Palaeobotany in Slovene Archaeology

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INTRODUCTION

The past two decades in particular have witnessed an increasing incorporation of natural sciences, often complementing or even elucidating archaeological finds, in modern archaeological investigations. Palaeobotany plays a significant role among these “complementary” natural sciences. It involves the investigation of botanic remains, which were gathered from various archaeological sites, that were in direct or indirect connection with human activity and it extends significant palaeoecologic and palaeoeconomic information to us.

Palaeobotany has asserted itself in the field of archaeology to the point that it is also termed archaeobotany. A somewhat longer neologism, palaeoethnobotany, has the same meaning. The term archaeopalynology is used when investigations consist solely of pollen analyses.

Archaeology directly applies three technically and methodologically differing botanical disciplines, all of which contribute information concerning a former environment, man’s influence upon the environment as well as the manner of life and subsistence of man within this very environment. The three disciplines are as follows:

a) Carpological analyses. This refers to the determination of the various types of seeds and fruits, in particular those that represented a part of the sustenance. Most often this comprises of charred cereal grains and their faithful companions, weed seeds. Apart from within the layers of the pile-dwelling settlements, uncharred seeds are rarely preserved. Of the fruits, only the stones of fruits, the rinds and hulls and also nuts, which sometimes survive even uncharred, are preserved.

b) Xylotomical and anthracotomical analyses of wood and charcoal from archaeological sites partially reveal what the surrounding forest that provided wood for burning and for building houses and for creating tools or weapons resembled.

c) Palynological analyses elucidate the palaeoeconomic conditions that were created by the then vegetation, forests in particular. They usually include a longer period such that changes in the vegetation in the environment during the time prior to settlement, during settlement as well as after settlement can be observed. The circumstances of the environment before it was settled by man and in what condition it was later left can be discerned. Whether a natural forest stood there or whether it was already a degraded woodland, grassland or even tillable land can be determined. Nonetheless, the reverse possibilities should not be overlooked; perhaps the characteristic disturbances in the natural vegetation, observed from the pollen...
diagram, are an indication of the proximity of a yet undiscovered settlement.

A SHORT HISTORICAL REVIEW OF PALAEOBOTANICAL INVESTIGATIONS IN SLOVENIA

K. Deschmann, the then collator and director of the Regional Museum for Carniola (Krainisches Landesmuseum Rudolfinum in Laibach), investigated and evaluated plant macro-remains already during the second half of the previous century. He, himself, conducted the excavations of the pile-dwelling settlements at Ig that were discovered amidst the construction of the new road toward Kočevje. In addition to studying the archaeological material finds, he also studied vegetal remains: the wooden posts for the pile-dwellings as well as seeds and fruits (Deschmann 1875; 1878).

Schrieber, in 1904, investigated plant remains from the laying out of a Roman road that was discovered near Babna Gorica (Werneck 1949, 205).

W. Schmid investigated the newly discovered pile-dwelling sites at Notranje Gorice in the years 1907 and 1908. In addition to numerous archaeological finds, he also examined the oak, poplar and alder wood posts (ANSl 1975, 183). He also conducted the archaeological excavation at the Poštela hillfort (Zgornje Radvanje) and carried out an analysis of the wooden remains, the charcoal in particular, himself (Schmid 1915). He presumably carried out investigations of the vegetal remains from excavations in the region of Roman Emona, although any existing data abides in his own personal notes (by word of mouth: J. Šašel and A. Šercelj). During the years between the two World Wars few archaeologists (Saria, Ložar, Klemenc) devoted their selves to more cultural questions; perhaps this was partly due to the fact that there were very few opportunities to excavate. Namely, there are no reports concerning "archaeobotanical" investigations in the archaeological literature, nor does Werneck (1949) mention any. S. Brodar was the sole individual to send a sample of wooden charcoal from Potočka zijalka (Brodar 1938, 153) to the botanist, Elise Hoffmann, in Vienna, for an analysis.

Following the Second World War, a new zealously flared among young archaeologists and excavations were commenced throughout Slovenia. In 1947 the Slovene Academy of Arts and Sciences established the Archaeological Committee, later termed the Section for Archaeology, and then again in 1972 renamed the Institute of Archaeology. J. Korošec, the founder and director of the Section for Archaeology, planned an extensive program of excavations on the Ljubljana moor in 1953. He was entirely aware of the fact that such a project generating an abundance of excavated organic materials would also demand the cooperation of natural scientists. Thus in addition to a palaeontologist joining the research team, he also invited the botanist, A. Šercelj, who further organized a palynologic laboratory and who instigated systematic palaeobotanical investigations. These investigations comprised of pollen analyses as well as analyses of wood and charcoal from the pile-dwellings. Carpological analyses were not yet foreseen as the excavated moorland soil was not yet being sieved; nonetheless, the larger and characteristic hulls of water chestnuts (Trapa natans) were easily discernible.

