by means of various analyses and expert reports, but they are able to ask questions on the past by themselves and to find answers. In this field, the Institute of Archaeology currently holds an important organisational role in the collaboration with other archaeological institutions.

DATABASES

National archives of palaeoethnobotanical data were recommended to set up already in the first IWGP, in order to avoid a difficult work in the search for information on the finds of macroremains of various plant species, distributed in journals of a very different nature. These archives were intended to collect evidence in the form of images, data, maps and literature. E. Opravil published the first complete bibliography

the facilities of the laboratories, the geodetic and photographic archive and the library were situated. Apart from grave material damage of the buildings and the equipment, the losses in the archival and library collections were most serious. Kuna, M., Maříková-Kubková, J. & M. Starcová (2019). Co vzala a přinesla voda. In Kuna, M., Starcová, M. & J. Maříková-Kubková (eds.). *Sto let v archeologii*, pp. 220–221. Archeologický ústav AV ČR, Praha – Academia.

174 The last-mentioned area includes basic research in the field of archaeogenetics, anthropology, palaeopathology, archaeozoology and palaeobotany, but also conservation, restoration and dating of the finds (in collaboration with the Nuclear Physics Institute of the CAS, the institute operates the Czech Radiocarbon Laboratory). Jiráň, L. & M. Kuna (2009). Archeologický ústav v Praze. Archeologický potenciál Čech: teoretický výzkum, metodologie a informatika, péče o národní kulturní dědictví, výzkumný záměr č. AV0Z80020508, pp. 1–5.

for Czechoslovakia (up to 1970) in 1973.[175] Later he also systematically built both a card index and a specialised library. Also, Z. Tempír published overviews of new data in archaeobotany on a regular basis,[176] and he collected images of important macroremain finds as well (in the archive of the National Museum of Agriculture). In the field of palaeoecology, the aim to make an overview of existing data led to the publication of isopollen maps[177] based on a wide synthesis published previously by Rybníčková.[178]

Gradual increase in the number of analyses, mainly since the nineties, has led to the need for a uniform treatment of data, which was then already possible in an electronic form. Specialised database systems were needed to allow efficient exchange, processing and utilization of data, as well as centralizing and archiving all data from the country. An improved possibility to analyse large datasets due to the rapid development of computer technologies has triggered the creation of national databases. Within the field of palaeoecology, a database of Holocene pollen profiles in former Czechoslovakia (PALYCZ) was established[179] and later also a database of plant macroremains of the Czech and Slovak Republics.[180]

[175] Opravil, E. (1973). Bibliographie der Tschechoslowakischen Quartärpaläobotanik (bis 1970). *Acta museorum agriculturae, 8*(1), pp. 15–67.

[176] Tempír, Z. (1966). Výsledky paleoetnobotanického studia pěstování zemědělských rostlin na území ČSSR. *Vědecké práce Československého Zemědělského muzea, 6,* pp. 27–144; Tempír, Z. (1973). Nálezy pravěkých a středověkých zbytků pěstovaných a užitkových rostlin a plevelů na některých lokalitách v Čechách i na Moravě. *Vědecké práce Zemědělského muzea, 13*, pp. 19–47.; Tempír, Z. (1992). Analýzy a vyhodnocení zuhelnatělých zbytků kulturních rostlin a plevelů v archeologických nálezech z některých lokalit na jižní Moravě. *Vědecké práce Zemědělského muzea, 29*, pp. 73–97.

[177] Rybníčková, E. & K. Rybníček (1988). Isopollen maps of Picea abies, Fagus sylvatica and Abies alba in Czechoslovakia: their applications and limitations. In: Lang G. & C. Schlüchter (eds.). Lake, mire and river environments, pp. 51–66. A. A. Balkema, Rotterdam.

[178] Rybníčková, E. (1985). Dřeviny a vegetace Československa v nejmladším kvartéru [Wooden species and vegetation in Czechoslovakia during the late Quaternary]. – DrSc. Thesis, Institute of Botany, Academy of Sciences of the Czech Republic, Průhonice.

[179] Kuneš, P., Abrahám, V., Kovářík, O., Kopecký, M., Břízová, E., Dudová, L., … & A. Wacnik (2009). Czech Quaternary Palynological Database-PALYCZ: review and basic statistics of the data. *Preslia, 81*, pp. 209–238.

[180] Hájková, P., Štechová, T., Šoltés, R., Šmerdová, E., Plesková, Z., Dítě, D., Bradáčová, J., Mútňanová, M., Singh, P. & M. Hájek (2018). Using a new database of plant macrofossils of the Czech and Slovak Republics to compare past and present distribution of hypothetically relict fen mosses. *Preslia, 90,* pp. 367–386. https://doi.org/10.23855/preslia.2018.367.

Archaeobotanical database of the Czech Republic (CZAD) was established in the Institute of Archaeology in Prague.[181]

Both pollen and macroremain databases were designed to be compatible with international data. The structure of pollen data in PALYCZ follows the EPD structure, whereas macroremain data are stored in the *ArboDatMulti* database program. All the data are stored in relational tables to allow for a broad range of queries to provide answers to specific scientific questions which is a great contribution to future research. *ArboDatMulti* specialized multilingual database program was built on the general principles, structure and thesauri of the German program *ArboDat* developed for the processing and evaluation of archaeobotanical data.[182] The program was created within the scope of the bilateral project, financially supported by the Czech Academy of Sciences in 2009-2011. It is basically a MS Access application, primarily designed for data processing by individual researchers. A part of the data set – the already published data – is presented to the public through an internet client. The internet version runs on the Institute of Archaeology in Prague web server and includes information in a simplified form. It presents basic information on the archaeological fieldwork event (location, director of the excavation, dating, etc.) and major information on the archaeobotanical analysis (author, context and amounts of samples, taxa and macroremains). The site location is displayed on an interactive map.

THE LABORATORY OF ARCHAEOBOTANY AND PALAEOECOLOGY (LAPE)

The Laboratory of Archaeobotany and Palaeoecology (LAPE) was established in August 2002 at the Faculty of Science, University of South Bohemia in České Budějovice (Budweis, Czech Republic). A significant advantage and benefit for the members of the new unit were and still are the presence of a large biological research

[181] Pokorná, A., Dreslerová, D. & D. Křivánková (2011). Plant macro-remains from archaeological contexts in the Czech Republic. An interim report about a new archaeobotanical database in progress. *Interdisciplinaria Archaeologica: Natural Sciences in Archaeology, 1*(2), pp. 49–53.; Dreslerová, D. & A. Pokorná (2015). Archaeobotanical Database of the Czech Republic. In Kuna, M. (ed.). Structuring archaeological evidence. The Archaeological Map of the Czech Republic and related information systems (129–134), Institute of Archaeology, Praha.

[182] Kreuz, A. & E. Schäfer (2002). A new archaeobotanical database program. *Vegetation History and Archaeobotany, 11*(1), pp. 177–180.

The building of the Laboratory of Archaeobotany and Palaeoecology (LAPE) and the Centre for Polar Ecology USB České Budějovice. Photo J. Kovárník, 2022.

centre, under the authority of the Academy of Sciences of the Czech Republic. It provides diverse experienced laboratories, departments and individual specialists. The founding idea of LAPE grew out of several years of previous research activity in the area of archaeobotany and palaeoecology, focused primarily on the topic of medieval Prague and several other sites. The predecessor research activity up to 2002 was associated with a group of young researchers (P. Kočár, P. Pokorný, J. Kaštovský and V. Komárková). Later, from 2002 on, J. Novák and Kateřina Nováková were employed in LAPE; T. Kolář, Z. Vaněček and A. Čejková studied under the leadership of J. Beneš. The first members of the LAPE are still in frequent contact with our team, which is evident in publication and project activities. Despite personnel shift, which is so typical of university life, a decade of work has shaped a compact team that operates in various scientific fields and research activities. The first scientific retrospective account of LAPE was published in 2012.[183]

[183] Bernardová, A., Beneš, J., Kovačiková, L., Houfková, P., Šálková, T., Komárková, V., Novák, J., Kosňovská, J. & T. Bešta (2012). The Laboratory of Archaeobotany and Palaeoecology (LAPE) at the Faculty of Science, University of South Bohemia (2002–2012). *Interdisciplinaria Archaeologica, 3*(2), pp. 287–295. doi: 10.24916/iansa.2012.2.9

In the second decade of its existence, the LAPE began to focus on basic research in archaeobotany. The focus was on the analysis of Neolithic and medieval material from the Czech Republic. The department was granted several projects on the basis of which a number of employees were grown, but also the portfolio of analytical methods was expanded. The LAPE has also started working more on archaeological excavations abroad,[184] for example, in Italy. At the same time, the workplace also began to focus on the development of the analysis of plant macroremains from specific sites (M. Ptáková, J. Kosňovská-Irmišová, T. Šálková, A. Bernardová and P. Houfková-Marešová, plant micro remains with the new employees J. Kovárník and K. Budilová. Today, the LAPE works on research in the prehistory and the Middle Ages of the Czech Republic and on abroad expeditions in North Macedonia, Egypt and Senegal. I. Šitnerová, T. Majerovičová, J. Bumerl and N. Atanasoska are as well employed as environmental archaeologists in various LAPE projects. The LAPE closely collaborates with the Institute of Archaeology of the Faculty of Arts of the University of South Bohemia, where T. Šálková works as an archaeobotanist. Together, these institutions constitute the School of Environmental Archaeology.

Veronika Komárková (LAPE USB České Budějovice) analysing material in Santa Severa, Italy. Photo J. Beneš, 2013.

[184] Beneš, J, Pokorná, A., Bernardová, A., Divišová, M., Houfková, P., Chvojka, O., Kodýdková, K., Komárková, V., Paclíková, K., Prach, K., Preusz, M., Lencová, K., Novák, J. & T. Šálková (2015). PAPAVER. Centre for human and plant studies of postglacial Europe and Northern Africa, 2013–5. *Interdisciplinaria Archaeologica, 6*(1), pp. 113–123. https://doi.org/10.24916/iansa.2015.1.8.

ARCHAEOBOTANICAL WORKING GROUP AND CONFERENCES OF ENVIRONMENTAL ARCHAEOLOGY

The tradition of the Conference of Environmental Archaeology started in 2005 in Prague, when a group of Czech archaeobotanists organised their first working meeting at the Institute of Archaeology. These modestly organised conferences were held in Czech under the *Archaeobotanical working group*. Twelve experts met in one day. Among the founders were Petr Pokorný, Petr Kočár, Jaromír Beneš, Veronika Komárková, Adéla Pokorná and others. Issues of analysis of plant macroremains and other palaeoecological issues were discussed. The next conference was organised in České Budějovice at the beginning of February 2006. It was already a two-day event and was attended by 28 participants. In 2010, the Archaeobotanical Working group was transformed into the Conference of Environmental Archaeology (CEA). Later, the Scientific Committee of the conference decided to be held every three years in English in order to open it up to an international audience. The first such meeting was organised as the 11th Conference of Environmental Archaeology in February 2015 in České Budějovice, under the auspices of the PAPAVER Centre. In 2017, the Conference of Environmental Archaeology took place in Nitra, Slovakia – for the first time, outside of the Czech Republic.[185] February 2018 saw the conference leave its central European 'motherland' and head towards southern Europe, Italy. The organization was overtaken by the University of Modena and Reggio Emilia, under the auspices of the Laboratory of Palynology and Palaeobotany of the Department of Life Sciences, an interdisciplinary biology centre in the full spirit of interdisciplinarity within environmental archaeology.[186] This was the third congress locally organised by the Modena team since 2013, and it was an obvious continuation of its scientific activity: proposing a bridge between palaeoecology and ecology and emphasizing the role of archaeobotany in environmental archaeology and the modern science of conservation. The 16th conference was international in nature and organized by the Czech University of Life Sciences.[187] This last pre-Covid-19 conference addressed the issues of starvation and nutrition in human history. CEA is closely associated with the Interdisciplinaria Archaeologica journal (www.iansa.eu). The younger generation of Czech archaeobotanists, geoarchaeologists and palaeoecologists and zooarcheologists (L. Lisá, P. Pokorný, J. Beneš, L. Šmejda, R. Kyselý and J. Peška) was well represented at this conference.

[185] Mlejnek, O. & M. Hajnalová (2017). Conference of Environmental Archaeology Crosses Czech Borders. *Interdisciplinaria Archaeologica, 8*(1), pp. 3–5.

[186] Beneš, J. & A. M. Mercuri (2018). CEA 2018: The 14th Conference of Environmental Archaeology in Modena and this Special Issue of IANSA, Republic of Macedonia. *Interdisciplinaria Archaeologica, 9*(2), pp. 115–118.

[187] Jurasová V., Karlík P. & M. Hejcman (eds.). Environmental Archaeology of Farmers and Pastoralists – What to Eat in the Case of Crop Failure? Proceedings of the 16th Conference of Environmental Archaeology (CEA2020), January 27–29, 2020. – Czech University of Life Sciences Prague, Prague.

KEY PERSONALITIES: INTERVIEWS

The history of archaeobotany and palaeoecology is encoded in the memory of the direct actors of the discipline. Here, we present interviews with four founding personalities of modern Czech and Slovak archaeobotany. Unfortunately, Emanuel Opravil, one of the founders of professional archaeobotany in Czechoslovakia, is no longer alive, but his long-time collaborator, the archaeobotanist Věra Čulíková provided us with a lot of information about him and, of course, about her own outstanding work. The reader will certainly appreciate the words of one of the fathers of our prehistoric archaeobotany and a co-founder of the IWGP conferences, Zdeněk Tempír. The interview with Eva Hajnalová will introduce the beginnings of Slovak archaeobotany. In addition to the interviews with the researchers dealing with macroremain analysis, the fourth interview introduces to the reader a researcher in the field of palynology. The importance of Vlasta Jankovská, 'the queen of Czech palaeoecology', is crucial, among other things, thanks to her contribution to the pollen analysis of anthropogenic sediments.

The interviews with founding figures of the field of archaeobotany are further supplemented by debates with three archaeologists who (each from a different angle) bear witness to the development of archaeobotany and the beginnings of its direct cooperation with the field archaeology. The prominent archaeologist of the Neolithic period Ivan Pavlů recalls the circumstances of the construction of the first flotation station in Bylany . Jiří Svoboda, a long-time head of research in the Moravian Palaeolithic, recapitulates the deployment of archaeobotanical methods on the world-famous Gravettian sites. Finally, one of the authors of this book, Jaromír Beneš, recalls the development and consequences of the introduction of archaeobotany into the common practice of contemporary environmental archaeology.

INTERVIEWS WITH ARCHAEOBOTANISTS

ZDENĚK TEMPÍR

(* 1926)

Zdeněk Tempír was born in 1926 in Hrabenov, Šumperk District, in a family of Moravian smallholders. His father led young Zdeněk, from his early childhood, to take an interest in nature; he dried plants to create herbaria, recorded daily notes on weather and observed nature. However, his study in secondary school in Šumperk was soon interrupted by the beginning of World War II. Therefore, he had to complete his formal education at the Czech citizen's school in Ruda nad Moravou and Bludov (1938–40). Then he decided to become a gardener. In 1940–42, he studied in the Orchards and Dendrological School of the Vyhlídal Brothers in Kostelec na Hané and in Prostějov with a garden architect Ožena. He completed his apprenticeship in the field of *'Gardening, dendrology and fruit tree nurseries'* after which he planned to build a garden centre. However, he changed his plans thanks to advice of a Jewish physician MUDr. Herrmann, who was hiding in Kostelec school. He recommended Zdeněk to complete secondary school graduation (maturita). Therefore, he continued his studies at the Higher School of Fruit Growing and Horticulture (Vyšší ovocnářsko-vinařská a zahradnická škola) in Mělník (1942–45). He graduated in July 1945 as a Landscape Architect. After the war, he studied at the University of Agricultural and Forest Engineering of the Technical University in Prague (1945–49). During his studies, he worked as a 'demonstrator', then he became an assistant at the Department of Plant Production. However, in 1950, his contract was terminated due to his interest in genetics (at that time, 'Lysenkoism' flourished and as he was making fun of it, which was a problem). Two years later (1952), he became an assistant in the Czechoslovak Musem of Agriculture (he stayed in the Museum for the next 36 years, until his retirement in 1989). In 1963, he submitted his candidate dissertation on *'Study of archaeological finds of prehistoric agricultural plants on the territory of the [Czechoslovak] Republic'*. In 1965–72, he became a director of the Musem. and since 1984, he was a deputy for science of the Museum. In 1993–97, he taught as an external lector, along with other historians of agriculture, at the Czech University of Agriculture in Prague. He also participated in the creation of a vast monograph entitled *Studies on technology in the Czech Lands.*

The interview was conducted by Marcela Starcová and Adéla Pokorná.

MS, AP: What did bring you to archaeobotany?

ZT: It was Antonín Klečka, the chairman of the Czechoslovak Academy of Agriculture, who had worked with archaeologists already since the 1930s. In 1957, the National Museum was preparing a new permanent exhibition and then Klečka came to me and brought some archaeobotanical material from the museum. Because he didn't have time to determine it, he gave it to me and said: 'It has to be finished in three months!' He gave me some offprints on the subject, and so I had to learn it. In 1963, I submitted my candidate dissertation on the *'Study of archaeological finds of prehistoric agricultural plants on the territory of the [Czechoslovak] Republic'*. In my archaeobotanical works, I focused on cultural plants and weeds.

I liked working with archaeologists, I knew many of them personally. The director of the Institute of Archaeology Jan Filip even offered to employ me at the Institute of Archaeology, but I refused, my scope was much broader. I focused not only on the history of plant cultivation, but I was also interested in the development of agricultural technology, the history of beekeeping (my father used to be a beekeeper), and in the history of hop growing, as well as in practical questions of agricultural museology. I was also interested in the history of ploughing; I enlarged the collection of ploughing tools in the Museum. I participated in the reconstructions of La Tène and early medieval ploughing tools, mainly together with the archaeologist Magdaléna Beranová from the Institute of Archaeology. We performed experimental ploughing and we also demonstrated experimental ploughing in various conferences, as for example during the 8th IWGP in Nitra-Nové Vozokany in 1989. In the 1980s, we also performed experimental mowing with prehistoric and historic sickles in the Research Institute of Crop Production in Prague-Ruzyně. We mowed emmer and common wheat.

I also travelled a lot and I always collected information on agriculture and crops during my travels, I developed a network of contacts. I walked in the farmland, talked with the local people and made notes to my diaries. I wandered through hundreds of villages in Bohemia, Moravia and in Slovakia. I also travelled in the Balkans (from Bulgaria to the north), in Poland and the Ukraine, I collected information on the beginnings of agriculture in Europe. Of the western countries, I visited Germany and Italy, the countries which are important for the development of agriculture.

MS, AP: Did you take the archaeobotanical samples personally?

ZT: It varied. Sometimes they put it in something, sometimes, they told me: 'Come for it'. I went to the field and taught the archaeologists how to take samples since they did not necessarily see immediately, where the plant macroremains were. I had experience with seeds from the study at the university. I was thinking about how to get the samples from individual archaeological layers. Washing is the finest way how to separate seeds in various meshes. It also depends on the state of the preservation of the finds, i. e., on the level of the

Zdeněk Tempír. Photo T. Chlup, 2021.

carbonization of the caryopses, but also on the type of sampling. I made experiments in the Museum in Kačina. I put the caryopses into the soil and then studied their changes in time. I always recommended taking larger volumes of material when sampling, in view of preserving a part of it also for further research. Because current knowledge is not final! When you find out something, you must be able to verify your work later, because there will be new methods.

I always gave lectures to archaeologists, I taught them to know what agriculture is. You can't just look at those shards! Agriculture from prehistory to the present, is a huge scope; it requires thinking about the context, looking for new perspectives, performing analyses. Only then it is possible and also necessary to interpret the results. And you have to understand agriculture as a discipline, to know what it means when there suddenly appeared rye, what it could be used for! Or emmer, to know that the ears hold together, and how to produce flour and flatbread. This can only do someone, who is active in the discipline, who knows how to work with the mortar! You have to work with your hands, and you must love the smell of manure! It can't be done by an archaeologist; it is not possible! It is difficult even for a general biologist. You know, agriculture, it is the basis, it is the THE science!

MS, AP: What was your equipment?

ZT: I used simple things from the laboratory. Tweezers, needles, also an aluminium spoon, which I ate with before. And I had glass vials of various sizes which could be perfectly closed and I was careful not to break them. I had a binocular magnifying glass. I still have it at home. Mostly, I carried out the analyses in the evenings, because I had to shine on it anyway, and there was no time on it during the day. Mostly, I worked 12 hours in the museum, and when the exhibitions had to be prepared, it was even 16 hours.

I was always curious about what there was in the samples. For example, when I analysed material from the Celtic oppidum of Závist, I told the archaeologists: 'Here you have a nonsense, you mixed it up with the material from the Middle Ages!'

I tried to enforce new approaches, for example I was taking pictures of the finds and made drawings. A photographer from the Museum of Agriculture worked with me and I taught him how to take pictures under a binocular magnifying glass, how to light the finds for the phot shoot. There was originally no equipment for professional photographing in the Museum of Agriculture.

MS, AP: You co-founded the International Association of the Museums of Agriculture (IAMA) and you also initiated the establishment of the International Working Group for Palaeoethnobotany (IWGP). How did it happen?

ZT: The first international conference of agricultural museums [IAMA], which I organised in 1966, took place on the occasion of the 75th anniversary of the Czechoslovak Museum of Agriculture. After World War II, our agriculture changed completely, mainly as a consequence of mechanisation – the first inspiration for these large

agricultural projects was America. This was an inspiration for the Russians as well. Our government was interested in preserving what was going to disappear [i. e. the knowledge of traditional agricultural techniques]. Therefore, they supported the activities of agricultural museums. The permanent expositions, as well as specialized exhibitions, were officially presented as celebrations on the occasion of important state anniversaries (fulfilment of the five-year plans etc.), but other parts of the exhibitions were purely scientific.

I am sure that it was the agrarians, my colleagues and teachers, who managed it that there was enough food under the communist regime. Among them, it was Antonín Klečka, who was originally a member of the Agrarian Party. However, the Agrarian Party could not be renewed after the War, so he joined the Communist Party, because, you know, he was a realist.[188] This allowed him to maintain his influence on agricultural schools and institutes, and even the Ministry of Agriculture. Of course, it was not possible to mention the Agrarian Party in connection with the International Association of Museums of Agriculture. In the course of the organisation of the IAMA conference, I was invited to the Ministry of Agriculture, where I submitted my proposal, and I was asked whom I had invited from abroad. The documents included personal details of the participants, institutes and subjects they were working on. But I was asked for further information, mainly on their political attitudes. I told them I was not interested in this at all. I said it was them who was paid for it, not me. I was then assigned two workers who, like ordinary craftsmen, were present throughout the conference.[189]

MS, AP: And how was it with the IWGP?

ZT: In 1966, I read a paper at the UISPP congress in Prague [VIIth International Congress on Prehistoric and Protohistoric Sciences] on archaeobotany [*Einige*

Zdeněk Tempír sorting charred grain. Shot from the documentary film Man and Soil, from the series Sources of Knowledge, Czechoslovak TV Prague 1977. Inv. č. 107791/1, NZM Archive.

Ergebnisse der archäoagrobotanischen Untersuchungen des Anbaus von Kulturpflanzen auf dem Gebiet der ČSSR – Some results of archaeoagrobotanical studies of the cultivation of crops on the territory of Czechoslovakia]. I had been invited by my friend, the anthropologist Emanuel Vlček. At that time, I already had experiences and I was familiar with the subject of archaeobotany, thanks to my collaboration with the National Museum. I met Maria Hopf at the congress and with her and some other people[190] we discussed the need to create a workgroup of experts in archaeobotany. Then we arranged the symposium in Kačina in the autumn of 1968. Many of the registered, however, [due to the complicated political situation] cancelled their participation at the last moment. K. D. Jäger from Berlin was on the list of people who cancelled but he finally arrived. However, it was not possible to officially mention that he was there.[191]

Even earlier I became aware, when those conferences in the Museums of Agriculture were organised, that it is not good to make it too big. It makes sense if around 12 people meet, those who are most informed about the topic and who are concerned with specific problems. In Kačina, we sat around the table and discussed. We placed maximum emphasis on honest, detailed and professional discussion. We almost had an argument when we were planning what would happen next. Shortly after 1968, I attended a couple of other IWGP conferences, but then not anymore. I was not allowed to travel abroad and they did not want to pay it. Well, I preferred ordering the conference proceedings. Then I could only take part in the 8th IWGP conference in Nitra in 1989.

[188] The Agrarian Party was established in 1899, after the Czechoslovak Republic was proclaimed, they took an active part in the state administration. In 1945, the party was prohibited for an alleged participation in the destruction of the republic in 1938.

[189] The State Security observed local and foreign participants of international meetings and investigated their political attitudes.

[190] The idea of such a work group came up at the occasion of the 7th International Archaeological Congress in Prague in 1966 by Maria Hopf and her colleagues K. D. Jäger (Germany), M. Follieri (Italy), E. Opravil, Z. Tempír (Czechoslovakia), A. Patay (Hungary), J. Renfrew (UK) and further discussed by correspondence with F. C. Bachteev and M. M. Jakubciner (USSR) as well as with W. van Zeist (The Netherlands).

[191] Klaus-Dieter Jäger was present in Kačina in 1968, but he had no permission from the German Democratic Republic (Eastern Germany) to come, so he could not be mentioned in any official document. In a similar way, Jürgen Schultze-Motel, who was a suspect person for the regime and was also not allowed to come to Kačina, did not even get permission to attend the IWGP-meeting 1980 in Halle in his own country, only 50 km from his institute, but he secretly met some IWGP friends there (K.-E. Behre, personal communication).

VLASTA JANKOVSKÁ

(* 1941)

In the course of her studies at the Faculty of Science at Charles University in Prague (1958–63), she focused on subfossil macroremains of mosses and algae from bog profiles. Since 1963, she has been continuously working in the Institute of Botany of the CSAS, however, it was not all easy for her before the 1989 revolution. Naturally, she wished to travel and explore far-way countries, mainly those in the north-east, but she was not allowed to travel. She compensated for her passion only after her 50th birthday. With her travels to the Arctic and to Siberia, she succeeded to establish a whole new way of thinking in Quaternary palaeobotany by focusing on palaeobiogeography. Her international contacts with top academic institutions at the Universities in Bern and Cracow were crucial for her younger Czech colleagues. She inspired a whole generation – after 1989, she untiringly taught at many Czech natural-scientific faculties. In 2014, she was awarded the J. G. Mendel Medal by the president of the Czech Academy of Sciences for her merits in biological sciences.

The interview was conducted by Petr Pokorný.

PP: Dear Vlasta, at the time of your studies at the Faculty of Science in Prague, you started with algae and bryophytes. But how did you arrive at Quaternary pollen analysis and palaeoecology? Which of the living or historical personalities inspired you at the very beginning?

VJ: During my study at the Faculty of Science of the Charles University, I was almost immediately attracted by the Department of Botany, the group of so-called 'Cryptogamology' (Phycology and Bryo-lichenology), which was then directed by Prof. B. Fott. I wanted to specialise in the ecology of the bryophytes, especially of the liverworts [*Hepaticae*], but Prof. Fott urged me to engage in phycology. I opposed to him that I was a 'fieldwork' person and did not want to sit only at the microscope, and that is why I rejected his offer to investigate pyrenoids of *Anthoceros* bryophyte. Prof. Fott came up with a subject for me: *'to look in the sediment of Červené blato mire for my bryophytes and algae'*. However, there were no such remains present, apart from *Sphagnum* and so I tried, as a self-learner, to determine everything I could: fruits, seeds and mainly various plant tissues. I determined these according to reference collections and also the atlases of Russian authors. So, it was the analysis of macroremains that led me to palaeoecology. Prof. Fott then directed me to Dr. Vlasta Vodičková-Kneblová, at the then Central Institute of Geology at Malostranské Square in Prague, where I started to get to the heart of pollen analysis. Both these disciplines, palynology and bryology, were the subject of my Master's thesis, dealing with the study of peat sediments from the bog site Červené blato in South Bohemia.

PP: In the field of palaeoecology, you have taken advantage of your long-standing interest in algae in a completely phenomenal way. You first determined algae remains in lake sediments in South Bohemia and later, you became internationally famous thanks to these analyses – together with the phycologist Prof. Jiří Komárek. So you, indirectly, returned to your original interest.

VJ: After completing my studies, I was urged by Dr. Vodičková-Kneblová to continue in palaeoecology at the Central Institute of Geology. However, I decided to continue in this field at the Institute of Botany of the CSAS in Průhonice, in its branch in Brno, where Dr. Eliška Rybníčková already specialised in pollen analysis. There I started to work on my Candidate degree in the autumn of 1963. The subject of my candidate dissertation was the palaeoecology of the Třeboň basin, with the use of pollen and macroremain analyses and with a final output for the reconstruction of the vegetation and other conditions in the Třeboň District from the Late Glacial up to the present. I found algae and mosses in a sediment right at the first profile at the site of Velanská cesta, west of České Velenice. Based on my previous experiences, I was able to determine the mosses by myself. I did not want to overlook algae in the pollen slides, especially coenobia of the *Pediastrum* genus, as usually did other colleagues at that time. It was then that I remembered prof. Fott and I started to deal more with the found algae. My first contact with a phycologist was Dr. J. Sulek. Soon after that, I addressed Prof. J. Komárek. I was in close professional contact with him for my whole career. Our collaboration resulted in a number of publications and finally in a monograph on the *Pediastrum* genus, written especially for palynologists. It contains the lifelong experiences of Prof. Komárek and also my personal experience with palynological practice.

I want to add that I only later remembered a note by Prof. Fott on the find of *Pediastrum kawraiskyi* in the sediments of a central Bohemian fen mire by the inter-war palynologist H. Losert. Thanks to this, I was then able to identify this important Glacial relic also on other sites of the Czech Republic, in large quantities at the Komořany lake, but also in other countries, such as in Zyuratkul lake in the Southern Urals.

PP: I remember the second half of the 1990s when I was your Ph.D. student. Thanks to your contacts to the University of Bern, I had the opportunity to get to know the amazing personality of Prof. Brigitta Ammann and also many other extraordinary people around her, like Jacqueline van Leeuwen and Pim van der Knaap. It was a completely different world than in our country and I absorbed it with all my pores. How did you feel about the contrast between the scientific environment here and in Switzerland? I was then at the very beginning of my carrier, but for you, wasn't it already the eleventh hour, since you were not allowed to leave Czechoslovakia before the revolution in 1989?

VJ: In some European countries, palaeoecology was more developed than here. My first international contacts with colleagues of the same specialisation as me

Vlasta Jankovská. Photo T. Chlup, 2021.

were in Krakow, Poland. I spent one week with Dr. Wanda Koperowa, when we got to know not only her work, but I met in person with Dr. J. Oszast, Dr. Dyakowska, Prof. Szafer, Prof. Środon and the young generation of that time. Later, I was in close contact with this generation, mainly with Prof. K. Mamakowa, prof. K. Wasylikowa, Prof. L. Stuchlik and with others. Later I was in contact also with Polish colleagues of my generation and younger, for example, with Dr. A. Obidowicz, Dr. E. Madeyska, Prof. D. Nalepka, Dr. A. Wacznik, Prof. E. Zastawniak and many others. The Cracow palaeobotanical school influenced me profoundly and it allowed me to get to know colleagues also from other places in Poland: Toruń, Poznań, Warsaw and Lublin.

The first contacts with colleagues from western countries were made possible through meetings with Dr. Pim van der Knaap, Dr. Jacqueline van Leeuwen and Prof. R. Janssen. Thanks to the expedition to Spitzbergen in 1988, I got an offer from these three to a one-month stay at the University of Utrecht. After Dr. Jacqueline van Leeuwen and Dr. Pim van der Knaap went to Bern University, they and Prof. B. Ammann invited me a couple of times. I was working there, thanks to the support by Prof. B. Ammann, mainly on determinations of Chlorococcales algae from sediments of various sites, from the Alps to the lowlands. Thanks to these Swiss and Dutch colleagues, I met, for the first time, many colleagues from abroad, mainly during international excursions to bog sites. It is a shame that all this was really already the eleventh hour for me. By all means, I am really grateful for it!

PP: Expeditions have always been your big passion. I don't wonder. Each of us ecological biologists get, during long expeditions, into immediate contact with nature and with the living world that surrounds us and fascinates us. Which travel experiences were especially important for you? Which of your expeditions was the most important for you?

VJ: All my life, I wanted to explore foreign countries. Especially, when I had to try to get 'palaeo-reconstructions' out of my results. How could I do that without travelling to places that offer analogies to our distant past? I was interested mainly in the regions in the north of Europe and Asia, mainly because of the comparison with Central European conditions in the Late Glacial and early Holocene, which are being reconstructed based on various fossil finds. Thanks to my Russian colleague, Prof. G. A. Elina, I was able to take part not only in an excursion to Karelia, but also to the Kola Peninsula. There I finally had the opportunity to explore zonal and montane tundra, forest-tundra and northern taiga. I learned not only the vegetation of these biomes, but also the natural conditions, which form them. Sometimes, it was a shocking experience and I was only afraid if I had messed it up earlier in my 'palaeo-reconstructions'. I hope not, due to my inborn cautiousness. In northern Karelia, I saw lilies of the valley growing together with *Rubus arcticus* and *R. chamaemorus,* in peat moss, on an almost 5-m thick bog sediment. In a thin pine cover in the headland of the White Sea, there were lilies of the valley growing together with lichens *Cetraria nivalis, C. islandica, Cladonia sylvestris, C. rangiferina*,

C. alpestris and others. In the tundra, hidden behind large boulders and in depressions, there were not only massive clusters of ferns, but also single specimens of plants that I would not expect there (e. g., *Lathyrus vernus*). At that time, I became aware how important it is to get to know the broadest possible scale of various vegetation formations to have at least a partial idea of the past.

You are asking me which expedition was the most important for me. It was all of them! In 1988, I succeeded to take part in a 1-month expedition to Spitzbergen. I learned to know the real arctic tundra. There I saw vegetable gardens and 'green' cereals near the northern Arctic Circle in the Kola Peninsula. East of the Polar Urals, in the Arctic Circle in Salekhard and Labytnangi at the Ob River, in the tundra and forest-tundra, they were growing potatoes in gardens around wooden houses that were falling apart due to the melting permafrost. I could see in various situations, how the presence and activities of man were reflected in the vegetation, how the synanthropization approached from the stable and summer dwellings of the reindeer herders up to the modern population in the local towns and sites with oil and natural gas extraction. There is nothing like what you can see with your own eyes! By and by, I started to notice everything that went on in the landscape, not only the vegetation, but also where and how people lived there, what they did in that originally undisturbed landscape, and how they exploited it.

Understanding the world as broadly as possible is fundamental for the palaeoecologist. Sitting at the microscope is primary and necessary. It provides invaluable data, which, however, must be worked on by an expert in real nature and human activities in the past and present.

Vlasta Jankovská in the 60s. Photo archive of V. Jankovská.

PP: How did it come that you arrived from Quaternary palaeoecology, the research of large spatial and temporal scales, at the research of medieval latrines and archaeobotany? And how was the collaboration with archaeologists?

VJ: I started to work with archaeologists at the branch office of the Institute of Archaeology of the CSAS in Most. Thanks to the helpfulness of this institute, I found a dwelling to be able to conduct sampling of the sediments of the vanished Komořany Lake. At that time, the archaeologist Jan Klápště addressed me with the request to carry out pollen analyses also from the sediments of medieval features. By then, today's Prof. Klápště carried out an intensive rescue excavation of medieval Most. It was mainly the sediments

of a previous well from the 13th century, where he had found big 'treasures' mainly in the shape of ceramics, similar to other cesspits. I answered to him that we must try it. The result was a surprise for both of us. Such a rich pollen spectrum I had seen before only in the analysis of honey, which was brought to me by sad girls from the company Medos-Galantha, which the Germans returned the ordered honey because they considered it to be adulterated. It was a completely different pollen spectrum compared to 'our' usual samples of bog and lake sediments. In addition, in the samples, especially those from the upper layers of well sediments, I had troubles with objects reminding of Rhizopods. Browsing through a textbook on parasitology by O. Jírovec, I found out, by chance, that these were the eggs of whipworms (*Trichuris trichchiura*). Then I also discovered the capsulae of roundworms, *Ascaris*, and also pinworms (*Entherobius*). Thus the next phase of my interest started, mainly after which J. Klápště told me that it was unclear why such a thorough well stopped being used as a well so soon and became a latrine. Obviously, it was because the water was polluted. I loved working with J. Klápště because he was able to get deep even into the mysteries of pollen analysis. The results of pollen analyses from so-called 'anthropogenic' sediments are extremely interesting, and today, it has become an independent discipline. The results, however, require a different approach to palaeoreconstruction. Pollen finds from synanthropic vegetation prevail, mainly crops (cereals and buckwheat), field weeds and ruderal species. We also detected pollen grains of 'exotic' *Myrtus* type (apparently a clove), *Borago* etc. The collaboration with archaeologists was rich. The only shame is that the results mostly remained hidden in inaccessible archives. Today, I regret especially the results of pollen analyses from medieval Opava. They remained unpublished. It was a larger set of pollen-analytical results which also provided a lot of information on the history of some interesting taxa.

PP: Which of your research or discovery do you consider with hindsight the most important in terms of the development of the discipline? In your case, it may not be one, but several…

VJ: The answer is not at all unambiguous. I tried to cover the broadest possible range, i. e. to notice in pollen spectra not only the 'classics', i. e. pollen grains and spores, but also other objects. Today, they are referred to as *non-pollen palynomorphs* (NPPs). We already talked about the finds of algae. The publication prepared with Prof. J. Komárek intentionally for pollen analysts achieved an almost world-wide usage. Something similar achieved the publications of other palaeoecologists on amoebae, the remains of fungi, crustaceans and other animal objects. I Perhaps it was beneficial that I drew attention to the presence of eggs of Tardigrades (water bears) in the sediments from the permafrost at Spitzbergen. Thanks to Prof. L. Kaczmarek and Dr. Milena Roszkowska, the publication of these finds was distributed not only among pollen analysts, but also zoologists. In archaeobotany, it was not only the finds of the remains of parasitic worms, but also the pollen finds of *Myrtus* type, which led even to consideration on the use of cloves as a spice. From the

'classical' profiles of bog sediments, I consider as important the results witnessing climate changes in the course of the last millennia. Evidence of this climate change found in the Nordic palsas in Scandinavia and Russia provides an explanation for some of the ambiguities in the profiles of Central Europe.

PP: You spent your whole long life as a researcher. Looking back, taking a critical look, what would be your message to the youngest generation of palaeoecologists?

VJ: I am well aware that I am no longer able to solve many problems for time and other reasons, however, I try to at least draw the attention of specialists from other fields and younger colleagues to these challenges. It would be, for example, interesting to explain scientifically and objectively, why chloroplasts have been preserved in algal cells of *Melosira* found on the basis of the deep and old profile Labský důl. There is the same problem with mosses in deeper layers of the profiles in bog site of Červené blato. These mosses have a brown-green colour when sampling, which quickly turns dark brown in the air. Even the next day, chloroplasts can still be observed microscopically, however, they quickly decompose. Is it because these layers were deposited in a cold environment and even in permafrost and where thus conserved this way? Is it because these layers were formed in the cold environment of permafrost and were preserved in this way?

The palynological research still faces a great future. Even the founding fathers did not even imagine it: Karl Rudolph, Franz Firbas and others from their generation, as well as from my generation. The discipline of palaeoecology with all its subdisciplines is growing quickly. When I started in the 1960s, I managed to read and look through all publications on the subject in Europe. Now this is no longer possible, and it necessarily requires closer specialization. It can be observed both on the international and local scale, even in the Czech and Slovak Republics. In addition, the number of palaeoecologists in Czechia and Slovakia has grown considerably. They work intensively and diligently and use of the most modern approaches. They are working in interdisciplinary teams. Today, the findings of palaeoecology can be used by many disciplines of the living and inanimate nature, which is of mutual advantage.

I wish the current young and middle generations an unflagging enthusiasm in discovering and solving unexpected problems and mysteries in the already vast field of palaeoecology. I just want to appeal to them to keep in mind that although laboratory and computational work, as well as modelling, statistics etc. are indispensable today, direct contact with nature and its direct observation However, observing nature is still the basis of everything.

I would recommend to the young generation to hold together, to exchange and discuss their results and to publish together. There are some people excellent at analytical work, others in synthetic. The combination of the results of pollen and macroremain analysis with the analysis of charcoal, algae, diatoms and other NPPs, dendrochronology, archaeology, geography, geology, history, climatology, dating and more has a great future.

EVA HAJNALOVÁ

(*1941)

In 1963, she graduated as engineer in agronomy at the University of Agriculture (today, Slovak University of Agriculture) in Nitra. After three years of obligatory on a state farm (state agricultural enterprise), where she first worked as zootechnician and then as agronomist, she returned to the academic realm and started to work as an assistant at the Department of Crop Production at her Alma Mater. In 1969, she moved to the Institute of Archaeology of the Czechoslovak Academy of Sciences in Nitra, where she started to build and later develop Slovak archaeobotany. She focused on the analysis of carbonised seed and charcoal. Among others, she was the first specialist in Czechoslovakia who started to determine spelt. She lectured at the University of Agriculture in Nitra and at the Department of Archaeology at Comenius University in Bratislava. In the course of her 37-year practice as an archaeobotanist, she processed material from more than 300 sites mostly from Slovakia. Unfortunatelly large part of them remained unpublished due to the lack of interest of colleagues from the Institute of Archaeology, who did not provide necessary dating and contextual information. She published her findings in three monographs and over 120 articles and received her research proffessorship (DrSc.) in 1992.

The interview was conducted by Mária Hajnalová.

MH: I know that you were interested in plants since you were a little girl. But it would be nice to hear, when and where your professional journey towards archaeobotany started. Let's start with what did you study and how it continued?

EH: I studied agronomy at the University of Agriculture in Nitra, and after its completion in 1963 was sent for a mandatory period on a (socialist) state farm. The next two years I worked there as a zootechnician and then as agronomist. In 1965 they offered me a position of a research assistant at the Department of Crop Production at the University of Agriculture in Nitra. My director and tutor was professor Emil Špaldon, at that time rector of the University, and a very active and visionary person. He was a childhood friend of Anton Točík, the director of the Institute of Archaeology of the Czechoslovak Academy of Sciences in Nitra at that time. One day Točík brought to the department a hand-full of charred cereal grains recently discovered in a silo pit at the site of Nitrianský Hrádok–Zámeček.[192] He wanted to know, if it is possible to determine what species the cereals are. I was the only one

[192] An important 'tell'-type settlement of the Bronze Age also referred as the Slovak Troy.

Eva Hajnalová. Photo M. Fallen, 2021.

who was inspired by this puzzle as much as to start its analysis. First, I sorted the seeds according to size and then shape, and then I determined them using botanical, agronomical and ethnographic literature, and personal seed reference collection of František Kühn.[193] Soon after, in 1968, I joined the Institute of Archaeology in Nitra. First only as fellow at the Czechoslovak Academy of Sciences, and since 1971, as an employee of the newly founded department of 'Auxiliary scienes', where I worked alongside Cyril Ambróz (archaeozoologist), Júllius Jakab (anthropologist) and later Ján Tirpák (geophysicist).

MH: How was the archaeobotany perceived at the time you started and what did the archaeologists expect from it?

EH: At the time when I started: I was the only archaeobotanist in Czechoslovakia, which was employed directly at an archaeological institution. The colleagues who had studied seeds form archaeological sites already couple of years before (Z. Tempír, E. Opravil and F. Kühn) worked in museums or in botanical institutions. So, even though there were archaeobotanists, archaeobotany as a discipline did not exist. For a very long time, we were seen as merely a 'service'. Archaeologists were bringing to us individual finds, which they spotted in the field and recovered by hand. They wanted only lists of the taxa but were not interested in our expert conclusions or publications. Basicaly, they were interested in two questions only: *'what did people of the past eat'* and perhaps *'what did they use as construction timber'*. They expected only reports with a list of the species. This information sometimes appeared in the archaeological papers. Sadly, I was not able to evaluate and interpret results of archaeobotanical analyses of many assemblages, because of the lack of information by the archaeologists. Still I have some of these analyses in my 'drawer'.

MH: What did the fieldwork look like at that time? What was your equipment?