Anthracotomical and carpological analyses became more of an actuality with the commencement of extensive excavations in drier conditions in caves.

SELECT EXAMPLES OF ARCHAEOBOTANICAL INVESTIGATIONS

The Ljubljana Moor

Palaeobotanical investigations of the pile-dwelling settlements on the Ljubljana moor were carried out for numerous years parallel with the archaeological excavations conducted by T. Bregant. Initially xylotomical analyses were predominante. More than a thousand posts were analyzed. It was established, among others, that oak wood was the predominate construction material at the Maharski prekop pile-dwelling settlement, while ash wood predominated at Parte, which is also an indication of chronologically varying settlement formation phases. Pollen analyses of sediments from drilling holes or cross-sections were also regularly carried out. The effect of human activity upon the surrounding vegetation is perceivable from all the pollen diagrams, even more can be said of the then agricultural activity considering that the pollen of cereals is always present in the cultural layers (Culiberg 1984; Culiberg, Šercelj 1978; 1980a; 1980b; Šercelj, Culiberg 1978; 1980). Much less was done in the line of carpological investigations during the initial excavations. Carpological analyses were at first sporadic, usually of the chance find of a seed or fruit, and then with time increasing amounts of soil from the cultural layers were examined. The finds were a success right from the start: cereal grains and
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The Dolenjska Region

Archaeological investigations of prehistoric hillfort settlements throughout the Dolenjska region have invariably yielded seeds of various cereals: wheat (*Triticum sp.*), barley (*Hordeum sp.*) and millet (*Panicum miliacenum*), as well as cereal weeds. From leguminous plants the grains of horsebeans (*Vicia faba*) and peas (*Pisum*) have been found (Culiberg, Šercelj 1995a).

A particular point of interest is the regular bearing of quite a large number of seeds crossbreed between the *Brassica* and *Sinapis* genera. These are the predecessors of today’s variety of cabbage, turnip, kohlrabi and mustard. According to the present stance of our knowledge, seeds from the genus *Brassica* and dating to the period extending from the Bronze to the Iron Ages are quite a rare find. Perhaps the idea that the presumable native soil of such cultivators is precisely in our region as opposed to the Mediterranean, as suggests Hegi (1986), deserves some merit.

Kučar

Analysis of larger amounts of wooden charcoal left behind by Iron Age or Late Roman inhabitants suggests the existence of an oak forest mixed with hornbeam (*Carpinus*), hop-hornbeam (*Ostrya*), maple (*Acer*), hazel (*Corylus*), ash (*Fraxinus*) and elm (*Ulmus*). The high frequency of a type of poplar (*Populus tremula*), most likely the trembling poplar, indicates a heavily degraded pasturage landscape. The wood of fir (*Abies*), which is well represented as construction material, was most likely transported from the more distant and modest remains of a beech-fir forest.

As far as cereals are concerned, only grains of millet were discovered, and that in large amounts; a few grains were from the genus *Brassica* indicating cabbage, turnip, kohlrabi or mustard (Culiberg, Šercelj 1995b).

Gorjanci

Two pollen diagrams from Gorjanci (Culiberg, Šercelj 1997a) illustrate a strong reduction in forest land which could easily have been in consequence to the colonization of the Uskoki. Gruden (1992) claims that these peoples settled in Žumberk and Marindol during the first half of the 16th century. They would have required large pasturage area considering that they lived off of stockbreeding.
This coincides with the pollen diagrams which indicate high pollen values in grass vegetation. That agriculture was also a significant branch is depicted in the pollen diagrams by the high pollen values of cereals. Buckwheat (*Fagopyrum*) is of special significance. The Uskoki were likely to have brought it along with them from elsewhere. Its natural habitat is namely in south-eastern Asia; it was brought to Europe also somewhat earlier via the Islam world (ital.: grano sarraceno). It is mentioned in Slovenia in the Gornji grad land register from the year 1426 (Blaznik et al. 1970).