EH: For the first time, I took active part in an archaeological excavation in 1974. It was in Šarišské Michaľany – Fedelemka, a settlement and cemetery of the Bükk culture, which was excavated by Dr. Stanislav Šiška. He was one of the first archaeologists willing to adapt the excavation to the needs of archaeobotanical sampling. We worked side by side at the excavation and together selected the places suitable for archaeobotanical sampling. The extracted samples – buckets of soil – were carried by the diggers to a nearby stream, where flotation took place. I used a method, which is today called wet sieving with a stack of three laboratory sieves. I then dried the sieved fractions (three from each sample) on newspapers. So, in the field, I was 'equipped' with sieves, newspapers, a paper notebook, a pencil and paper bags

[193] František Kühn documented at the time cultivation of emmer landraces in various parts of Slovakian Carpathians.

for packing of the dried material. Not all colleagues were willing to discuss and to try various sampling strategies and sampling methods. But in time I surrounded myself by a small group of specialists, for whom the presence of an archaeobotanist at the excavation was not a burden and/or who supplied me with interesting material and its contextual information.

Until the end of my carrier in the Institute of Archaeology of the Slovak Academy of Sciences, I worked with a simple stereoscopic microscope without drawing mirror or camera. The photographs of seeds were taken by a photographer with various magnifying lenses. The charcoal and wood were first also analysed only under a stereoscopic microscope, but since 1984 with microscope with reflected light. In the taxa determination I could rely on two referential collections. Doc. F. Kühn kindly gave me the part of his seed reffrence collection of crops plants and Dr. Marie Lhotská, well known specialist on (not only) Fabaceae plants, who really enjoyed one of my first lectures the seeds of wild-growing species. Dr. Josef Kyncl – the father of Czech dendrochronology – taught me how to prepare the reference collection of charred wood. The first computer came in 1991.

MH: What site did address you most? Do you have a favourite one?

EH: Well, there is more than one site, depending on angle I look at them.

Most often I perceived the sites through the people who were conducting the excavation. Among those, are sites from my native Spiš region, such as Spišská Kapitula, Levoča, Spišské Tomášovce and Pavľany which were managed by the archaeological technician, Mr F. Javorský. These excavations yielded very interesting archaeobotanical material, but it remained unpublished. Further, there are the sites which were excavated by colleagues that were interested in my results and called me repeatedly to their excavations. Here belongs the early medieval settlement in Mužla-Čenkov (I. Kuzma), the Roman camp in Iža-Leanyvár (J. Rajtár), the prehistoric and medieval sites in the centre of old Bratislava (P. Baxa) and the Roman-period settlement in Ostrovany (M. Lamiová).

Another viewpoint is the material itself, through which I could see the relate to the past inhabitants of now vanished site. When I recovered a charred wild apple during flotation in the stream near Šarišské Michaľany, I imagined a woman, who seven-thousand years ago washed the clothes in the same stream and then went to dry the fruits for the winter at her fireplace. During the analysis of a complete carbonised loaf of bread from Devín I thought about what it might have tasted like and why they did not remove the poisonous corncockle before grinding the flour.

The last viewpoint represent knowledge accumulated in almost four decades, which help me to imagine individual regions of Slovakia and how time, people and climate changed their landscape. For example, the region at the foot of the High Tatras, our largest mountain range, which today consists of a mosaic of pastures, meadows, coniferous monocultures, was covered with oak and beech woodlands in the past. I see how the first people cut the oak trees and established their fields, which were then ploughed for at least six thousand years. In the Bronze and

Eva Hajnalová and Mária Hajnalová. Photo archive E. Hajnalová.

Iron Ages people cut the beech and spruce trees in high elevations and build fortified settlements and refuge places.

MH: What do you consider your most important archaebotanical identification?

EH: The determination of impressions of ears of spelt in the daub from a wall of a German hut at the site of Cífer Pác. At that time, we did not know that this type of wheat was cultivated in Central Europe in Antiquity. After the publication of this findings, I was criticised by colleagues, but after a short time, the occurrence of spelt was confirmed in Austria, which pleased and encouraged me. The second most important find for me was the already mentioned apple from Šarišské Michaľany. Unfortunately, the find never 'saw the light of the day' because it disappeared together with the matchbox where I put it during the excavation. And you, dear daughter Mária, can confirm its existence because you found it in the mesh. Most surprising were the finds of exotic rice and nutmeg from high-medieval Bratislava.

MH: How would you describe the change of archaebotany, between the time you started and today?

EH: For more than 15 years I have not been active in the field, but you keep me informed. I would compare it to a change in the way children are spending their leisure time. At first children used to play games outdoors, then they read books, watched TV and now spent most of the time with online computer games.

A vast change can be seen in the questions archaeobotany is asking. Today, it does not suffice to determine the range of species, which grew on the site. It is necessary, using the information on the archaeological context to interpret how the plant remains got into the soil and samples and what they reflect from the past life of the community. In my life I saw, how archaeobotany moved in Slovakia from the position of archaeological 'auxiliary' specialization and become independent scientific discipline producing important results not only for archaeology, but also biology and ecology.

MH: What would you recommend to today's beginning archaeobotanists?

EH: In the first place humility; humility towards the material, which they receive and humility towards knowledge, which was gathered by generations of experts before them.

MH: Do you have any special memory from your personal life in connection with archaeobotany?

EH: My strongest and very enjoyable memory is from the 8th IWGP, which I organized in Nitra, Slovakia, at the beginning of June 1989, a couple of months before the Velvet revolution. On the one hand, because I had a strong support by the administration of the Institute of Archaeology, on the other hand, because a group of amazing people gathered here, who understood each other as experts and as humans. For most of the participants from Western Europe it was the first time they crossed the Iron Curtain and could take a closer look. I was pleasantly surprised by the tolerance of all participants and by the positive reactions to the program and the excursion to archaeological and natural monuments.

VĚRA ČULÍKOVÁ

(*1951)

Věra Čulíková was born in Opava, where she spent the majority of her life. In 1970–5, she studied biology at the Faculty of Sciences of Masaryk University in Brno, specialising in systematic botany. In the course of her study visit at the Department of Botany of the Masaryk University, she expanded her master thesis to a rigorous doctoral thesis named *'Taxonomic studies of Leontodon species in Czechoslovakia'* (RNDr. title obtained in 1977) supervised by Prof. Miroslav Smejkal. In the same year, she started working in Opava as an assistant of the first Czech archaeobotanist Dr. Emanuel Opravil, in the Department of Archaeobotany of the Institute of Archaeology in Brno. The Department of Archaeobotany in Opava was founded by Dr. Emanuel Opravil already at the beginning of the 1960s and until the end of the 1990s, it remained the only one of its kind in Czechia.

Věra Čulíková remained in the Department of Archaeobotany in Opava as an employee throughout her professional life, until it was closed at the end of 2019. In 1979–82, it was her study visit, then she stayed there as a candidate-of-sciences student, after defending her candidate dissertation named *'Reconstruction of synanthropic vegetation in medieval Most based on the macroremains from anthropogenic sediments'* (CSc. title, 1986) she became a scientific assistant and finally, after 1988, she was a research associate. The only exception in her scientific activities was the time between 1990 and 1992 when she was a member of parliament, occupied with legislation in the Committee for Science, Education and Culture.

Věra Čulíková focused on carpological, xylotomic and anthracological analyses for four decades. She focused on plant macroremains not only from prehistory, but mainly from the medieval and post-medieval periods, originating in archaeological sites on the territory of Bohemia, to a lesser extent also from Moravia and Silesia. The analysed material stemmed mainly from archaeological excavations carried out by the Institute of Archaeology of the C(S)AS in Prague, but sometimes also from other institutions (for example, National Heritage Institute, Archaia, regional museums etc.).

The interview was conducted by Jaromír Beneš.

JB: How did it happen that you got involved in working with archaeologists and how does it relate to your original specialization?

VČ: I would have liked to continue with taxonomy after my graduation, but there was no position available at that moment. However, looking back today, it seems to me that I, actually, could not have avoided archaeobotany. First of all, I lived in Opava, the town hosting the only Department of Archaeobotany of its time. Already during my studies, I had a part-time

job with its founder, Dr. Emanuel Opravil. By the way, he was a graduate of geobotany at the same *alma mater* as I. I had gained experience in preparing xylotomic preparations, in the flotation of material from Mikulčice and I also helped to complete the reference collection of seeds and fruits (I added material from my own field collections). But mainly, the end of my studies coincided with the time of rescue excavations in the historical centre of the royal town of Most. Bags of samples piled up in Opava department; it had become obvious that the botanical analyses from whole Bohemia, Moravia and Silesia were beyond the possibilities of a single expert. When my focus on specialisation in archaeobotany was approved by my respected supervisor, the taxonomist Miroslav Smejkal, who considered it a promising discipline, I was decided.

Dr. Opravil had developed cooperation with archaeologists long before, already during his studies. I still admire his coherent concept of the Department of Archaeobotany, which he created, despite of a minimum contact to foreign countries, where archaeobotany had, after World War II, an advantage over us. He systematically, at his own expense, exchanged and gathered offprints and seeds in order to build an expert library and reference collection. Choosing Opava as the seat of this office was given, on the one hand, by the fact that the Silesian Study Institute of the Academy of Sciences was willing, at the turn of the 1950s and 1960s, to cover this natural-scientific discipline. On the other hand, Opava belonged among the towns which were the most damaged during the war and, therefore, many archaeological rescue excavations started to take place there. At the time of E. Opravil's arrival, the Silesian Institute already had an unused chemical laboratory. He originally imagined that, besides macroremain analyses, he would analyse also pollen, so he started to equip the laboratory for this purpose. But soon it became evident that he was not able to manage both. Later, the laboratory of archaeobotany became part of the Institute of Geography, and in 1977, shortly before my arrival, Dr. Opravil finally succeeded in integrating the laboratory into the Institute of Archaeology of the CSAS.

At my arrival, I was determined to process the finds from Most, later from other Czech sites, whereas Dr. Opravil continued with analysing the material from Moravia and Silesia. Despite the institutions, to which the laboratory belonged, changed several times, the offices of Dr. Opravil moved only once. Since then, he was always sitting on the same chair. However, I have to state that the conditions there were less than poor. There was very little room and I also found myself there and two permanent laboratory technicians with us. The optical instruments used in our laboratory were not very good, determination guides for seeds were almost non-existent, there was very little contact to abroad, and it was always complicated. Still, I stayed there for almost 40 years.

Unfortunately, the laboratory Dr. Opravil had built so hard all his life, and with which I had tried to help him, has been closed, after more than 60 years. It was me who had to liquidate the office. In the end, shortly before the first Covid lockdown in 2020, the last samples were transferred to the Prague repository of the Institute of Archaeology and the remains of the equipment were discarded; I swept and closed the door. However, I have to

add that I have reckoned with the development and the decline of the Opava department for a long time; we were gradually replaced by the younger generation of workers trained in the field, for example by those working in České Budějovice, at the Institute of Archaeology in Prague and in other institutions. And this is definitely right!

JB: Could you describe the motivation of Emanuel Opravil? As far as I know, he was a functionary of the Czech Pomological Society.

Do you mean what lead him to decide to develop a discipline, which, despite being founded earlier, didn't have any tradition in our country? Or what lead him to build a department with such a specialisation? Or do you mean what led him to become one of the European experts? Or to become a researcher at all?

It is clear from Opravil's vast bibliography that he devoted his whole life to the scientific work, which is, however, generally assumed for scientists. His connection to nature was lifelong and he used to say that he already with seven years has the wish to work with wood. His activities and hobbies were diverse; he was a member of many societies and associations – both expert and non-expert ones. Whether his membership in the pomological society was connected with his focus on the taxonomy of the *Prunus* genus, I don't know, but probably yes.

JB: I would say that also your impact on the field is very distinctive. You have produced dozens of studies, among them, those about Most and the historical centre of Prague, including Prague Castle, were important contributions.

VČ: I am very grateful for Most and all the Prague sites. When Miroslav Richter, the then director of the Prague Institute of Archaeology, promised to me that there would not be any such vast archaeological research as Most in our lives again, I hardly believed him. Naturally, he was right; the macroremain assemblage from Most remains hitherto the vastest one in the whole history of Czech archaeobotany. The samples mainly stemmed from waste pits of houses from the 13th–16th centuries, in a smaller extent also from wells and dung heaps. My beginnings fell into a period when there were no flotation machines to separate plant macroremains; all washing and separation was done by hand.

My colleague Opravil evaluated, at the beginning, only one feature from Most, the one from Rozmarýnová Street. Nevertheless, he managed to find ivy there, which I did not succeed to find not only in Most but also in no other site in the Czech Republic which I processed later. As for the quantity of the material from Most, I processed 157 bags, mostly 50 l each (!). We washed separated the whole volume of them, which was in total thousands of litres. The determination of more than 250 thousand of seeds and fruits as well as the essential parallel study of similar finds in Europe really took about 8 years of concentrated work. The obtained collection of more than 300 identified taxa of herbaceous and woody plants represented at the same time the essence of my archaeobotanical training; the basic range of species then grew only slowly by

Věra Čulíková. Photo T. Chlup, 2021.

processing additional sites. I disposed over the mentioned reference collection and the respective literature from Dr. Opravil. The results then led to a large Candidate dissertation on the *'Reconstruction of synanthropic vegetation of medieval Most based on the macroremains from anthropogenic deposits'* (CSc. title, 1986).

JB: I would also like to ask about your collaboration with archaeologists in Most. How did it start?

First, I was an employee of the Most branch office of the Institute of Archaeology in Prague, directed by Dr. Tomáš Velímský. The archaeologist Dr. Jan Klápště supplied us with material for the analyses. Despite his youth, our colleague Klápště was an exemplary co-worker; Dr. Velímský was a wonderful and straightforward boss with a real interest in our cooperation.

JB: And what about the Prague sites?

Actually, the largest number of archaeobotanical sites analysed by me comes from Prague, mainly from Prague Castle and Malá Strana (the Lesser Town of Prague). The oldest samples from Prague I analysed are from the Early Middle Ages, the youngest from around the turn of the 17th and 18th centuries. Not all results from here have been published so far. I am grateful for these samples: the ones from Malá Strana yielded a long-range of species, and the Prague Castle, including Hradčany, is an exceptional and prestigious locality. Especially, the Malá Strana sites offered me an opportunity to study the gradual enrichment of useful plants assortment from the Middle Ages to the Early Modern Period. In the samples from the Early Modern Period, we often encountered rare imported goods. Some specimens represented unique, or, at least, the oldest finds within Central Europe.

JB: Can you name some of the archaeologists with whom you have collaborated the most in Prague research?

VČ: It was mostly Ivana Boháčová and also Jan Frolík, both from the Institute of Archaeology. From the National Heritage Institute, it was Jarmila Čiháková. I have to say, that the collaboration with I. Boháčová and J. Čiháková is still ongoing. They also deserve my thanks for the material provided.

JB: Do you remember any analytical surprises you encountered in Most?

I have to be careful because, some time ago, my younger colleagues blamed me, or rather made fun of me, that I focus mainly on rare species! Of course, this is not the case, the specialities appeared from time to time because we always processed large volumes consistently. It sometimes happened that we found such a rare species only in the last sample, as a kind of a 'bonus'.

We often found many sorts of spices, luxury foods and drugs in Most features from the 13th–16th centuries. Among them, we repeatedly encountered seeds (and once also a leaf) of *Arctostaphylos uva-ursi*. This species has not yet been reported

from any Central European anthropogenic sediments. However, for a long time, there was a great mystery to me– findings of small brown-red seeds with a reticular surface; not even Dr. Opravil could help to determine them. Well, it turned out over time that this was bilberry (*Vaccinium myrtillus*)! Finally, a bilberry compote for lunch proved it.

This brings me to sieves. When I first started working in the archaeobotanical office in Opava, around 1975, we used sieves with 1 mm meshes. It was quite a problem then, to get sieves with finer meshes. I personally think that we this way missed some species with smaller seeds, such as rushes (*Juncus* sp.); for example, in Mikulčice and elsewhere. Over time, we changed to sieves with 0.5 mm meshes, and later we managed to get even meshes of 0.3 mm, thanks to a former mill of our family. Today, you are perhaps using even finer meshes of 0,25 or 0.2 mm, however, according to my experience, 0.3 mm is sufficient. For example, the seeds of tiny procumbent pearlwort (*Sagina procumbens*) are caught on it. I don't know of any seeds smaller than those, which could be encountered in archaeological contexts.

Lots of tiny achenes similar to cudweeds (*Gnaphalium* sp.) appeared in several localities in Prague, first in Malá Strana and later in Hradčany. Such little seeds probably also escaped us in Mikulčice, due to previously used coarse sieves. Although Dr. Opravil almost approved my preliminary identification as a cudweed, it was curious that the achenes became more and more abundant; there were thousands of them, after all. Only later, I managed to identify them correctly and I dementated my previous identification as *Gnaphalium* since it was a cattail (*Typha* sp.), which frequently occurs in wetlands, and it is a species with vast production of diaspores. Simply, these were the errors of the beginnings. This can no longer happen to your students, since there are wonderful guides of seeds and fruits today. Besides, I also published my photographs a long time ago.

JB: Were there other 'miracles', apart from cattail, in Prague? I mean findings that took a long time to identify.

Of course, there were many! For example, relatively large achenes of the Apiaceae family, also appeared repeatedly. I bothered many botanists with my questions, including participants of the IWGP in Cracow, but in vain. Preliminarily, I determined the fruits as *Libanotis montana*. However, at the end, it turned out to be fennel. By chance, my colleague Vlasta Jankovská and I travelled to Morocco where we bought an old variety of fennel which is very different from what is offered in our stores today. And so I had to correct my already published data again, this time those from Hradčanské Square and Thunovská Street from the 16th–17th centuries, and I think that also some others.

JB: If ninety-nine identifications are usual and then bang!

In a cesspit of a monastery in Thunovská Street from the 17th–18th centuries, I found a species I didn't even know it existed: the wax gourd (*Benincasa cerifera*). An up to 80-cm-long pumpkin from South-East Asia, which has until then not been

documented in the neighbouring countries. In the cesspit, there were remains of many fruit species and also rarer rare species of legumes, including American paprika, lettuce (*Lactuca sativa*), spinach (*Spinacia oleracea*), and eggplant (*Solanum melongena*). I found there also many spices, even seeds of cardamom (*Elettaria cardamomum*), which were already known from medieval Germany. I was especially delighted by finding of characteristic seeds of rosemary (*Rosmarinus officinalis*) since it is commonly assumed that rosemary does not develop seeds under our conditions. When my colleague, the palynologist Vlasta Jankovská, proved that pollen, which repeatedly occurred in her medieval samples, was not a myrtle, but a clove (*Myristica fragrans*), I focused on the search of its macroremain – a twig with lignified buds. However, I didn't succeed to find these even the early modern cesspits. I even don't know of any finds of clove macroremains even in the neighbouring countries. Simply, cesspits are a paradise of archaobotanists! The one from Thunovská Street was a great pleasure for me at the end of my 'career'. However, I have to stress that in my youth, I definitely preferred synanthropic vegetation, such as that of dumps, rubble sites etc.

JB: Speaking of rare finds from the New World, when did you actually encounter tobacco for the first time?

I found tobacco, specifically the Aztec tobacco (*Nicotiana rustica*), already thirty years ago (1992/93) in a waste pit of St. Anthony Hospital in Kanovnická Street in Hradčany, Prague, which was dated to the 1st half of the 17th century. From the botanical point of view, it was a very luxurious and rich collection, both concerning macroremains and the number of species (more than 180!). Although, we had discovered pipes in the cesspit, this type of tobacco was mainly used as a medical plant. A pharmacy was a part of the former St. Anthony Hospital, which has been proved by a range of glass bottles and small bowls. We can't exclude that the Aztec tobacco was cultivated in the hospital garden. I don't deny that the determination of my first (and very fragile) tobacco seed took me some time. The contents of the first of the two cesspits in the same yard had already been analysed years before by Ing. Dohnal. I want to add that head of archaeological research, colleague J. Frolík, did not ascribe such great importance to the post-medieval finds (perhaps, the archaeologists, in general, considered the written sources sufficient). This may explain not only the delay in the processing of the material but also the very small volume of the samples.

A set of 25 samples (from Early Medieval to Early Modern Period) from various contexts of the Prague Castle and Hradčany had a similar fate (excavations of I. Boháčová, H. Březinová, I. Herichová and K. Tomková). Fifteen years had passed between the sampling and the processing! The two richest samples (ca 200 taxa!) originated from an adit in front of the Archbishop's Palace at Hradčanské Square. The tunnel was built on the order of Rudolf II, the Holy Roman Emperor, in the 16th century. Also here, a single seed of Aztec tobacco was encountered. A find of a seed of American pokeweed (*Phytolacca americana*) was unique there since it was the first find of the species in Central Europe (same as tobacco, it was of North American origin). The black-violet fruits of the American

pokeweed were used as 'plant kermes' to dye food and wine until the beginning of the 20th century. In the U.S., other parts of the plant were used as a remedy. The species was more frequent in the cesspit in Thunovská Street, where we also found, for the first time, both species of tobacco, i. e. apart from the Aztec tobacco also the Virginia tobacco (*Nicotiana tabacum*).

JB: Which of the sites you have worked in do you consider the most important?

VČ: I think I've already indicated a lot. Of course, apart from Most, it was a number of Prague sites from the early Middle Ages to the Early Modern Period. But I must definitely not forget Libice nad Cidlinou offering a relatively detailed picture of the environment surrounding a Slav hillfort. From the medieval sites of Prague, the analyses of sediments beneath Hartig and Lichtenstein Palaces and especially in the premises of the Kolowrat Palace were great contributions; many analyses from the Malostranské Square have not been published yet. Samples from the alluvial sediments beneath the Kolowrat Palace consisted of only about three buckets, however, the species range was immense, containing even some mountain species.

JB: There were rather few prehistoric excavations, weren't they?

VČ: It is important to say that our work represented a service for the archaeological departments, i. e. for the needs of the archaeologists. Since the demand of analyses of medieval sediments clearly prevailed for the whole time, it resulted in the published studies and contributions. Nevertheless, I never refused any prehistoric samples and I was also determining charcoals. In the course of the time, I conducted some prehistoric analyses; only lately, (2016 and 2019), my colleague Milan Lička published the results of the long-term processing of the site of Mšeno belonging to the Stroke-ornamented ware culture. The archaeobotanical contribution to his publication interested me a lot and I enjoyed it, and since the found set was much more modest than from the Middle Ages, it took less time.

I hope that we have achieved useful results which were useful either for archaeologists or for botanists focusing on the history of plant species on our country and perhaps the younger generation of archaeobotanists will be able to continue our work.