**Vranje near Sevnica**

The results of the anthrctomical and xylotomical analyses indicate that oak wood was predominate. Most likely the settlement was surrounded by a mixed oak forest along with hazel, alder (*Alnus*) and even chestnut (*Castanea*). There were probably very few beech (*Fagus*). The wood of fir used as construction material and especially the wood of yew (*Taxus*) used for tools were probably brought from elsewhere.

Pollen analyses were carried out on samples of sediment from the water well, which began to accumulate only once the settlement was already abandoned, and soil from along the walls of the ruins. The analyses indicate a reviving forest. Pioneers seem to dominate: birch (*Betula*), hazel, alder and hornbeam. Chestnut and even beech seem to have grown as well. The presence of walnut (*Juglans*) is also of some interest.

The pollen analyses of vegetation other than trees encompass the pollen of cereals and other grasses, Compositae and mugwort (*Artemisia*). Pasturage and the cultivation of land in proximity to the settlement are indicated (Culiberg 1998).

**Poštela**

The taxonomic structure of tree charcoal from Iron Age graves at Poštela suggest that the surrounding forest in direct proximity to the hillfort had already undergone a good deal of change. The essential elements of the then natural Pohorje forests - fir and beech - are poorly represented in comparison with the elements of a mixed, phytocoenological indeterminate forest and the pine and poplar tree pioneers (Šercelj 1990a).

**Rabeljča vas near Ptuj**

Archaeological excavations of the Roman necropolis at Rabeljča vas even presented the discovery of southern fruits in two Roman graves, probably as grave goods. Dates, figs, pomegranates and jujubes (*Zizyphus jujuba*) were determined. Each of these fruits had to have been brought from the Mediterranean region (Šercelj 1990b).

**Divje babe I**

Palaeobotanical investigations in the Palaeolithic cave of Divje babe near Idrija are in process already since 1980 in correspondence with the archaeological excavations. The results of pollen analyses of cave sediments are for the most part moderate; numerous pieces of charcoal from various hearths were also examined (Culiberg, Šercelj 1997b). The upper layers 4-17 to a depth of 5.5 m contained enough pollen and spores that the vegetation could...
be depicted in a pollen diagram. The layers 17-26 from a depth of 5.5 m to 11 m contained enough pollen only in select layers, while other layers only contained individual grains. The predominately coniferous trees - pine (*Pinus*) and spruce (*Picea*) - are characteristic of exclusively Pleistocene vegetation. Nonetheless, pollen of deciduous trees - hornbeam, hazel, linden, hop-hornbeam and even up to a value of 5% beech in the layers 17-17b - was also present. This is significant for climatological evaluation purposes. The families of Compositae, Umbelliferae and Dipsacaceae plants, in addition to a large number of fern spores, are predominate among the pollen of herbs. This pollen, and likewise also the fern spores, could not possibly have been transported into the cave by wind but rather must have been carried in by bears or humans. The pollen of mostly entomophilous Compositae was probably obtained from the excrement of bears that nibbled away at the fresh vegetation on the plateau above the cave after their hibernation. Analogous conditions were determined also at the Vindija cave in Croatia (Draxler, 1986).

The results of the anthracotomical analyses indicate that the majority of charcoal pieces examined were of coniferous origins: pine and spruce. There were many fewer deciduous trees, of which beech, ash, and willow/poplar were determined. The discovery of the charcoal of a yew (*Taxus*) more towards the back of the cave is quite extraordinary. The wood of yew was most likely used for tools and weapons considering its hardness and pliability.

**CONCLUSION**

Select significant results which are the product of more extensive and long standing palaeobotanical investigations were presented in elucidation. The list of archaeological sites procuring palaeobotanical investigations is really much more comprehensive. More than one hundred sites and their corresponding analyses are registered in the index files (Šercelj, Culiberg: The Jovan Hadži Institute of Biology, Scientific Research Center SAZU). Numerous results are published independently or as supplements to archaeological publications, while many have remained only reports.

Palaeobotanical investigations, in addition to those mentioned at Divje babe, are being carried out at numerous other Palaeolithic stations: Mokriška jama, Poljšiška cerkev, Babja jama, Koprivška luknja, Ciganska jama, Matjaževa kamre, Lukenjska jama, Postojnska jama, Betalov spodmol, Parska golobina, Jama v Lozi, Ovčja jama, Županov spodmol, Zakajeni spodmol and others (Šercelj, 1996; Šercelj, Culiberg 1985). The vegetal remains at Palaeolithic stations are for the most part wood charcoal and rarely also pollen (as at Divje babe). Analyses of the determined types of trees can partly contribute to the chronological determination of a site depending upon the palaeoclimatic conditions.