INTERVIEWS WITH ARCHAEOLOGISTS

IVAN PAVLŮ

(*1938) ARCHAEOLOGIST

Ivan Pavlů studied archaeology at the Faculty of Arts of Charles University (1956–61) and in the workshop of prof. Jan Filip, he graduated with work on '*The organisation of the Neolithic agrarian society in the light of archaeological sources*'. Still, as a student, he worked at the first research excavation of a neolithic settlement in Czechoslovakia, in Bylany. In 1963, he started at took a position in the Institute of Archaeology of the CAS in Prague and together with Bohumil Soudský, he worked on a codification of the Neolithic pottery from Bylany. After B. Soudský moved to Paris, Ivan Pavlů was entrusted with the supervision of the branch in Bylany (1971–88). For many years, he was the head of the Prehistoric Department of the Institute of Archaeology of the CAS in Prague (1976–90) and held lectures at the Faculty of Arts of the Charles University. For his research, publications and his collaboration with German universities, he was appointed corresponding member of the German Institute of Archaeology. In 1993–94, he was on a one-year Fulbright scholarship in Tuscon (University of Arizona). After this stay, he wrote a broadly conceived monograph on *Pottery Origins* (1997) on the beginnings of pottery production in different regions of the world. For this work, he obtained (1996) the DrSc. title. In 2018, Ivan Pavlů was awarded the European Archaeological Heritage Prize for his contribution to the study of Neolithic settlements.

The interview was conducted by Jaromír Beneš.

JB: Perhaps I should start by mentioning that Bohumil Soudský, actually, conceived the archaeological excavation in Bylany under the influence of the large fieldwork projects of the 1950s; as a kind of Neolithic Jarmo in Central Europe…

IP: It was a sort of purely artefactual archaeology. We did not even dream of archaeology as conducted today by Dagmar Dreslerová.

JB: In Bylany, archaeobotanical analyses started very early at that time, despite being not at all a priority. I need to know, what you know about it. How did it come about?

IP: I have rather faint memories. I started there in 1958 as a student. Before that, I was in Most and in Březno and at that time, Norbert Mašek did not get any money for his field research, and so they were sitting at the institute and he said, I can't

go on like this. Jiří Sláma and Jan Bouzek were there, and they said with a sneaky smile, then send him to Bylany! So I, unsuspecting, went to Bylany by motorbike – I hitchhiked a bike – and Soudský was there. First, he did not want to let me enter, but I had a letter of recommendation from Norbert. I was there, and he gave me a test pit, and then I went there during the vacations of 1959 and 1960. And in 1961, I did my military service. And wrote my master thesis. It [archaeobotany] must have started by then, and from what I remember, Soudský had not much of an idea about it although he had visited Prof. P. J. R. Modderman in 1959 in Holand. Later, in Leiden, the student Corrie Bakels appeared, who is still directing it or is retired.

JB: Sometimes she still attends conferences.

IP: After 1989, I was with Dreslerová there. We made a sort of tour around the classical sites. And in Leiden, on the one side, on the first floor there were the archaeologists and professor and on the other, the biology lecture rooms and the professors and the students in the corridor. And this Corrina was active. Already then, Soudský had arranged a collaboration with the second lady, which was into bones, Classon was her name. There were not many bones in Bylany. Soudský had the idea they should by determined and analysed. And he arranged this collaboration with A. T. Classon, who at the end really came. And all these bones were then, under Jan Rulf, who started his assistantship somewhen in 1980 and started to work with the environmental material systematically, and then Luboš Peške received these bones. He completed, revised and finished it. So, in all, we managed the bones. But about the macroremains, Soudský no idea at all. He started work still in the 1950s. And I remember a moment, and I was present! It must have been in 1961, and I already wrote my master thesis, or perhaps still in 1960. At that time, I was in Bylany as a student at the excavations. A situation came about, in which in one pit, no. 464(?), suddenly charred grains started to drizzle there. Some worker called Soudský and he noticed it and started to rummage in it. And then he made the Silo theory of it. It is described in the 'Small Bylany' book.

JB: I have it. I will look it up.

IP: This must have been in 1960. And then Soudský seized it and contacted Zdeněk Tempír – perhaps through Magda Beranová – and arranged cooperation on the analysis. But the archaeological discovery itself was given by this silo. And Soudský called director Doc. Jaroslav Böhm. I remember this. Böhm did not talk much with me, I was a student, we only said hello, he did not discuss with me. He was quite often in Bylany, he had scholarly debates with Soudský: post pits and now a silo with caryopses, tiny layers and a source of information on agriculture. And there is a photograph, with Soudský and Böhm poking into this section. Then Ing. Zdeněk Tempír got in touch, at that time, he might already have been the director at Kačina [a branch of the National Museum of Agriculture]. He was not the director of the whole museum; this must have been someone else. What this

Ivan Pavlů (right) during the bucket flotation in Bylany near Kutná Hora, 1980. FT000061173, ARÚ Prague Archive.

belonged under was the Academy of Agricultural Sciences, which was directed by an Academician Klečka. And the Museum of Agriculture was part of it. Back then, it was situated in Slezská Street in Prague beneath the Náměstí Míru Square. I visited it with Soudský a couple of times. And Tempír became the head of the branch in Kačina. And then we worked with him. He was to analyse it, we were ready to provide flotation of it, actually, the method was not yet used at that time, we sieved it dry. And Tempír suggested building a flotation machine and processing the samples systematically. Then Soudský started to take care of it and already next year, in 1961 and in 1962, he started at the Bylanka stream, I know the place exactly, he started to build the flotation station.

[IP shows a place in the 'Small Bylany' book] Here the Bylanka flows and here was some sort of occasional spring, here was a sort of sunken lane, they put carcasses there, today it is filled up. But here, somewhere in these places beneath this sunken lane, the construction was erected. I don't remember it, because at that

time I served in the military for two years, and they constructed the machine at this time. I will show you a more detailed map.

JB: I will be glad.

IP: Since that time, I haven't been there. Then it was overgrown. One season, I remember this, we were transporting bags with soil on wheelbarrows there. Then someone complained. Some water manager that we fill up their stream with waste. Then we stopped digging. We were digging until 1967. And later, Soudský had no such interest in flotation any more. Sediment was processed mostly somewhere in a bucket, up at the base, where we had electricity. And the construction was overgrown and vanished. What it looked like, was a concrete slab with four columns, there was a shelf, on which we laid the meshes and water was brought from the stream. That's all I remember. Perhaps you might still find the remains of this construction. Then it was in some way destroyed. Either these water managers forbid it, because it was at the stream without permission.

JB: This is highly interesting. It must have been the first flotation machine ever in Czechoslovakia.

IP: And Soudský lost interest in the flotation, no other silo with wheat appeared again. If there later was a carbonised layer, he took a small bag full of it and washed it in a bucket. But this affair had a specific end. It ended badly. At Kačina [Castle], Tempír had collecetd all samples in a suitcase, then came the year 1968, and it stayed at Kačina. And when we asked about it at the beginning of the 1980s, then there already was Pavel Novák. So from these samples of the main classical set, was left only what was in this database.

JB: This is what Luboš Peške put together?

IP: Yes. The caryopses were published in Bylany Varia [looks into the book]. Here it is. Peške – Rulf – Slavíková as the authors. Jiřina Slavíková worked with charcoals. Perhaps, this is the best archaeobotanical analysis from Bylany, we have. She took the charcoals, which were separated during flotation or manually, she went through all of them and determined them. 90% was oak. She was able to determine if it was from the trunk or from the branches, and it is here in this database, for examples branches up to three years, which is important for the study of nutrition system of the cattle. It is the first and may be a single contribution of this type on Bylany. Here are bones, charcoals and those caryopses. But Tempír did not finish it by then. It's not here [looks into the book]. At that time, he did not have the data collected. This is a sort of short history of the flotation machines.

JB: It was one of the first facilities at Neolithic excavations. Usually, they were installed later, for example by Robert Braidwood, he had a whole team for it.

IP: I witnessed Braidwood and met him in person. In 1966, when he attended

the World Congress of Archaeology in Prague. Soudský told me, see, Braidwood needs to go to the Staroměstské Square. He'll start at the Law Faculty, lead him to the 'Staromák'. I was surprised. It was a massive man. But tall, a corpulent man. By then, I knew a couple of words in English, so I tried to govern the conversation on the way through Pařížská Street. He was kind, sympathetic and I was student. And that was all. And then, when I drove around Turkey, then all, a whole generation, where actually his students. Whether they provided flotation, I don't know.

JB: They did. Archaeobotany was done for him by Hans Helbaek. He is the actual founder of Neolithic archaeobotany.

IP: The Turks of the younger generation still were admitted to him. Not only them. For example, also Isabella Caneva, who processes the chopping industry from Çayönü site, considers herself her student… And flotation? When I lecture in Hradec Králové university, then I ask a control question: 'Do you provide flotation?' – 'Yes, we do.' I hear. But, I think, they do it only occasionally. And if there is something in the bucket, if something appears. But whether anybody does it systematically… Once, all sediments will be processed by flotation completely. But this will be perhaps only in the future.

JIŘÍ SVOBODA

(*1953), ARCHAEOLOGIST

Studied archaeology and history at the Charles University, then continued with geology at the Université de Provence in Marseille. He primarily worked at the Moravian Museum in the Anthropos Institute, since 1981, in the Institute of Archaeology of the CAS in Brno, where he served as the director of the Centre for the Research of the Palaeolithic and Palaeoanthropology and of the field base at Dolní Věstonice. In 2010–19, he was director of the Institute of Anthropology of the Faculty of Science, Masaryk University in Brno. The results of his vast research, some of which was conducted abroad (Sahara, Siberia, Tierra del Fuego etc.) were published in 500 journal papers and 30 monographs. He served as a founding editor of the monographic series 'Dolnověstonické studie' and as a member of a number of editorial and scientific boards.

The interview was conducted by Michaela Ptáková.

MP: What was the beginning of natural-scientific analyses in Dolní Věstonice like? Where did the initiative come from?

JS: An archaeologist, who takes on a site from his predecessor, usually wants to introduce a new approach or method. When Assien Bohmers[194] replaced Karel Absolon[195] in 1939 in Dolní Věstonice he introduced pollen analysis, which by then was on a high level in Germany. The manuscript of the palaeobotanist R. Schütrumpf, who accepted the task, was later handed to me by Fritz Brandtner, but today it has rather a historical value. Although single pollen grains have been preserved in the loess of Věstonice, which was confirmed in the following period by Brigitte Urban in a section in the brickyard of Věstonice, their small number and only selective state of preservation did not allow for any evaluation. But Josette Renault-Miskovsky from Marseille used an innovative method to separate the pollen grains at palaeolithic sites in France, which was applied in the 1980s by Helena Svitavská in Dolní Věstonice, i. e., in the

[194] Assien Bohmers (1912–1988), the Dutch geologist and palaeontologist, head of the excavations done in the proximity of the village Dolní Věstonice by the research department of the SS, the so-called Ahnenerbe, in 1939, 1940, 1942 and 1943. Eickhoff, M. (2009). Historie „ukradeného" naleziště. Assien Bohmers a vykopávky SS-Ahnenerbe v Dolních Věstonicích. RegioM: sborník Regionálního muzea v Mikulově, pp. 129–146.

[195] Karel Absolon (1877–1966), a Czech archaeologist, geographer, and palaeontologist, engaged in the research at Dolní Věstonice (1924–1938). Sklenář, K. & Z. Sklenářová (2005). Biografický slovník českých, moravských a slezských archeologů. Libri.

Jiří Svoboda at Matobo Hills in Zimbabwe. Photo P. Pokorný, 2017.

backfill of the newly discovered human calva DV 11 or in the context of the triple burial DV 13–15. Thereby the number of grains grew. And at about the same time, Eliška Rybníčková and Kamil Rybníček recovered a wholesome pollen range from peat-bog from a drilling core in nearby Bulhary, which, as a matter of fact, is contemporary with the settlement of Dolní Věstonice.

So there already were evaluable pollen granges, and in addition, our cultural layers and namely the fireplaces rich in fragments of carbonised wood, which (after individual analyses by J. Slavíková-Veselá, V. Kneblová and V. Nečesaný) were step by step determined by Emanuel Opravil. In consequence, the problem of the interpretation of the Interpleniglacial landscape appeared (MIS 3 and the transition to MIS 2). At that time, simplistic reconstructions of a cold woodless tundra as the prototype of the glacial landscape prevailed and a part of the scientists was not willing to accept a higher variability and changeability in time and space. They accepted pollen of undemanding conifers, but demanding broadleaved species (oak and beech) were considered as an intrusion, either from earlier deposits or as self-seeding from far-away. But the same species had been attested also in fragments of carbonised wood, which was obviously of local origin. Only when the palaeobotanical methods were interconnected (later, analyses of phytoliths conducted by Debora Zurro were added), it was possible to push through reconstructions of a more colourful landscape, in addition, variable throughs the MIS 3.

MP: What was your expectation from the collaboration with natural scientists? Was it fulfilled?

JS: Apart from the reconstruction of the glacial landscape, we asked the palaeobotanists other important questions concerning vegetal nutrition, technological raw material for the production of tools or fibre, and composition of the firewood. The pollen analysis can indicate the potentials of the landscape, but cannot provide proof of the practical use of the plants in itself. An example is the use of roots of palynologically identified cattail, which can be used in meal preparation or nettle to produce fibres and fabric (as documented in the negative impressions in clay). So, we were looking for additional types of plant macroremains. A ground-braking find was crushed plant tissue, which was separated by Sarah Mason in the flotation of the fireplace near the male grave DV 16 from 1987 and interpreted as the remains of mash, perhaps from children's faeces. In 2005, we provided flotation, together with a team from Cambridge University, the whole capacity of the cultural layers from an area near the triple burial of Věstonice and obtained further masses of carbonised wood. Based on this result, David Beresford-Jones presented a study and a more detailed chronology of MIS 3 and on the problem of firewood. The Vienna researcher Otto Cichocki even considered extending the dendrochronological curve deeper into the Glacial. But a new type of macroremains did not appear.

Nevertheless, we were able to contribute to the question of nutrition, regarding some sort of flour or mash, in another way, i. e. by the surface analysis of stone grinders and plates. These were used at on our sites to grind mineral dyes, as we can see at the first sight; but for new analyses we needed fresh material from new excavations. The opportunity occurred after the discovery of a new site Pavlov VI in 2007. The Italian team of Anna Revedin was actually able to detect remains of plant tissue and starch grains (perhaps from the mentioned cattail) on the surface of a grinder and was able to confirm her find also in the material from Dolní Věstonice I and from other European sites. This way we proved that the Palaeolithic populations did not live from meat only.

MP: Do you see a shift in the last decade in the mutual collaboration between archaeology and archaeobotany?

JS: In the last decade, we have conducted fieldwork in Pavlov I, Dolní Věstonice IIa and Milovice IV. The composition of the palaeobotanical team has changed, Helena Svitavská and Alena Dohnalová were followed by Petr Pokorný in the pollen analyses, Jan Novák took on the analysis of carbonised wood after Emanuel Opravil and Věra Čulíková. New personalities contribute innovative methodological approaches and a wider range of comparisons. For example, Petr Pokorný, given his good knowledge of the Nordic countries, can provide a broader and inspirational reconstruction of the landscape types. It will also be necessary to maintain the international character of the research. The methodology develops further and some surprising (not only palaeobotanical) discovery is to be expected in the area of Dolní Věstonice-Pavlov-Milovice at any time.

JAROMÍR BENEŠ

(*1958) ARCHAEOLOGIST AND ARCHAEOBOTANIST

Studied archaeology at the Faculty of Arts of the Charles University in Prague and botany at the Faculty of Biology of the University of South Bohemia in České Budějovice. For ten years, he was employed at the Institute of Archaeology of the CAS in Prague, where he led the research concerning the Neolithic. In 2002, he founded the Laboratory of Archaeobotany and Palaeoecology (LAPE) at the Faculty of Science of the University of South Bohemia and has since then been its head. Apart from this, is active in the Institute of Archaeology of the Faculty of Philosophy of the University of South Bohemia. In addition to the research of the Neolithic and the Middle Ages in the Czech Republic, he has carried out archaeobotanical research in Italy, Egypt, North Macedonia and Senegal. He is the author or co-author of about 200 studies and co-author of 24 monographs. Apart from theoretical and environmental archaeology, he also specializes in archaeobotanical analyses of wood and charcoal. In 2010, he was the co-founder of the international journal Interdisciplinaria Archaeologica. Natural Sciences in Archaeology (IANSA) and until 2021 the head of its editorial board.

The interview was conducted by Michaela Ptáková.

MP: What brought you to archaeobotany?

JB: When I was a child, I was interested in geology, but archaeology won it. During my studies, it was not only a social but to a certain extent also a natural-scientific discipline to me. Surprisingly, I was most influenced by archaeologists of the Middle Ages, Jiří Sláma and Zdeněk Smetánka. Professor Sláma always told me: 'Dear colleague, do, what you want to do. Do not look back, but most importantly, learn your craft.' At the end of my studies, I worked at the excavation in Roztoky (directed by M. Kuna), where, thanks to Martin Kuna, I learned to know books by Michael Schiffer and David Clarke. It is safe to say that I draw much inspiration from processualism, which is connected with exact methods and exact methods are connected with data analysis. And so, when I graduated from archaeology, I started, on the initiative of Jan Rulf, a post-doc in mathematics. Mathematics provided me with the intellectual background on how to view the analysis of any problem. This was the main aspect of my shift towards natural sciences.

When I then started at the Prague Institute of Archaeology of the CSAS, they placed me at the Most branch office. There I saw the destruction of the landscape, the devastation (see Mostecko), but at the same time, its huge potential for archaeology. Already then, I was convinced that the environment is decisive for the study of archaeology. For introducing me to archaeobotany and palaeoecology, I am thankful to Vlasta Jankovská and Jan Klápště. Vlasta Jankovská was my major inspiration. Once she told me, when she was on a field trip in Most: 'We are on our way to the Komořany lake. You will see the

Jaromír Beneš in Most. Photo P. Meduna, 1987.

last remains of the bottom of a post-glacial lake.' And I helped her to drill the sections in the Dřínovská pool, the bottom of which consisted of the last sediments of the vanished Komořany lake. These were the sections, which were then processed by Jan Novák and Petra Houfková-Marešová in the course of their project with excellent results. I was really impressed by Vlasta. She was able to talk about the dynamics of the Holocene and the landscape in such a wonderful way and I became aware that archaeology is close to Quaternary geology.

As a novice in archaeology, I went with Jan Klápště to the field, and he showed me many interesting things in the land of Most. When I was there (in the 1980s), there was a wonderful atmosphere in the branch office in Most, extraordinarily liberal. Although we were part of the Prague Institute of Archaeology, we were in a certain way hidden from the regime there. Most was a little bit of punishment, but thanks to this periphery, we could do the research as we liked. At that time, I made common cause with Vladimír Brůna from the Institute of Landscape Ecology of the CSAS. We started to invite ecologists and archaeologists to a joint workshop. We had much support from the archaeologist Zdeněk Smrž, who organised the first workshop, and apart from archaeologists, he also invited botanists. This way, the famous Most workshops developed, which at the beginning of the 1990s were published in the book *'Archeologie a krajinná ekologie'* (Archaeology and Landscape Ecology).

MP: How did the discipline develop in after the revolution and which personalities were of key importance for you?

JB: After 1989, the social atmosphere changed. Evžen Neustupný became the director of the Institute of Archaeology and organised visits of experts from abroad. At that time, I was digging the Neolithic site of Hrdlovka and Neustupný also invited Ian Hodder. I feel honoured that I had the opportunity to spend the day with Ian Hodder in the field when he visited the site. We discussed the meaning and the cause of the darkening of Neolithic feature infills, but also other non-archaeological subjects, such as music. By then, I already knew Hodder's early publications, it was a big thing for me to meet him in person at my excavation.

Later we were working with Marek Zvelebil from Sheffield University and with Martin Kuna on the British-Academy project entitled *'Ancient landscape reconstruction of Northern Bohemia* (ALRNB)'. At that time, the palynologist Simon Butler and the archaeozoologist Mark Beech arrived. Other Czech experts, who participated, were the archaeozoologist Lubomír Peške, the botanist Jiří Sádlo, the archaeologists Martin Gojda and Dagmar Dreslerová, who analysed the settlement structure. Thanks to the ALRBN project, I came into direct contact with environmental archaeology. This was a great experience, both my travels to the UK and the fieldwork when we were drilling the section in the Ohře River region together with Simon Butler and Lubomír Peške. Marek Zvelebil contributed the system of British expedition work to the project. By then, it gave me so much.

MP: What caused your shift from an archaeologist in the field to an expert in natural-scientific analysis?

JB: I was scientifically influenced by many people. The supervisor of my master thesis was Slavomil Vencl, whom I always highly esteemed, he inspired me much. He worked on the Stone Age and I was tempted to do my research similarly to him. And because I already had conducted an excavation of a large Neolithic site, I stayed with the Neolithic. And the research of the Stone Age is always in some way related to the natural-scientific approach. Later, I met Barbara Otaway at the University of Bradford, who focused on the research of Chalcolithic hilltop settlement in Bavaria and worked a lot with a large number of environmental analyses. She was a sort of my greatest inspiration in these years when I visited Britain. And then I was influenced by many people from the University of Sheffield, mainly by archaeobotanist Glynis Jones, the archaeozoologist and archaeologist Paul Halstead and, of course, Marek Zvelebil. In Sheffield, I attended the lectures of Glynis Jones and found out that without archaeobotany it is not possible to make advances in the interpretation of settlements.

MP: How did you come to the analysis of charcoal and wood? What were the beginnings of these analyses in the Czech Republic?

JB: In 1993, I and my wife moved from Most to Prachatice in South Bohemia. One of the reasons was that our eldest son was quite suffering by the local air polluted by industrial exhalations. Therefore, I left the

Institute of Archaeology. For four years, I was employed at the Prachatice Museum as archaeologist. I put the local archaeological collection in order and conducted some interesting fieldwork. At that time, I met the botanist Karel Prach, who invited me in 1995, to read lectures at the Faculty of Biology of the University of South Bohemia in České Budějovice. At first, I only commuted to Budějovice. I was still working at the Prachatice Museum. After leaving the museum in 1997, I decided, for economic reasons, to establish a private archaeological society, which was called Archeos. I directed it for 10 years then I passed it to my colleague Jan Vladař, who is still its director.

In the first years, we worked intensively with Karel Prach on interdisciplinary research in the Bohemian Forest (Šumava). I started to study charcoal kilns, lumbering and the historical development of the landscape. It was necessary to analyse the charcoal and the wooden finds, but at that time, nobody did it here. By then, I received much help from the dendrochronologist Josef Kyncl, whom I had met earlier in the Most workshops. He gave me his comparative collection of anthracological material, which I still have in my cupboard and use it. At that time, I acquired an old microscope, equipped it with a spotlight and started to learn charcoal by myself. An important moment was meeting Stefi Jacomet in 1997 at the IWGP in Toulouse, who gave me Schweingruber's Anatomy of European Woods as a present. I still have it and use it. In 1999, I took part in a course on dendrochronology led by Professor Schweingruber in the Bohemian Forest. So I gradually worked my way to an analyst of wood and charcoal. For a long time, I worked with bad microscopes, only in 2006, I bought a large and beautiful scientific Nikon microscope system, with which I was working for many years and occasionally use it still today.

At that time, I was more and more connected with Budějovice. In my small team I included Petr Kočár, Romana Suchá (today Kočárová) and Petr Pokorný. I gave lectures to this first wave of botany students on the development of the landscape. In the 1990s, I also started an intensive collaboration with the archaeologist Petr Starec from the City of Prague Museum. Petr Starec later invited us to participate in his excavations in the Old Town of Prague. With the Kočárs and Vlasta Jankovská, I also published the archaeobotany of the Renaissance water pipeline in Prachatice (1996), which was extremely rich in finds. A great impetus was also the reconstruction of the medieval houses and and the allotments in České Budějovice under archaeologist Jiří Militký. My collaboration with the Kočár couple, worked until about 1999, when we conducted for Petr Starec large research in Na Příkopě, Prague, published in Vegetation History and Archaeobotany. Later, we continued with Petr Starec with other research, this time already with Veronika Komárková as archaeobotanist.

By then, our archaeobotanical analyses worked through – then my – Archeos company. I remember that at one IWGP, I guess in Sheffield, I talked to Karl Ernst Behre. I told him that we have a private company, which does the analyses for the university. He appealed to me to try to work as soon as possible directly under the university, to practice this on an academic and not commercial basis. I listened to him and went to Střeleček, the rector of our University at that time. He told me we could

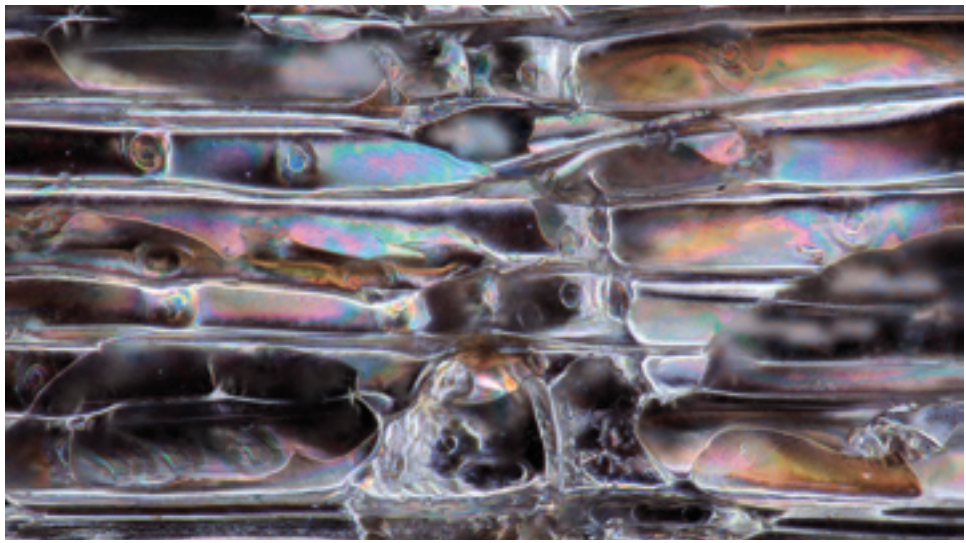
work directly for the university and offer our results to the archaeological public. So we obtained a licence for the university, and in 2002, I founded the Laboratory of Archaeobotany and Palaeoecology (LAPE). In 2022 we celebrate 20 years of the existence of the institution.

MP: So, is it possible to say that your discussion with Karl Ernst Behre was an important impetus for the foundation of the LAPE?

JB: Yes, this discussion was crucial, K. E. Behre explained quite emphatically that through commercial analyses the development of archaeobotany will not be complete and profound. This world-respected professor was the then editor in chief of the VHA and a very strict reviewer, but also, as I found out, a very kind person. He was one the great examples for me. The second impetus was purely academic. Gradually, I became aware that is nice to offer my service to archaeological institutions, but it was not enough for the development of the discipline. After the foundation of the LAPE, we started collaboration with Prague Castle (Department of Medieval Archaeology of the Institute of Archaeology of the CAS in Prague), mainly with Jan Frolík. We carried out large archaeological and archaeobotanical research, in the course of which there was considerable pressure to publish and to create an added academic value. These were the factors, which led to the gradual transformation of the LAPE in view to have an own research and publication programme. The first projects came, and we started to realize that we one can breathe much better scientifically, if he does not have to chase deadlines and analyse large amounts of material for the laboratory to survive. The more projects we had, the more we were free in the research.

MP: What do you consider your most favourite archaeobotanical discovery?

JB: Among the discoveries at home, I consider the research of the medieval ditches in Na Příkopě Street in Prague the greatest success; using diatomic analysis, Jan Kaštovský was able to define what water ran through these originally medieval ditches and in which direction. By then, it was, together with the analysis of pollen and macroremains, an extremely complex finding. The work was published in 2002, in unbelievable detail for that time. It even passed the strict review of K. E. Behre. Among the research abroad, I love to recall the one in Abusir, Egypt. I was fascinated to analyse wooden coffins, either of cedar or sycamore. For a great variety of publications with the egyptologists, I was then searching, what did wood actually meant for the ancient Egyptians. I found out that, i. e., sycamore was connected with the goddess Hathor, and that the use of a specific species of wood was ascribed an important ritual effect. I much benefited from my five-year participation in egyptological expeditions in 2005–10 and am very thankful for this opportunity. My analytical engagement with the Egyptian material did not stop yet. With Jaromír Krejčí, we are preparing a book, another volume on the research of the Mastaba of Prince Verkaure. From the new archaeobotanical projects, I was most surprised by the discovery of a Bronze-Age settlement at Ohrid Lake in North Macedonia, which



Microphotography of juniper tree charcoal from a prehistoric settlement at Lake Ohrid. Photo J. Beneš, 2021.

vanished in an earthquake around 1200 BC. Its remains were found in a depth of almost six meters.

MP: How do you perceive the collaboration between archaeologists and archaeobotanists today? Is there enough willingness to listen to each other and to mutually study the publications and possibilities of the other discipline?

It has been twenty years since the foundation of LAPE in 2002. If taking the year 1999 as an arbitrary beginning, when we started our first large research projects, and if I look at the situation today, when flotation in the course of archaeological excavations represents something almost automatic, then the development in these about twenty years has been absolutely amazing. But it was a gradual change. The first decade of the new century was an era of searching and persuading archaeologists that they should learn, i. e., the basic botanical terminology. Today, environmental archaeology is already understood as an integral approach both on the side of archaeology and botany. In 2006, archaeology became a subject of study at the University of South Bohemia, and I had the opportunity to convince the students that archaeobotany is a natural part of the research. At that time, my first student of archaeobotany, the anthracologist Veronika Petrlíková, carried out an analysis of the charcoals from the Iron-Age settlement in North-Bohemian Kyjice and Lovosice, and that was a bright moment. The key article I wrote a couple of years later, was published in the Archeologické rozhledy journal next to a study by Věra Čulíková on the macroremains from Lovosice. The archaeologists were able to verify that archaeobotany answers the most basic questions of the study of settlement

areas – what was their size, what impact they had on the landscape, how the landscape was deforested and which economic resources it offered.

Today it is important that the archaeologists do not have the feeling that the archaeobotanical information constantly only repeats the same. Once talked about it with Rudolf Procházka, an archaeologist from Brno. And he asked: 'What is it good for? There is always only blackberry, raspberry, trampled places… that's everywhere. Then, there are intestinal parasites, and that's all'. In some way, Rudolf was right. Nevertheless, the problem is that if you conduct basic archaeobotanical analyses of a medieval cesspit and do not look for the deeper interpretative background, some new question, archaeologists may view it as cloning of constantly the same information, which do not offer anything new. It is the task of the archaeobotanist to offer the archaeologist solutions of new issues, to act as the representative of an independent discipline. Meanwhile, archaeobotany starts, together with chemistry and molecular biology to solve questions that 20 years ago would have appeared absolutely incredible. I wish for archaeobotany to exist as an established discipline both within botany and archaeology. On the other hand, I wish that the education system would not only work for this vision in České Budějovice, where it works, but also at other universities. I wish the academic community to understand that whether it does research in archaeology or botany, there was only one history. Through botany and archaeology, we are able to study many social and natural phenomena in the past – and the other way around, botany receives from archaeology many key findings on why the vegetation in the landscape is arranged the way it is.

TALKING SITES

The quiet and peaceful dissolution of the Czechoslovak federation in 1993 ensured an uninterrupted collaboration between Czech and Slovak research. The 1990s were a time of the transformation of science under the new commercial conditions and also in the search of new approaches to archaeological excavations. Czech and Slovak archaeobotany had completed the first large modern excavations of the medieval sites in Mikulčice, Most and Prague and of prehistoric sites on many places in Slovakia. Nevertheless, a real change came only after 2000, when Czech archaeobotany started to publish more in international periodicals and monographs.

The presented selection represents Czech and Slovak archaeobotany of the last two decades. The choice was determined by publications in international periodicals and by some important monographs, which are easily accessible to the foreign reader. We tried to present archaeobotany focusing primarily on the territories of the Czech Republic and Slovakia, both in prehistory, in the Middle Ages and Early Modern Times. We have described the results of studies of common and unique prehistoric settlements in the open landscape and rocky terrains on the one hand and the archaeobotany and palaeoecology of early medieval centres of the nascent Czech state on the other. The choice is concluded with the archaeobotany of the main centre of the Lands of the Czech Crown, Czechoslovakia and the Czech Republic: of the capital of Prague.

DZERAVA SKALA CAVE – ARCHAEOBOTANICAL RESEARCH OF A PALAEOLITHIC CAVE SITE

THE SITE

Dzeravá skala cave (Pálffybarlang) is located in a short but deep-cut karstic valley in the western slopes of the Small Carpathian Mountains (Malé Karpaty). The cave entrance is 18 m broad, 22 m long and 10 m high. It is located 450 m a.s.l., 37 m above the valley floor, and faces to the east. The last excavations at the Dzeravá skala cave opened a complex stratigraphic section, showing combination of in situ developed sediments, in-blown loess, and clays, paleosols and clasts removed most probably from the cave chimneys. This sequence illustrates the climatic record from the Holocene over the Last Glacial Maximum to the more temperate oscillations of the Interpleniglacial, and, possibly, even before that. The archaeological record comprises the Neolithic, probably Late Palaeolithic, Gravettian (25–31.7 ka BP), Early Upper Palaeolithic (34–37 ka BP), and the Late Middle Palaeolithic (50.4 ka BP). The multidisciplinary approach and detailed sampling of organic materials has provided a unique archaeobotanical data set, which allows creating an image of the life of the various hunter-gatherer populations who utilized the cave and the surrounding area repeatedly in the past.

RESULTS OF THE RESEARCH

Charred and uncharred botanical remains from the excavated strata provide valuable information especially about Palaeolithic environment. Fragments of wood, although very small in size, were relatively common. They reflect at least four different vegetation types and show that the surrounding vegetation has undergone a series of profound changes. Most surprising was the presence of warm-demanding trees (like oak and pine, or beech and other mixed deciduous forest species) in strata from periods with presumably harsh climates. Thus, macro botanical data most probably demonstrate a mosaic of individual events and reflect occupation phases that took place during the most favourable (warmer) climate oscillations. Based on the density of plant remains it seems that the cave was most intensively used during the Aurignacian and the Micoquian. Despite intensive sampling, very few remains attest to the prehistoric plant diet. From edible and possibly gathered plants uncharred seeds of *Rubus* sp., present in the Gravettian and Aurignacian layers and *Chenopodium* and *Sambucus* present in many Holocene as well as Pleistocene layers should be mentioned.

MH, EH

The Dzerava skala cave. Available from: https://commons.wikimedia.org/wiki/File:Jasky%C5%88a_Derav%C3%A1_skala_03.jpg.

Hajnalová, M. & E. Hajnalová (2005). The plant macro-remains: the environment and plant foods exploited by hunter-gatherers. In Kaminská, E., Kozowski, J. K. & J. A. Svoboda (eds.). Pleistocene Environments and Archaeology of the Dzeravá skala Cave, Lesser Carpathians, Slovakia. Krakow: Polish Academy of Arts and Sciences, Slovak Academy of Sciences, Institute of Archaeology, Academy of Sciences of the Czech Republic, Institute of Archaeology, pp. 91–135.
Svoboda, J., Kaminska, L. & J. K. Kozlowski (2004). The 2002–2003 excavations in the Dzerava skala Cave, West Slovakia. *Anthropologie, 42*, pp. 311–322.

VELKÝ MAMUŤÁK – ROCKSHELTER SITE IN A FORESTED LANDSCAPE

THE SITE

The rockshelter Velký Mamuťák is situated in the Northern Bohemian sandstone region called Bohemian Paradise. A continuous sequence of finely layered sediments, recording a period from the Late Glacial to present days, was deposited in the floor of this rock shelter. The site is permanently waterlogged thanks to the soaking of rainwater. In addition, the exceptional size of the rockshelter and its north-northeast orientation leads to a cool and stable microclimate. All these factors contribute to the remarkable preservation of organic remains, and the excavated assemblage includes organic artefacts, bedding layers and individual dung pellets. The whole stratigraphy of Velký Mamuťák is extremely rich in archaeological features, especially hearths. This record has been intensively studied using several approaches including archaeobotany (pollen, macroremains, charcoal), archaeozoology (bones, snails, insect remains), archaeology (stratigraphy, micro-stratigraphy, features, artefacts), parasitology and radiocarbon dating.

The excavation at the Velký Mamuťák rock shelter site. From left: Petr Šída, Ivan Horáček and Michaela Ptáková. Photo M. Pták, 2017.

Plant macroremains and insects from dung pellets (1–9) from Velký Mamuťák; 1, Calluna vulgaris fruit; 2, Pinus sylvestris needle; 3, Rosaceae prickle; 4, Abies alba needle; 5, Quercus sp. acorn testa fragments; 6, Chenopodium album seeds; 7, Panicum miliaceum glume fragments; 8, Rubus fruticosus agg. seed; 9, Plantago media seed. Scale 3 mm. Photos: M. Ptáková, 2018.

RESULTS OF THE RESEARCH

This multi-proxy record has allowed examining human-environmental interactions in a permanently wooded landscape throughout almost the entire Holocene. The site was first used as a retreat by Mesolithic hunter-gatherers. Since the Late Neolithic, the occasional presence of dung material and forage plant remains indicates a change in the function of the site to using the shelter as a pen for livestock. The site is characterized by strong continuity in keeping livestock there, with the most abundant evidence in the horizons covering the late Hallstatt, La Tène, Roman and early Middle Ages, from which there are excellently preserved dry layers of uncarbonized animal bedding and fodder material with substantial amounts of dung pellets. The livestock kept at the site evidently browsed in nearby woods as well as on the ruderal habitats around settlements and there is evidence that it was fed on leaf fodder, chaff from crop processing, beechnuts and acorns. Our findings show the movement of herds among distinct areas of past landscapes which were used for grazing. In addition, the multi-proxy nature of this detailed investigation provides evidence of the impact of hunters-gatherers and latter woodland pastoralists on ecological functions, taxonomic composition and diversity of the local woodland ecosystem throughout the Holocene.

MP, PP, PŠ

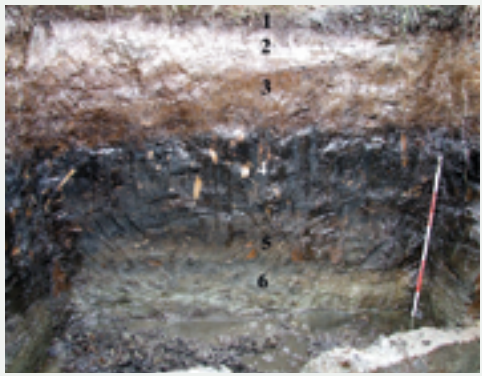
Ptáková, M., Pokorný, P., Šída, P., Novák, J., Horáček, I., Juřičková, L., Meduna, P., Bezděk, A., Myšková, E., Walls, M. & P. Poschlod (2021). From Mesolithic hunters to Iron Age herders. A unique record of woodland exploitation from eastern Central Europe (Czech Republic). *Vegetation History and Archaeobotany, 30*, pp. 269–286. https://doi.org/10.1007/s00334-020-00784-0.

PALAEOENVIRONMENTAL RESEARCH OF THE MESOLITHIC ARCHAEOLOGICAL SITE AT ŠVARCENBERK LAKE

THE SITE

The former Švarcenberk Lake is situated in the northern edge of the Třeboň Basin, South Bohemia, Czech Republic. The former lake was discovered in the 1970s when V. Jankovská identified lacustrine sediments under a peat layer in the wetland area adjacent to the present-day pond. Later it turned out that this was a large original lake and that there was a thick and uninterrupted sequence of lacustrine sediments of unexpectedly old age in the middle of the basin. The site is unique for great scientific potential based on conditions suitable for both palaeoenvironmental and archaeological research. Therefore, investigations of the lake bring important data on vegetation, landscape development and human occupation since the end of the Last Glacial Maximum.

Aerial photograph of the area of former Lake Schwarzenberg. Photo P. Pokorný, 2013.



Visual stratigraphy in the trench cut into a littoral zone of the former lake. 1 –subrecent sedge peat, 2 – highly decomposed peat with clay of Late Holocene age , 3 –decomposed peat with wood of Mediaeval age, 4 –reed peat coloured in black by microscopic charcoal particles, Middle Holocene age, 5 –reed peat of Early Holocene age, 6 – lacustrine sediment of different composition containing wooden artifacts, Early Holocene age. Photo P. Šída, 2008.

RESULTS OF THE RESEARCH

Based on the results of pollen and other microfossils analyses of the central core, hypothesis on intensive occupation of the area in Mesolithic times was given in the late 1990s. This hypothesis was largely supported by later archaeological survey and excavations. Eight Mesolithic archaeological sites were so far identified in the SE shore of the former lake. In the peninsula that protrudes to it, an undisturbed dry archaeological site was discovered. In wet shoreline areas, excavated by test pitting, organic strata transformed by humans were investigated. These organic strata with clay and sand turned out to be rich in pollen grains and vegetable remains, including wooden artefacts dated to the Early Holocene age. Particularly interesting seem to be shells of hazelnuts and raspberry seeds, which are surprising in lake sediments because they represent types that grow in upland habitats. Thus, they likely represent the remains of gathered foodstuff. The finds of hazel and water chestnut are dated to the very beginning of the Holocene and could be even related to their introduction by humans. Moreover, evidence for the burning of the littoral vegetation, temporally correlated with local human settlements, is present in the form of abundant microscopic charcoal particles that are found in the sediments. Also, the site presents a remarkable occupation continuity since the Late Glacial to the Middle Holocene. Questions of relationships between hunting-gathering communities of Švarcenberk Lake and farmers settled nearby is needed to be addressed by future research.

PP, PŠ

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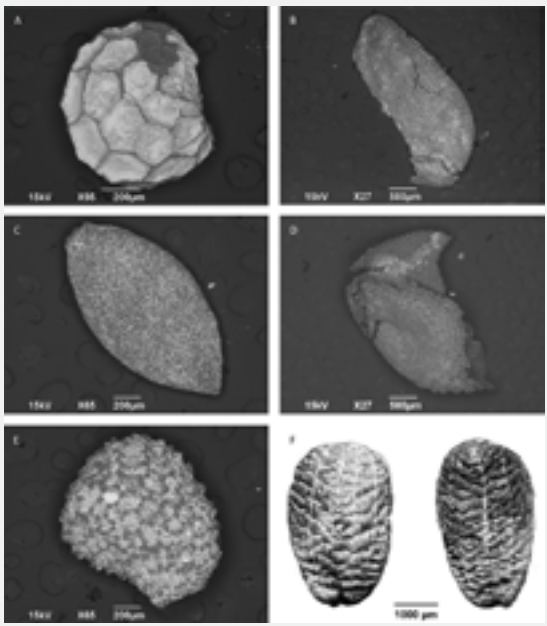
UNIČOV – THE NEOLITHIC WELL FROM THE LBK PERIOD WITH COMPLEX ENVIRONMENTAL RECORD

THE SITE

An archaeological rescue excavation at the Uničov – U kravína site has exposed an LBK settlement with a wooden well. Excavation in central Moravia, Czech Republic, yielded the discovery of a wooden well with sediment fill from the beginning of the Neolithic period and allowed to study an array of topics by a multi-proxy approach using a set of complementary methods. The archaeological research unearthed one part of a settlement area of the LBK with 12 longhouses, building pits, irregular composite pits, storage pits and ovens. An exceptional find was a water well with a preserved timber lining. In a depth of 120 cm below the surface, a dark black, clayey, irregular rhombic ground plan was detected, indicating the original timber lining of the well shaft. The length of its sides was 90–100 cm and the infill consisted of water-saturated brown-black silty clay with many organic remains. The upper groundwater level was reached at a depth of 170 cm below the surface after the removal of topsoil, where the preserved wooden lining began to appear. The construction was gradually dismantled and continued to the depth of 320 cm.

Uničov. Wooden well. Photo M. Kalábek.



Cultivated plants inside of wooden well: A – Papaver somniferum, B – Linum usitatissimum. Wild plant species: C – Urtica kioviensis, D – Agrostemma githago, E – Hyoscyamus niger, F – Onopordum acanthium Photo P. Kočár, J. Štelcl and Z. Vaněček), 2020.

RESULTS OF THE RESEARCH

The well was dendrochronologically dated. Oak wood was felled in the years 5093-5085 BC. The fill of the well was subjected to many environmental analyses. The wooden posts and boards still exhibit well visible and well documentable tool marks and traces of construction details. The pollen record comprised three distinct layers. Interesting is the abundance of green algae typical of cold, little eutrophicated lakes. The tree composition generally corresponds with the pollen spectra of natural profiles from the valley of the Morava River. A high abundance of *Corylus* might indicate a locally disturbed woodland, but there is no direct evidence. Grass pollen were dominant: diversity was quite high. *Mercurialis* indicates disturbed and fresh bare soil, or possibly gardens. The analysis of plant macroremains yielded remarkable results. Total of 115 plant taxa were recovered. The assemblage constitutes the oldest evidence of several species found in Czechia. The find of *Agrostemma githago* is one of the first documenting the occurrence of this specialized weed of winter cereals during the Neolithic period. Next species is *Onopordum acanthium*, known from the Early Iron Age, accompanied by *Linaria vulgaris*, *Anthriscus caucalis* and *Nepeta cataria*, which have so far been known only from the Early Medieval Period. Cultivated plants account for only 3% of the macroremains. Einkorn wheat (*Triticum monococcum*) and emmer wheat (*Triticum dicoccum*) predominated. Other crops present were fine-grained tetraploid wheat (*Triticum durum/turgidum*), so-called 'new type wheat', poppy (*Papaver somniferum/setigerum*) and flax (*Linum usitatissimum*). The gathered fruits represent the remains of hazelnut fruits (*Corylus avellana*), strawberries (*Fragaria* cf. *vesca*), apple tree seeds (*Malus sylvestris*) and bladder cherries (*Physalis alkekengi*), which has previously been documented to occur only in the High Medieval and Early Modern period.

IV

Vostrovská, I., Petřík, J., Petr, L., Kočár, P., Kočárová, R., Hradílek, Z., Kašák, J., Sůvová, Z., Adameková, K., Vaněček, Z., Peška, J., Muigg, J. & P. Kalábková (2020). Wooden well at the first farmers' settlement area in Uničov, Czech Republic. [Studna s dřevěnou konstrukcí z osady prvních zemědělců v Uničově, Česká republika] *Pamatky Archeologicke, 111*, pp. 61–111. https://doi.org/10.35686/PA2020.2.

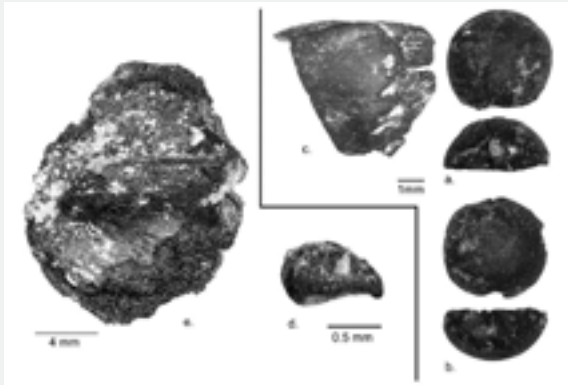
THE EARLY NEOLITHIC SETTLEMENT AREA AT TĚŠETICE–KYJOVICE – DOMESTIC CROP AND VEGETATION

THE SITE

The study site is situated in the southeast of the Czech Republic. The prehistoric settlement area spreads out on the south-eastern plateau at an elevation of 265–290 m, cut by the narrow, deep valley of the Únanovka stream. Systematic excavation at Těšetice–Kyjovice has uncovered a multi-period site with settlement remains from the Neolithic Period, Bronze Age and Iron Age. The Early Neolithic settlement falls within the timespan of c. 5300–4950 BC. The LBK settlement was excavated on an area of 2.4 hectares; at least 22 badly preserved outlines of timber post longhouses, 11 inhumation graves and more than 123 settlement features were found. For environmental analyses of the LBK settlement area, 455 samples from 32 settlement or building pits, 1 grave and 93 post holes from 13 houses were processed. The site was systematically sampled for charcoals, plant macroremains and subfossil shells.

Těšetice. Current landscape of the Neolithic site. Photo I. Vostrovská, 2021.

Těšetice. Cultivated and collected plants: (a, b) Pisum sativum; (c) Corylus avellana; (d) Fragaria vesca; (e) Malus sylvestris (core). Photo H. Lukšíková.



RESULTS OF THE RESEARCH

The anthracological spectrum of the LBK settlement area at Těšetice–Kyjovice stands out as having a high ratio of heliophilous species and shrubs, and a smaller ratio of habitat-demanding species; it thus reflects the open canopy of prehistoric woodlands. The local malacological spectrum reflects warm and open or modest canopy preferences. Forest snails are strictly absent from the assemblage under study. Open enclaves are also evidenced by finds of *Stipa* sp., which groups with species of steppe and forest-steppe vegetation. The palynological record, by contrast, indicates a mixed deciduous forest in the surroundings of the settlement. Based on these findings, settlement areas were forest-free enclaves within open woodlands, shrub thickets and grassy patches. It therefore can be supposed that LBK people only started to impact the environment around their settlements. However, Early Neolithic land use was not too intensive. The subsistence strategies of the first farmers reflect the characteristic Neolithic range of cultivated plants (e. g. *Triticum monococcum*, *Triticum dicoccon*, *Lens culinaris* and *Pisum sativum*). *Corylus avellana*, *Fragaria vesca*, *Rosa* sp. and a fragment of an apple core of *Malus sylvestris* are considered gathered plants. Shrub formations at the edges of woodlands could be exploited for their berries. Fruits of, for example, *Prunus*, *Ligustrum*, *Pomoidea* or *Rhamnus* were likely gathered for eating. Large terrestrial molluscs and mussels such as *Helix pomatia*, *Cepaea vindobonensis* and *Fruticicola fruticum*, were possibly gathered as food, toys or adornments.

IV

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BŘEZNICE – THE LATE BRONZE AGE SITE WITH EXTRAORDINARILY BURNING STRUCTURES

THE SITE

The Late Bronze Age settlement of Březnice in South Bohemia has become known for a large amount of specific and at first enigmatic features: trenches, rich in burnt material and structured depositions of finds. Březnice site, dated by radiocarbon to the interval from 1277 to 912 BC, belongs to the large settlements with so-called 'trenches': oblong pit features with breadth around 1 m and length 4–7 m. They contain unusual number of pottery, daub, loom weights and other finds, mostly with traces of a strong fire. Trenches of the same type have been known only from the Late and Final Bronze Ages from South and West Bohemia, Bavaria and a part of the Austrian Danube region. Those sites raise number of questions: structured deposition, abandonment rituals, biographies of things and others. The Březnice settlement yielded so far the largest number of 'trenches' within a single site. Their function is still somewhat unclear; interpretations range from purely practical to symbolic and cultic. Authors of archaeological research consider the hypothesis that they were originally parts of above-ground buildings, with the mixture of tertial settlement waste and debris from intentional fires on certain occasions, probably abandonment of the homesteads.

Březnice. View of the exposed ditches on the upland area of the settlement. Photo O. Chvojka, 2014.

Březnice. Charred seeds of Stellaria graminea and Lychnis flos-cuculi. Photo J. Beneš, 2022.

RESULTS OF THE RESEARCH

The most apparent properties of the features is their rich find content consisting of pottery, daub, clay weights and other artefacts: the settlement refuse deposited at a single specific event. The majority of artefacts displays signs of strong burning, which must have occurred elsewhere than in the trenches themselves. From the perspective of archaeobotany, the fillings are very similar: the concentration of plant macroremains is low, with little remains of useful plants, rubble plants and weeds prevail. Many species from grasslands and woodland were recorded. The fillings of a pair of features located side by side had many similarities in taxa spectrum, but significant differences were recorded: trench 1/07 has provided a dominant share in remains of crops (especially *Panicum miliaceum*), while the findings from trench 5/07 are dominated by rubble plants and weeds. In addition, all samples from 5/07 contained a large amount of the seeds of *Cuscuta* cf. *europaea*. Therefore, these features were filled either at different times or with little different materials. The source of material was probably the same – the waste characteristic for one household. The character of the archaeobotanical collection in the feature is influenced of its location within the settlement. In most cases, the features are similar in botanical spectrum and occurred close to each other. The settlement exploited the potential of its hinterland from which it drew resources. Plants were deposited originally from different types of habitat as the settlement waste.

OCh, TŠ, MK

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VLADAŘ – A RULING HILLFORT

THE SITE

An impressive fortified hilltop site of 115 ha called Vladař (the Czech meaning of its name is 'the Ruler') is situated in the northwest of the Czech Republic. The site was inhabited from the middle Bronze Age. During the 6th and 5th centuries BC, the fortifications expanded to its maximum length of 18 km. However, around the birth of Christ, the hillfort was abandoned. Wet sediments of a cistern, up to three metres deep, situated in the middle of the large citadel plateau were studied by the means of environmental archaeology, including analyses of pollen, green algae, Cladocera, plant macroremains (including charcoal and wood) and chemical composition. A multi-proxy approach was used to clarify the settlement chronology, to reconstruct the former character of human activities at the hillfort, as well as the vegetation succession after the site was abandoned. The continuous record covers the period from ca. 400 BC to recent times.

Vladař hillfort, aerial view. Photo P. Pokorný, 2015.

Research of a cistern at the Vladař hillfort. Josef Matiášek (back) and Petr Pokorný. Photo M. Kaplan, 2004.

RESULTS OF THE RESEARCH

The cistern was without doubt man-made in order to collect rainwater. A thin but well-defined layer of carbonized plant macroremains (mainly chaff) 11 cm above the base included burnt husks of grain and weed seeds. This may suggest some sort of initiation ceremony, but further evidence is lacking. Mistletoe wood fragments were also rather frequent in the bottom layers of the cistern. The results of the analyses show that the Vladař hillfort was an important regional centre during the early and middle La Téne period (from ca. 400 to 340 BC). The hillfort must have been settled by a substantial number of permanent inhabitants. Large numbers of livestock were probably grazing at the hilltop and in its closest vicinity. The territory was almost deforested in that time. The trend for pollen of arable crops and grazing indicators suggests that periods with predominant grazing alternated periods of higher proportions of arable crops. From around 200 BC, the hill was only scarcely inhabited and shortly after the beginning of the Christian era the site was abandoned completely. After the abandonment, the plateau was overgrown by pine and birch woodland, which are fast growing trees colonizing abandoned settlements, pastures, and fields. The succession to natural woodland communities took about 500 years. The final phase of this period was characterized by a climax community with mainly fir, beech, and oak. In the 11th century AD, a new phase of colonisation reached the region. However, the site was not settled again in the Middle Ages and was only used for grazing and fields.

PP

Pokorný, P., Boenke, N., Chytráček, M., Nováková, K., Sádlo, J., Veselý, J., Kuneš, P. & V. Jankovská (2006). Insight into the environment of a pre-Roman Iron Age hillfort at Vladař, Czech Republic, using a multi-proxy approach. *Vegetation History and Archaeobotany, 15*(4), pp. 419–433. https://doi.org/10.1007/s00334-006-0064-8.

SKLÁŘSKÉ VALLEY – A UNIQUE MOUNTAIN LA TÈNE SITE IN ŠUMAVA MOUNTAINS

THE SITE

The range of Šumava Mountains is situated in the southwest part of the Czech Republic. A significant increase in settlement in the Šumava foothills took place during the Iron Age. There are numerous hillforts and hill-top settlements at heights above 700 m a.s.l., generally situated on the margins of or outside the regular settlement zone. The highest La Tène site Sklářské valley (802 m a.s.l.) so far discovered in the Czech Republic lies in the valley of the gold-bearing river Křemelná near the village of Prášily. The site was discovered by chance during an archaeological survey for the Upper Palaeolithic and Mesolithic in 2011. It is situated on a small platform next to a distinct river meander and its small tributary. Because of its position, it would have been (and indeed was) possible to find the site repeatedly even in the dense mountain forest. Archaeological research of the adjacent area was a challenge. Most of the area is under forest, moreover, the size of the excavation trenches was limited by the regulations of the Šumava National Park. The excavation trenches were supplemented by a series of test pits, in order to determine the boundary of the settled area. The off-site peat bog pollen profile was situated ca. 50 m from the archaeological site.

Field base for macroremain separation during archaeological excavation in Sklářské Valley. Bucket flotation in Křemelná brook. In the foreground Radka Kozáková and Přemysl Bobek. Photo A. Pokorná, 2018.

Bucket flotation in Křemelná brook. Photo D. Dreslerová, 2018.

RESULTS OF THE RESEARCH

Among the charcoal, pine, birch and spruce were present. Small-scale tree cutting and disturbances are indicated in the La Tène period by increasing number of *Plantago lanceolata* and *Rumex acetosa* type pollen, an increase in *Betula* could be also associated with human activity. Among the macroremains, caryopses of barley, naked wheat and broomcorn millet were present, along with a fragment of charred hazelnut shell and several pieces of what we take to be pulses. It is assumed that these crops were not grown in the locality, but were brought from elsewhere. Organic residue analysis of several pottery fragments using gas chromatography suggests that the pottery might have been used for cooking or storage of beef and pork. Bones do not survive in acidic mountain soils so there is no direct evidence that the site could have served as fishing or hunting camp or for seasonal herding activity. The latter is improbable because of the limited number of pasturing indicators in the pollen profile. The possibility of its having been a camp for seasonal gathering activities (berries) or a way-station on a long-distance trading route was not supported by sufficient evidence. The so far quite limited conclusion is that an unknown activity of a small group of persons who (probably) required a degree of seclusion (such as a hermitage), or perhaps secrecy, took place at the Sklářské valley site, at least in two main phases, and possibly repeatedly.

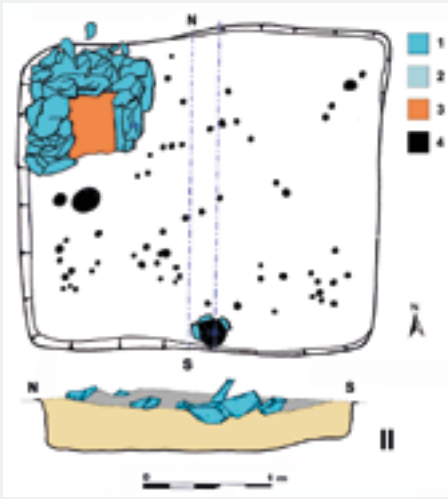
DD

Dreslerová, D., Kozáková, R., Metlička, M., Brychová, V., Bobek, P., Čišecký, Č., Demján, P., Lisá, L., Pokorná, A., Michálek, J., Strouhalová, B. & J. Trubač (2020). Seeking the meaning of a unique mountain site through a multidisciplinary approach. The Late La Tène site at Sklářské Valley, Šumava Mountains, Czech Republic. Quaternary International, 542, 88–108. https://doi.org/10.1016/j.quaint.2020.03.013.

ROZTOKY – A PUZZLING SITE BY THE RIVER

THE SITE

The Early Medieval settlement at Roztoky represents an extraordinary case among sites of the Prague-type Culture (PTC; 6th–7th century AD). It covers a narrow strip (ca. 2 km in length) at the base of the canyon-like valley of the Vltava River. The site, accessible by land only from the north, is lined with steep, partly rocky slopes. Despite the fact that these characteristics are rather unfavourable for a settlement, the entire extent of the site was covered by an extensive settlement agglomeration. To date, more than 300 PTC houses have been recorded, whereas their overall number can be estimated to be at least twice or even three times as much (considering the part that is built-up and not yet excavated). There are not many circumstances under which the importance of such a place, separated from the agricultural land, could have grown (e. g. river transport, long-distance routes crossing fords, or a need for a hiding place). However, no specific finds that could be interpreted functionally have been found, i. e. no evidence of specialised production, trade, residence of an elite or a cult. The site was systematically sampled for a series of environmental analyses: charcoal fragments, carbonized plant macroremains, animal bones, fish bones and scales, and molluscs. The phosphate analysis of house floors and micromorphological analysis of the fill of the sunken-floor houses were among other analyses.



A typical sunken Prague-type Culture house from Roztoky site. Based on M. Kuna.

Roztoky aerial view of the studied area in the Vltava valley. Photo M. Gojda, 2008. DL000000027, ARÚ Prague Archive.

RESULTS OF THE RESEARCH

The PTC settlement probably arose around two cores that differed from each other in their economic focus. The northern core represented a typical agrarian settlement, whereas the southern part, settled only during a limited time period, differed in many details from other settlement phases on the site, as well as from other contemporaneous sites. Millet was the dominant crop in Roztoky, which is in accordance with the general situation in Eastern Europe of the time. However, based on the composition of plant macroremains, the post-harvest crop processing took place mostly in the northern part, whereas plant products arriving at the southern part were already cleared of weeds. Also, storage pits were unusually rare in the southern part. Both parts of the site are characterized by unusually high proportion of pig bones. In the southern part, however, the proportion of pigs was higher than in the northern one, and the same applies to horses. The importance of fishing was surprisingly low. The intensity of human impact apparently decreased from north to the south. Molluscs of open landscape prevailed in the northern part along with charcoals indicating exploitation of degraded oak forest. In the southern part, on the other hand, oak-hornbeam forest was reconstructed by anthracological data and also molluscs of rubble slopes and forest environment occurred.

MK

Novák, J., Lisá, L., Pokorný, P. & M. Kuna (2012). Charcoal analyses as an environmental tool for the study of early medieval sunken houses infills in Roztoky near Prague, Czech Republic. *Journal of Archaeological Science, 39*(4), pp. 808–817. https://doi.org/10.1016/j.jas.2011.06.026.

Kuna, M., Hajnalová, M., Kovačiková, L., Lisá, L., Novák, J., Bureš, M., Cílek, V., Hošek, J., Kočár, P., Majer, A., Makowiecki D., Cummings L.S., Sůvová Z., Světlík I., Vandenberghe D., Van Nieuland J., Yost C. L. & M. Zabilska-Kunek (2013). Raně středověký areál v Roztokách z pohledu ekofaktů – The Early Medieval site at Roztoky. The evidence of ecofacts. *Památky archeologické, 104,* pp. 59–147.

MIKULČICE-VALY – ARCHAEOBOTANY OF THE EARLY MEDIEVAL STRONGHOLD AGGLOMERATION

THE SITE

The Early Medieval settlement and stronghold complex Mikulčice in South Moravia was one of the main Great Moravian centres. The fortified part itself covered an area of 10 ha (acropolis and the outer bailey) and around the fortified centre were 30 ha of different unfortified areas. Mikulčice–Valy (translated as ramparts), there used to stand an impressive stronghold protected by river branches and surrounded by a densely built-up extramural settlement (i. e. suburbium). The channels of the Morava River gradually silted up after the centre ceased to exist, while recurrent flooding during the Late Middle Ages and in modern times levelled the terrain almost to a plain. The only remaining visible evidence of the existing stronghold is a 2–3 m elevation of terrain representing the former rampart, a relic of the destroyed defensive wall that would have surrounded the main fortified area, the acropolis. Many decades of archaeological research were completed by long-term archaeobotanical and environmental investigation.

Mikulčice-Valy. Map of grape vine pips distribution in Mikulčice-Kopčany agglomeration. Drawing: M. Látková, 2017.

Mikulčice–Valy. Finds of waterlogged grape vine pips. Photo M. Látková, 2017.

RESULTS OF THE RESEARCH

The diversity of the macroremains from crops cultivated at the Mikulčice–Valy stronghold attested to the consumption of a number of cereals, legumes, cultivated fruit, and vegetables. Cultivated crops were found in the form of charred cereal grains here. Fortunately, due to the high level of groundwater, seeds and whole fruit from vegetables, cultivated fruit, and fibre crops were recorded. Cereals were found in the largest numbers in the 'produced crops' category, represented by five species including both bread crops (wheat and rye) and non-bread crops (millet, barley and oat). Legumes are represented by five species. Apart from the traditional legumes less typical legumes were found, notably bitter vetch and Celtic bean. Grass pea, is quite uncommon for this period and place. The wide range of fruit and vegetables is documented by the seeds and stones from peach trees, apple and pear trees, walnut, plum trees, and cucumber. Luxury crops are a reliable indicator of the high standard of living enjoyed by the resident elites there. Fibre and oil crops represent the remaining category of plants. Among the fibre or oil crops are species such as hemp, flax, and poppy. The Mikulčice–Valy stronghold holds an exceptional position among the early medieval sites in large part due its vine plant finds. An exceptionally rich assemblage of over 2,000 grape pips has been dated to the 9th century. The highest frequency of vine remains was recorded in the central fortress of the agglomeration (acropolis and outer bailey) and at Kostelisko, a part of the extramural settlement. Although grapevine-related remains (pips and wood) have been found at other early medieval strongholds, they are not as frequent as they are in Mikulčice, highlighting the exceptional status of the agglomeration inhabitants.

ML

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Látková, M. (2020) Food and Drink – A Reflection of Social Stratification, In L. Poláček et al. Great Moravian Elites From Mikulčice. Czech Academy of Sciences, Institute of Archaeology, Brno, pp. 191–202.

LIBICE – PALAEOECOLOGY AND ARCHAEOBOTANY OF THE EARLY MEDIEVAL STRONGHOLD

THE SITE

The alluvial stronghold of Libice in East Bohemia was founded on two island-like remnants of a fluvial terrace with a total area of 24 ha. The earliest early medieval settlement at the site can be associated with the arrival of the Slavonic ethnic group in the course of the sixth and 7th centuries. An increase in settlement activities is dated to the late 9th century when large burial grounds were established in the inner bailey. Finds of graves containing jewellery and weapons definitely corroborate the presence of higher social strata. In the second half of the 10th century, Libice appeared for the first time in written sources. The greatest extent of settlement was recorded from the mid-9th to the beginning of the 11th century when other settlements were established on the north bank of the Cidlina outside the fortified part of the stronghold. On the southern bank was the central burial site of the entire agglomeration. During the 11th century, there is significantly less settlement evidence at the stronghold. Settlements on the north bank of the river Cidlina were abandoned. The complex was not systematically examined archaeobotanically, however, valuable anthropically influenced sediments were analysed, which mapped the changes of the early medieval landscape.

Aerial view of Libice stronghold. Photo P. Pokorný, 2017.

Libice. Stronghold 3D reconstruction. Author: J. Unger.

RESULTS OF THE RESEARCH

Analyses of pollen and botanical macroremains revealed record of the landscape changes in connection with human occupation. Rich carpological study in former river oxbow recorded over 200 botanical taxa, some of them very value (*Lemna gibba*, *Calla palustris*, *Kicxia elatine*, *Nigella arvensis*) as well as plenty of plants from many ecological groups. Palaeoecological research documented landscape development. Even before the foundation of the stronghold, the vicinity of this site was mostly not wooded, reflecting the human impact of the previous settlement phase. The foundation of the stronghold was followed by a distinct vegetation change, marked especially by a decrease in trees that comprised the major woodland, *Quercus*, *Tilia*, *Carpinus*, *Ulmus* and *Corylus*. Simultaneously, the sediment type rapidly changed from predominantly organic into fine loams, probably as a consequence of the erosion following clearance of woodland in the region situated upstream. If most of the pollen recorded in the upper part of the pollen diagram was fluvially transported from further away, the cultural character of the spectrum can be magnified as a consequence of an extensive settlement located about 5 km upstream from Libice which had existed since the 6th century.

JM

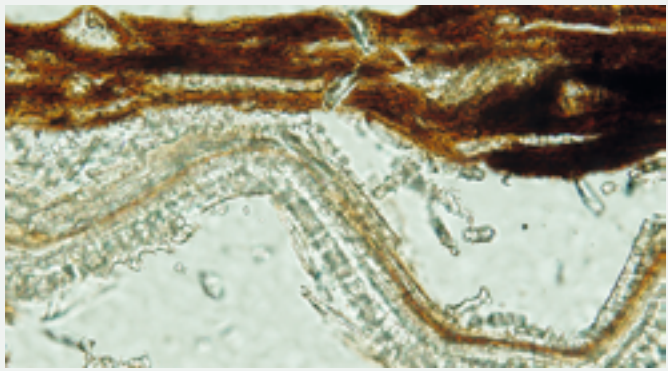
Kozáková, R., Pokorný, P., Mařík, J., Čulíková, V., Boháčová, I. & A. Pokorná (2014). Early to high medieval colonization and alluvial landscape transformation of the Labe valley (Czech Republic): Evaluation of archaeological, pollen and macrofossil evidence. *Vegetation History and Archaeobotany, 23*(6), pp. 701–718. https://doi.org/10.1007/s00334-014-0447-1.

MEDIEVAL HORSE STABLE IN VESELÍ NAD MORAVOU

THE SITE

Remnants of a well-preserved Medieval horse stable were discovered during renovation of the Castle in Veselí nad Moravou (south eastern part of the Czech Republic) in 2008–2010. The reason why the structure was interpreted as a horse stable was mainly due to the presence of stabling material containing horse hairs as well as artefacts which are typically used in the context of horse husbandry. A multi proxy approach (e. g. sedimentology, micromorphology, pollen and phytolith analysis, macroremains and anthracology, isotopes, dendrochronology and dendrology, and zooarchaeology) was applied in order to reconstruct the architecture of the horse stable, the maintenance practices associated with that structure as well as horse alimentation at the beginning of 13th century. Both, the specific diet of horses that occupied the stable during the last phase of its use, and the vegetation growing in the castle surroundings are discussed.

Veselí nad Moravou. Virtual reconstruction of the horse stable. Layout M. Dejmal, 2021.



Veselí nad Moravou. Articulated phytoliths representing degraded grasses in situ. Photo L. Lisá, 2014.

RESULTS OF THE RESEARCH

The infill of the stable was well preserved, with the uppermost part of the infill being composed of fresh stabling. Macroremains of 104 plant taxa were attributed to five ecological groups: 1) meadows, pasture, wetland; 2) cereal weeds; 3) economic crops; 4) ruderal plants; 5) wood, glade. The most frequently found types of macroremains were plants that typically grew in meadows, pastures, and harvested fields. Grazing was an important part of horse feeding. The examined samples indicate *Cynosurus* pasture species (e. g. *Prunella vulgaris*). The presence of willow sprouts (*Salix* sp.), small blackberries (*Rubus* sp.), hornbeam nuts (*Carpinus betulus*) and fragments of acorns constitute evidence of horses being fed in wooded pastures. Existence of communities of wet meadow/pastures in floodplain of the Morava River was supported by the analyses, as well as common types of mesic meadows but also (to a smaller extent) dry and very dry grasslands. Woody vegetation included oak and oak-hornbeam forests including hardwood forests of lowland rivers. Cereals such as millet and oat, as well as hemp seeds, were detected. Horsehair apparently indicated a seasonal change in alimentation (i. e. pasture during the vegetation season and feeding on hay during winter), and structural differences in horse alimentation. The isotope analysis indicated that horses from different backgrounds were kept in the stable Three possible explanations are suggested: The stable was probably used 1) on a temporary basis for horses of workers employed at the castle; 2) for courier horses; and 3) for horses used in a battle.

MD, LL

Dejmal, M., Lisá, L., Nývltová, M.F., Bajer, A., Petr, L., Kočár, P., Kočárová, R., Nejman, L., Rybníček, M., Sůvová, Z., Culp, R. & H. Vavrčík (2014). Medieval horse stable; the results of multi proxy interdisciplinary research. *Plos one*, *9*(3), e89273. https://doi.org/10.1371/journal.pone.0089273.
Plaček, M., Dejmal, M. (2015). Veselí nad Moravou – středověký hrad v říční nivě. Brno: ARCHAIA Brno o. p. s.

MEDIEVAL OLD TOWN OF PRAGUE DEFENCE SYSTEM – SOURCE OF URBAN ENVIRONMENTAL DATA

THE SITE

Between AD ca 1230 and AD 1348, the Old Town of Prague was protected by stone ramparts surrounded by a moat that was designed to be dry and clean. Therefore, there was constructed a drainage ditch, to avoid precipitation and natural brooks water getting into the moat. This was a simple trench, approximately 3–4 m deep and 6–12 m wide which was originally free of rubbish. The fortification lost its meaning after the foundation of the New Town of Prague (1348), which lead to its gradual destruction. However, the drainage ditch and the moat served as an open sewer. In the 19th century, a modern boulevard Na Příkopě (the Czech meaning of its name is 'On the Ditches') was built in its place. The layer of fill from both the main moat and the outer drainage ditch were investigated by the means of pollen, wood, macroremain and diatom analyses. Clay and sandy layers at the base of the ditch represent the phase of its drainage function, whereas the upper part of the profile consists of organic waste material. The fill of the dry moat, on the contrary, consists solely of dark coloured layers of waste.

Prague, Na Příkopě (Over an infilled moat) Street. Picture of the old Power Point presentation showing the supposed main and shallower drainage ditches projected on a historical view. Modified by J. Beneš.

Prague, Na Příkopě. Archaeobotanical sampling during medieval ditch rescue excavation. From left: Jaromír Beneš, Petr Kočár and Petr Pokorný. Photo P. Starec, 1998.

RESULTS OF THE RESEARCH

In the base of the ditch, contamination from waste material was only slight (only the macroremains of wetland plants were recorded), which made it possible to study the pollen of local vegetation without any interference caused by the input of waste material. The area of the drainage ditch must have been a frequently visited place already in the 13th century, as pollen indicators of trampled vegetation predominated, mainly *Polygonum aviculare*. The presence of pollen of wetland plant taxa points to permanent flowing water in the ditch, which is supported by the diatom analysis. According to the pollen data, it was assumed that the system was not fed from the waters of the nearby Vltava River, which could bring pollen from long distances (this assumption was also supported by the geomorphological reconstruction of the surrounding areas). Towards the end of the function of the feature as a gutter, the water current slowed down leading to stagnant or semi-stagnant water, however, it remained surprisingly clean (low diatom saprobic index). In the upper part of the profile, the completely opposite situation occurred, when a massive input of waste material reduced the relative representation of the natural pollen component. Some rarely found plant taxa were documented, e. g. pollen of *Helleborus viridis* and the first evidence of *Pimpinella anisum*. 180 plant taxa of plant macroremains were recorded which led to the reconstruction of various types of vegetation, as well as documentation of edible plants. The intensity of waste accumulation was not homogenous in time: in some periods, accumulation prevailed, whereas in others development of ruderal plant communities was recorded.

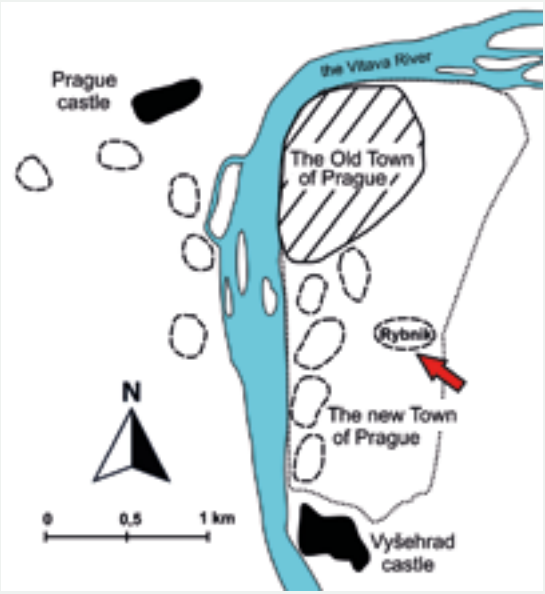
PS, JB

Beneš, J., Kaštovský, J., Kočárová, R., Kočár, P., Kubečková, K., Pokorný, P. & P. Starec (2002). Archaeobotany of the Old Prague Town defence system, Czech Republic: archaeology, macroremains, pollen, and diatoms. *Vegetation History and Archaeobotany*, *11*(1), pp. 107–120. https://doi.org/10.1007/s003340200012.

THE OLDEST SO FAR KNOWN FISHPOND DISCOVERED IN THE NEW TOWN OF PRAGUE

THE SITE

The foundation of the New Town of Prague in 1348 had posed prominent changes in the environment of the Mediaeval town's suburbs. According to its Foundation Deed, the New Town was established in a suburban area, where *'villages, gardens and fields had been located'*. The Rybnik village (the Czech meaning of its name is 'the Fishpond'), first mentioned in AD 993, was one of those ceased villages. The sediment of a water reservoir was examined during rescue archaeological excavation in the basement of a standing house in today's centre of Prague. A multi-proxy approach that combined the results of macroremains, pollen, diatom, anthracological, archaeozoological and sedimentological analyses was applied to examine the vegetation character of the Mediaeval Old Town of Prague's suburbs and to consider the environmental changes that have occurred before the mid-fourteenth century, when the site changed to one of building and construction. The research made it possible to study parallel processes taking place in various spatial scales (the reservoir, its immediate vicinity, regional level).



Prague. Na Rybníčku Street. Location of the ceased Rybnik village in the vicinity of medieval Prague centre. The situation before 1348. The boundary of the New town of Prague is indicated by dotted line. The former settlements' positions are marked by dashed lines. The approximate position of the archaeological site is marked by anarrow. Redrawn by A. Pokorná according to Mencl (1969).

The main profile A20 of the Rybnik site. Situation during the detailed sampling using sampling boxes. Photo P. Starec, 2009.

RESULTS OF THE RESEARCH

The sediments were dated using the radiocarbon method. The material has sedimented from the 10th to the 11th century until shortly before the demise of the village. An intensification of anthropogenic influence is clearly visible by the means of various proxies. Initially, the water was clean (the diatom composition in the base of the profile reflects considerably oligotrophic conditions) and the reservoir was surrounded by semi-natural vegetation. A successive deterioration of water quality was documented by various organisms (diatoms, green algae, water macrophyta, fishes and intestinal parasites). The high content of dissolved nutrients, probably connected with anoxia, could have caused the disappearance of both diatoms and fishes in the upper part of the profile. An intensification of human activity around the pool was evidenced by a gradual decline of semi-natural hygrophilous vegetation accompanied by an inverse tendency in ruderal and trampled vegetation. Field indicators increased in time, whereas proportions of broadleaf trees and shrubs decreased. The fish remains showed an ecologically diversified water environment, however, carp was not documented. The fishpond building (and the knowledge of carp breeding) was, in this country, probably connected with cultural influences coming from West Europe around the thirteenth century and it further culminated in the 15th to the 16th centuries. However, there are indications (sporadic written sources) that some kind of artificial water reservoirs containing fishes existed here already before the introduction of the carp.

PS, AP

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PRAGUE CASTLE – ARCHAEOBOTANICAL HOTSPOT WITH PLANT SPECIES OF GLOBAL ORIGIN

THE SITE

Prague Castle was the historical core of the Bohemian Kingdom. This residency of early medieval Bohemian dukes and medieval kings was also a crossroads of economic activity in the Early Modern period. The complex of Prague Castle and the nearby Hradčany town has been therefore one of the most important fields of archaeological activity since 1925. Prague Castle as the central point of Bohemia is an extremely valuable site in terms of environmental archaeology. Finds of imported species and raw materials are a key element testifying to the significance of the central area of Prague in the context of the development of all of central Europe. During the 16th century, the ambitious Habsburg family ruled over a large part of Europe, including Spain and part of the Burgundy heritage, the Netherlands. Thanks to their numerous contacts abroad, the Bohemian nobility began to become more cosmopolitan in nature. It is reflected in structure of luxury plants, recorded in many archaeological assemblages, mainly those dated to 16th and 17th century.

Prague Castle, Vladislav Hall. Aegidius Sadeler copper engraving from the year 1607 depicting the trade and social life in the hall. According to the book by K. Bečková (2000).

Prague Castle, finds of desiccated macroremains. Dianthus flower, peanut shell (Arachis hypogea), fragment of nutmeg (Myristica fragrans), citrus peel. Photo J. Beneš, 2022.

RESULTS OF THE RESEARCH

Archaeobotanical findings, newly recorded from Prague Castle and Hradčany in the Early Modern Period indicate plant composition shift towards unusual and exotic species. Among the hundreds of common local botanical species five archaeological sites at Prague Castle are unique with findings of new plants. The shared characteristics of all of these species are their origin in distant countries, primarily in the Mediterranean regions. Certain commodities are from Asia as bitter orange (*Citrus aurantium*), mandarin orange (*Citrus* cf. *reticulata),* sweet orange *(Citrus sinensis)* and Africa (*Coffea arabica*). The botanical provenance of American pokeweed (*Phytolacca americana*), peanut (*Arachis hypogea*), pumpkin (*Cucurbita pepo*) and rustic tobacco (*Nicotiana rustica*) originated in the New World. As we have numerous written records for these plants in the Early Modern Period, particularly for commodities such as coffee or pepper, their evidence in archaeobotanical assemblages represents a unique opportunity for their direct physical study. Similarly important is the potential for morphological, breed and genetic analysis of plant macroremains, particularly desiccated plant tissues from the waste fill in Vladislav Hall. Plant remains from Prague Castle and the surrounding area represent a valuable historical source of information illustrating the daily and luxury environment of the royal court at the beginning of the Modern period.

JI, JB

Beneš, J., Čulíková, V., Kosňovská, J., Frolík, J. & J. Matiášek (2012). New plants at Prague Castle and Hradčany in the Early Modern Period: a History of selected species, Interdisciplinaria Archaeologica – Natural Sciences in Archaeology 3.1, pp. 103–114. http://dx.doi.org/10.24916/iansa.2012.1.7.

ATTACHMENTS

TRANSCRIPTION OF THE ORIGINAL PUBLICATION OF THE FIRST IWGP CONFERENCE IN KAČINA 1968

SYMPOSION DER INTERNATIONALEN ARBEITGEMEINSCHAFT FÜR PALÄOETHNOBOTANIK

(Acta Museorum Agriculturae, Prague 1968, 1–2, pp. 45–47.)

Vom 14. bis 18. 10. 1968 fand auf Einladung von Herrn ing. agr. Z. Tempír CSc., Direktor des Tschechoslowakischen Museums für Landwirtschaft, das 1. Symposion für Paläoethnobotanik im Schloss Kačina bei Prag statt. Ziel dieses Treffens war es, Erfahrungen aus dem Gebiet der Geschichte der Kulturpflanzen auszutauschen und gemeinsame Probleme – und zwar speziell methodische Fragen bei der Untersuchung von Ausgrabungsmaterial – zu erörtern. Folgende Wissenschaftler nahmen teil:

K. E. Behre	Wilhelmshaven	West Germany
W. Gizbert	Krakow	Poland
M. Hopf	Mainz	West Germany
M. Klichowska	Poznań	Poland
K. H. Knörzer	Neuss	West Germany
F. Kühn	Brno	Czechoslovakia

A. Patay	Budapest	Hungary
Z. Tempír	Praha	Czechoslovakia
U. Willerding	Göttingen	West Germany
W. van Zeist	Groningen	Holland
H. Przesławska	Poznań	Poland

Bedauerlicherweise musste eine Anzahl weiterer Kollegen ihre Teilnahme absagen:

F. Bachtejev	Leningrad	Soviet Union
G. W. Dimbleby	London	England
M. Follieri	Roma	Italy
H. Helbaek	Kobenhavn	Denmark
J. J. Hémardinquer	Paris	France
H. Hjelmqvist	Lund	Sweden
K. D. Jäger	Berlin	East Germany
M. M. Jakubciner	Leningrad	Soviet Union
A. J. Mordvinkina	Leningrad	Soviet Union
E. Opravil	Opava	Czechoslovakia
B. Pál	Budapest	Hungary
J. Renfrew	Sheffield	England
M. Villaret von Rochov	Lausanne	Switzerland
J. Schultze–Motel	Gatersleben	East Germany

Einleitend wurden mehrere Referate gahalten, deren Zusammenfassungen auf den folgenden Seiten abgedruckt sind. Die Diskussionen behandelten einige Fragenkomplexe, deren Ergebnisse hier wiedergegeben warden sollen:

1. BIBLIOGRAPHIE

Die weitere Streuung der paläoethnobotanischen Veröffentlichungen in Zeitschriften sehr verschiedenen Charakters erschwert die Arbeit der einzelnen Fachkollegen in allen Ländern sehr stark. K.D. Jäger hatte sich bereit erklärt, eine regelmäßig zusammenzustellende Bibliographie in den ‚Beiträgen zur Frühbeschichte der Landwirtschaft' zu publizieren. Wenn dies nicht möglich sein sollte, will Ing. Arpád Patay die Herausgabe in der Internationalen agrargeschichtlichen Bibliographie veranlassen. Zur Erzielung einer möglichst vollständigen Übersicht wurden folgende Regelungen getroffen:

Die Bibliographie soll die mit Groß Resten nachgewiesenen Kulturpflanzen und deren Produkte, sowie die Ackerunkräuter und alle im Zusammenhang in archäologischen Grabungen untersuchten Sammel- und Wildpflanzen umfassen. Reine vegetationsgeschichtliche Arbeiten, insbesondere Pollenanalysen sollen in diesen Berichten nicht erfasst werden, da dafür eine gute Bibliographie in ‚Pollen et Spores' existiert. Das Gebiet soll vorläufig nur Europa umfassen.

Die berichte sollen jeweils bid zum 1. 4. eines jeden Jahres an Herrn Dr. Jäger übersandt werden und die Arbeiten des vorhergehenden Kalenderjahres sowie eventuelle Nachträge zu vorhergehenden Jahren umfassen. Jeder Teilnehmer des Symposiums in Kačina 1968 wird außerdem seine Separatabdrucke oder wenigstens deren Zitate an Herrn Dr. Jäger senden.

Für die Bearbeitung der einzelnen Länder werden folgende Fachkollegen vorgeschlagen:

Belgien, Holland	W. van Zeist
BRD	K.-E. Behre
Bulgarien, Griechenland	J.Renfrew
ČSSR	E. Opravil
Dänemark	Troels-Smith
DDR	K.-D. Jäger

England, Ireland, Scottland	J. Renfrew
Frankreich	J.J. Hémardinquer
Italien	M. Follieri/G. Forni
Jugoslawien, Ungarn	A. Patay
Norwegen, Schweden	H. Hjelmquist
Österreich, Schweiz	M. Villaret von Rochov
Polen	W. Gizbert (Kraków); M. Klichowska (Poznan)
Portugal, Spanien	M. Hopf
Rumänien	Z. Tempír
UdSSR	Ch. Bachtejev

Der erste Bericht soll bis zum 1. 4. 1969 an Dr. Jäger gesandt werden. Wenn in den Zeitschriften der betreffenden Länder Arbeiten über ander Gebiete erscheinen, sollen sie ebenfalls mitberücksichtigt werden.

Es wird gebeten, die Zitate sie folgt aufzubauen:
Verfasser, Jahr, Titel, Zeitschrift, Seitenzahl, Verlasort.

2. VERBREITUNGSKARTEN

Von J. J. Hémardinquer (Paris) waren dem Symposion mehrere Karten für einen projektierten Atlas über die Ausbreitungsgeschichte der wichtigsten Kulturpflanzen mit der Bitte um Stellungnahme übersandt worden. Die Teilnehmer bedauerten, dass sie zu den einzelnen Karten wenig sahen konnten, da die Fundunterlagen nicht beigegeben waren. Insgesamt gesehen wurden die Karten als für speziellere Zwecke zu grob bezeichnet. Abgesehen von einigen Ungenauigkeiten empfand man es als wenig glücklich, z. B. die Ausbreitung aller Triticumarten gemeinsam in einer einzigen Karte darzustellen und die in der frühen Zeit mindestens ebenso wichtigen Gersten gar nicht zu berücksichtigen. Es herrschte allgemein Einigkeit darüber, dass für wissenschaftliche Zwecke neue Karten in einen größeren Maßstab und mit Einzelfundsignaturen angefertigt sollten zumal einige bereits

in Arbeit sind (Polen, Tschechoslowakei, Ungarn, BRD). Deshalb wurde von den Symposionteilnehmern angeregt, derartige Karten erst einmal möglichst für alle Gebiete Europas vorzubereiten. Folgende z. T. auch nicht in Kačina anwesende Bearbeiter wurden für die einzelnen Länder vorgeschlagen:

Zusammenstellung von Funden nach Ländern und deren Kartierung

LAND	VORGESCHLAGENE BEARBEITER
Ägypten	V. Täckholm
Belgien	van Zeist
Bulgarien	Renfrew
Bundesrep. Deutschland	Willerding/Knörzer
ČSSR	Tempír
Dänemark	Helbaek
Deutsche Demokr. Rep.	Schultze-Motel/Jäger
England (Grossbritannien) + Irland	Renfrew
Frankreich	Hémardinquer
Griechenland	Renfrew
Holland	van Zeist
Israel	Hopf
Italien	Follieri
Jugoslawien	Patay
Naher Osten	Helbaek/Renfrew/van Zeist
Österreich	Willerding
Polen	Gizbert/Klichowska

Portugal	Pinto da Silva
Rumänien	Tempír
Schweiz	Villaret – v. Rochow
Sweden/Norwegen/Finland	Hjelmquist
Spanien	Hopf
UdSSR	Bachtejev/Mordvinkina/Jakubciner
Ungarn	Patay

Als Anlage zu den Karten wird für jeden Fundpunkt die Angabe von Pflanzenart, Fundort (auch Kreis oder Bezirk), Menge (Anzahl, Gewicht, Prozent nach der Anzahl), Zeitstellung (Kulturzugehörigkeit, Gewinnungszeit des Fundes und Erfassungsangaben), Bearbeiter und Literatur für unbedingt erforderlich gehalten.

3. BESTIMMUNGSHILFEN UND NOMENKLATUR

Die stark verstreute Literatur unseres Fachgebietes sowie die vom Objekt bedingte Variationsbreite (unterschiedliche Herkunft, Alter usw.) des Untersuchungsmaterials erschwert es sowohl eingearbeiteten Kollegen wie auch besonders Anfängern, sichere Bestimmungen von Kulturpflanzenfunden vorzunehmen, Erfahrungsgemäß differiert bei schwierigen Objekten selbst die Ansprache zwischen verschiedenen, versierten Bearbeitern etwas. Um für die Zukunft eine möglichst große Sicherheit und Einheitlichkeit bei der Bestimmung der einzelnen Arten zu erreichen, wurde vorgeschlagen, dass einzelne Kollegen für die Samen/Früchte solcher Pflanzenarten, mit denen sie sich seit längerem intensiv befasst haben, die wesentlichen Charakteristika und wichtigsten Merkmale zur Unterscheidung nahe verwandter Formen zusammenstellen (Abbildung und Beschreibung).

Die Angaben, die sich sowohl auf die Erfahrungen des Autors stützen wie auch vorliegende Literatur einbeziehen müssten, sollen vorwiegend zur Bestimmung von fossilen, verkohlten Früchten bzw. Samen geeignet sein. Es wird gebeten, einen Rohentwurf bis zum Herbst 1970 herzustellen, um ihn dann zwischen den verschiedenen Bearbeitern und einigen weiteren, interessierten Kollegen zur Stellungnahme kursieren zu lassen. Bei einer folgenden Zusammenkunft (vgl. Punkt 6) könnte dann eine endgültige Diskussion über die Kriterien und ggf. über deren gemeinsame Veröffentlichung stattfinden.

Triticum	Kühn
Hordeum	van Zeist
Secale	Klichowska
Avena	Behre
Panicum	Scholz
Setaria	Schlz
Vicia faba	Hopf
Vicia ervilia	Hopf
Lens	Patay
Pisum	Patay
Vicia sativa	Patay
Linum	Villaret v. Rochov
Papaver	Villaret v. Rochov
Camelina	Behre
Cannabis	Opravil
Cicer	Knörzer
Vitis	Patay
Prunus	Opravil
Getreidenkräuter und Hackfruchtungkräuter	Kühn

Neben der Fixierung von Bestimmungskriterien wird für alle Arten eine einheitliche Nomenklatur angestrebt, wobei empfohlen wird, sich möglichst weitgehend an EHRENDORFER und MANSFELD zu halten. Die Vorschläge für die ‚endgültigen' Art-Namen sollen ebenfalls von den Bearbeitern gemacht werden.

4. PALÄOETHNOBOTANISCHE ARCHIVE

Um nutzlose Arbeit bei der Suche nach Belegstücken, Literatur usw. zu vermeiden, wurde empfohlen, für die einzelnen Länder, ggf. auch kleinere Gebietseinheiten, zentrale paläoethnobotanische Archive einzurichten. Diese Archive sollen Belege in Form von Abbildungen, Daten usw. & Literatur sammeln. Als besonders wichtig wurde das Anlegen von Foto-Karteien für möglichst alle botanischen Grabungsfunde, besonders auch soweit sie unveröffentlicht sind, angesehen. Als erste gaben TEMPIR in Prag, PATAY in Budapest und HOPF in Meinz das Bestehen, bzw. den Aufbau derartiger Archive bekannt.

5. RUNDSCHREIBEN

An Wissenschaftler, die auf dem Gebiet der Paläoethnobotanik tätig sind, an dem Symposion in Kačina aber nicht teilnehmen konnten, wird ein Rundschreiben versandt, das sie über den Verlauf und die Ergebnisse der Gespräche informiert und das sie zur Mitarbeit an den besprochenen Aufgaben sowie zur weiteren Kontaktnahme mit den Symposionsteilnehmern auffordern möchte.

6. DIE FACHLICHE ORGANISATION

Unter den Symposionsteilnehmern bestand volle Einstimmigkeit, die gegenseitigen Kontakte sowie Zusammenkünfte in der durchgeführten Form als Internationale Arbeitsgemeinschaft für Paläoethnobobanik ‚IAP' (International Work Group for Palaeoethnobotany) weiter zu pflegen. Diese lose Arbeitsgemeinschaft kennt keine eingetragenen Mitglieder und keinen Präsidenten; sie soll vorerst keiner anderen Organisation angeschlossen werden. Ihre Zusammenkünfte und deren Themen sollen je nach Bedarf von einem Treffen zum nächsten vereinbart werden und nach Möglichkeit von Land zu Land wechseln. Das gastgebende Land stellt jeweils den Sekretär zur Führung der notwendigen Geschäfte. Der derzeitige Sekretär ist Herr Direktor Z. Tempir, Prag (Československé Zemědělské muzeum Praha 2, Vinohrady, Slezská 7, ČSSR). Die nächste Zusammenkunft ist für 1971 geplant. Der Tagungsort wird noch bekannt gegeben. Die oben aufgeführten Punkte 1) – 5) werden zur Verhandlung stehen.

gez.: Behre, Hopf, van Zeist

SELECTED HISTORICAL PHOTOGRAPHS FROM IWGP CONFERENCE IN NITRA–NOVÉ VOZOKANY 1989

In 1989, a conference of the International Workgroup for Palaeoethnobotany was held in Nitra–Nové Vozokany, Slovakia. We document this event with the following selected photographs.

Participants of the IWGP in 1989, the excursion. In the foreground from the left: Karl-Ernst Behre, Helmut Kroll. Photo archive E. Hajnalová.

Participants of the IWGP in 1989. In the foreground from the left: Otto Brinkkemper, Corrie Bakels, unknown. Photo archive E. Hajnalová.

Mordechai Kislev in the IWGP excursion in 1989. Photo archive E. Hajnalová.

Participants of the IWGP in 1989. From the left: Eva Hajnalová, unknown, Ulrich Willerding. Photo archive E. Hajnalová.

Mukund Kajale in the IWGP in 1989. Photo archive E. Hajnalová.

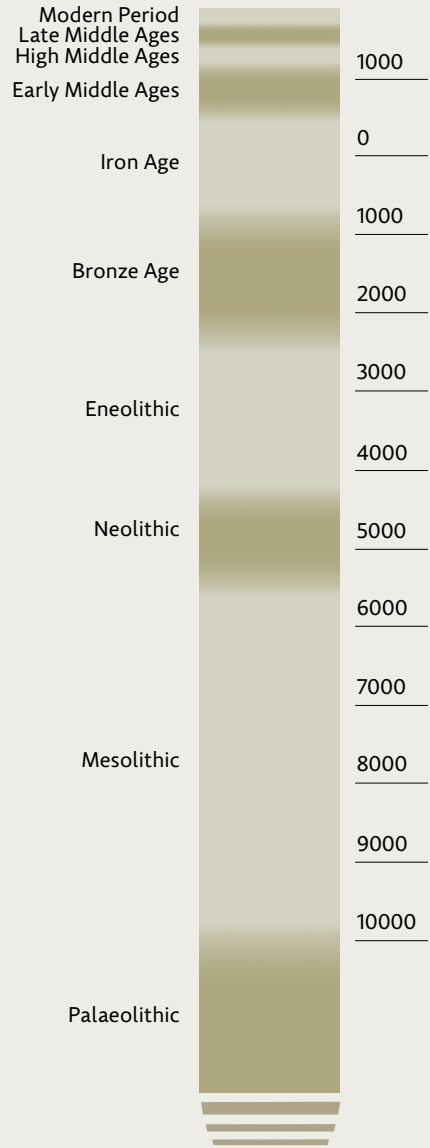
The auditorium of the IWGP in 1989. Photo archive E. Hajnalová.

Participants of the IWGP in 1989 observing plant macroremains on the meshes. Photo archive E. Hajnalová.

Participants of the IWGP in 1989. Maria Hopf and Helmut Kroll. Photo archive E. Hajnalová.

TIME AXIS OF ARCHAEOLOGICAL EPOCHS IN CZECHIA

Years BC/AD. Created by B. Mandelová.



MAP OF SELECTED SITES MENTIONED IN TEXT

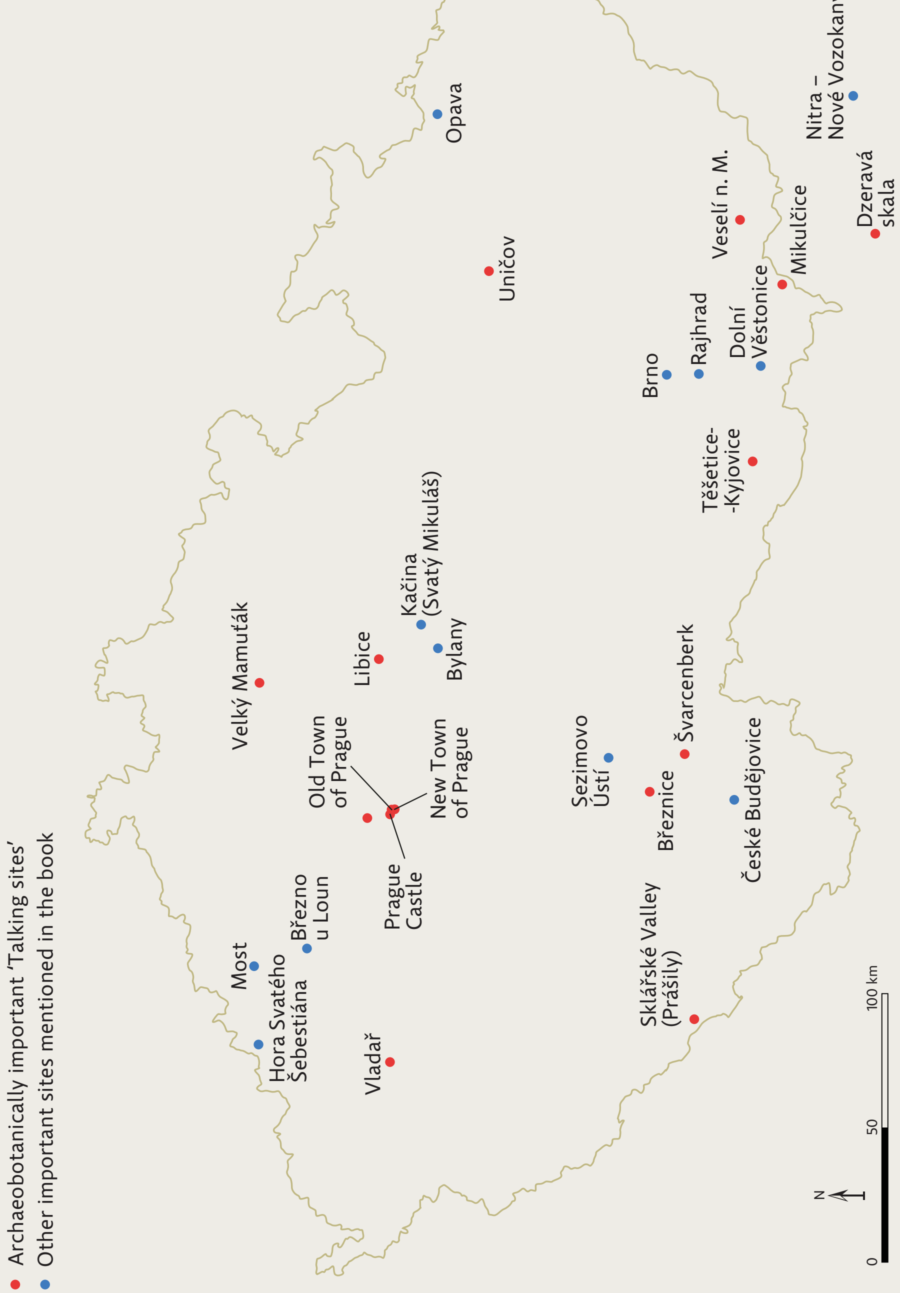
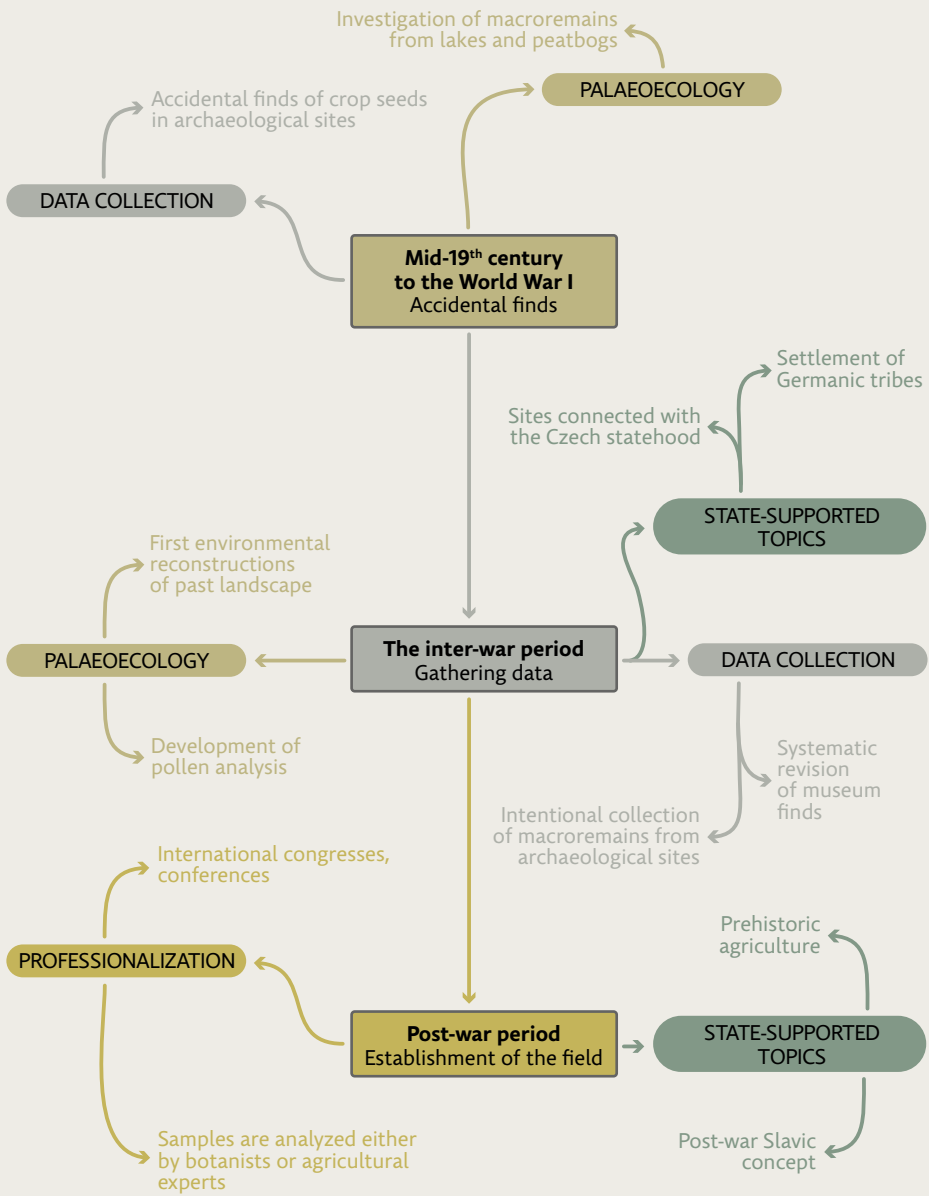
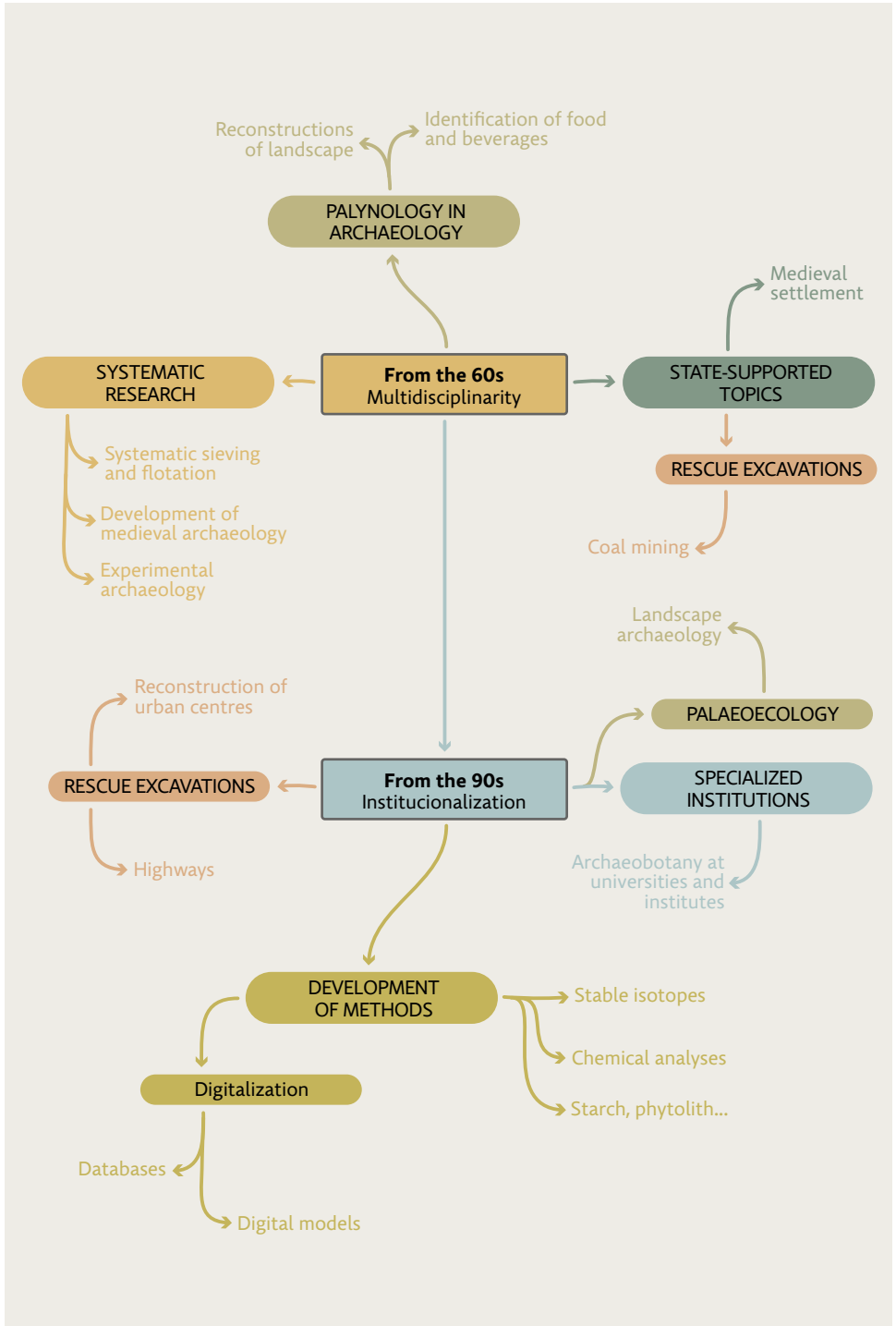


DIAGRAM: DEVELOPMENT OF ARCHAEOBOTANY IN CZECHIA AND BEYOND

Created by A. Pokorná and A. Mandelová.




Reconstructions of landscape
Identification of food and beverages
PALYNOLOGY IN ARCHAEOLOGY
Medieval settlement
SYSTEMATIC RESEARCH
From the 60s Multidisciplinarity
STATE-SUPPORTED TOPICS
Systematic sieving and flotation
Development of medieval archaeology
Experimental archaeology
RESCUE EXCAVATIONS
Coal mining
Landscape archaeology
Reconstruction of urban centres
PALAEOECOLOGY
RESCUE EXCAVATIONS
From the 90s Institucionalization
SPECIALIZED INSTITUTIONS
Highways
Archaeobotany at universities and institutes
DEVELOPMENT OF METHODS
Stable isotopes
Chemical analyses
Starch, phytolith...
Digitalization
Databases
Digital models

LIST OF ABBREVIATIONS

ALRNB	Ancient landscape reconstruction in northern Bohemia
ARÚP	1919–1952 State Institute of Archaeology (StAÚ)), 1953–1993 Institute of Archaeology of CSAS (AÚ ČSAV), since 1993 Institute of Archaeology Prague (ARÚP)
AV ČR/CAS	1953–1993 Czechoslovak Academy of Sciences (ČSAV), since 1993 Czech Academy of Sciences (AV ČR)
CEA	Conference of Enviromental Archaeology
ČR/CR	1918–1939 Czechoslovak Republic (ČSR), 1939–1945 Protectorate of Bohemia and Moravia, 1945–1960 Czechoslovak Republic (ČSR), 1960–1990 Czechoslovak Socialistic Republic (ČSSR), 1990–1992 Czech and Slovac Federative Republic (ČSFR), since 1993 Czech Republic (ČR)
CZAD	Archaeobotanical database by the Czech Republic
IAMA	International Association of the Museums of Agriculturae
IANSA	Interdisciplinaria Archaeologica. Natural Sciences in Archaeology
IAP	Internationale Arbeitsgemeinschaft für Paläoethnobotanik was the original German name of IWGP until the meeting in Budapest 1971; later it changed to the English form IWGP.
IWGP	International Work Group of Palaeoethnobotany
JZD	unified agricultural cooperative
LAPE	The Laboratory of Archaeobotany and Palaeoecology
LBK	Linear pottery culture
MŠANO	Ministry of Education and National Enlightenment
MU	Masaryk University
NZM/ČsZM	1918–2006 Czechoslovak museum of Agriculture (ČsZM), since 2006 National Museum of Agriculture (NZM)
PALYCZ	Palynological Database of the Czech Republic
RNDr.	Doctor of Natural Sciences (Dr. sc. nat.)
SAV	Slovak Academy of Sciences
SBK	Stroked pottery culture
UISPP	Union internationale of Prehistoric and Protohistoric Sciences
UK	United Kingdom
VÚRV	Research Institute of Plant Production
ZIP	West Bohemian Institute for the Protection and Documentation of Monuments

LIST OF BOXES

LIST OF TALKING SITES

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ARCHAEOBOTANY IN CZECHIA AND BEYOND

THE PAST AND PRESENT OF THE DISCIPLINE

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