The later archaeological eras introduce a larger variety of vegetal finds. Various types of seeds of cultivated plants as well as fruits and stones of fruits that were gathered in the surrounding vicinity have been determined at Neolithic sites. A large amount of charcoal and wooden material that was used for construction purposes or for tools is also present. Analyses of all these remains can provide significant insight into understanding the palaeoecologic conditions of a landscape. The Ljubljana moor pile-dwelling settlements and Ajdovska jama furnished the most in terms of vegetal finds. Analyses of large amounts of wood charcoal from the Neolithic site of Hardek near Ormož are currently running; it seems that other vegetal remains are scarce.

There is a mass influx of alimental cultivated plants, in conjunction with the *Brassica* family, during the Bronze and Iron Ages. The legumes - horsebeans, peas and flax - are also more frequent. In addition to an increase in the number of sites in the Dolenjska region and at Kučar, palaeobotanical investigations were also initiated at Dolnji Lakoš (Bronze Age) and furthermore at the Iron Age sites of Most na Soči, Molnik near Škofljica, Poštela, the SAZU courtyard etc.

The fruits of southern fruits discovered in the Roman graves at Ptuj are an indication of intensive merchandise trade and good connections during Roman times.

As mentioned already in the historical review, the appeal for palaeobotanical investigations in Slovenia surfaced soon enough, although only among select archaeologists. This interest augmented in response to the significant finds and results that were the consequence of interdisciplinary cooperation. Nonetheless, a more extensive history of intensive archaeobotanical investigations is lacking even in Europe, especially in Germany, France and Holland, where there are numerous active palaeobotanists.

It is by all means commendable that all excavated material is thoroughly examined at the majority of current archaeological excavations. Material finds are ever increasing and likewise also it seems that archaeobotany is experiencing its prime.
Paleobotanika v slovenski arheologiji

Previd

UVOD

V sodobne arheološke raziskave vključuje vedno več naravoslovnih ved, ki mnogokrat dopolnjujejo ali celo pojasnjujejo arheološke najde. Poleg edukacije so arheologijah pomembne paleoekološke podatke.

Paleobotanika je v arheologiji še toliko uveljavila, da so jo poimenovali kar arheobotanika. Pohiško raziskuje rastlinske ostanke iz arheoloških najdišč, ki so bili mesto med temi "dopolnilnimi" vedami pa-paleobotanika. Dopolnjujejo ali celo pojasnjujejo arheološke najde. Pomembno

a) Karpološke raziskave. To je določanje vrste semen in plodov, izpelodnjenih iz morda že degradiranih gozdov, pašnikov ali celo obdelovanih zemelj.

b) Ksilotomske in antrakotomske raziskave - izvorno izpelodnjenih rastlinskih ostankov iz neolitskih jamskih nekropol, kolaščnic ali iz dolžin obdelavanih zemelj.

c) Palinološke raziskave v arheoloških najdiščih - izpelodnjenih rastlinskih ostankov.

Dopolnitvene raziskave


Ansi 1975, Arheološka najdišča Slovencev. - Ljubljana.


Brodar, s. 1938, Das Palaeolithikum Jugoslawien. - Quartär 4, 140-173.


makroostanke. Sam je vodil izkopavanja koliščarskih naselb pri Ljubljanskem barju, vendar so podatki ostali v njegovih zapiskih (ustno J. Šašel in A. Šercelj).

V letih med obema vojnama so se maloštevilni arheologi pokazali veliko vnaprej in začela se izkopavanja na vinske trte (Leta 1904 je Schrieber raziskal rastlinske ostanke s trase rimskega barja). Vodil je tudi arheološki literatury namreč ni zaznali poročil o arheobotaničnih raziskavah, kar verjetno kaže na časovne razlike nastajanja naselb.

Po drugi svetovni vojni so mladi arheologi pokazali veliko izkopa in začela se izkopavanja na vinske trte po vsej Sloveniji. Leta 1947 je bila pri Slovenski akademiji znanosti in umetnosti ustanovljena Arheološka komisija, nasneje imenovana Arheološka sekcija oziroma Sekcija za arheologijo, ki se je leta 1972 preimenovala v Inštitut za arheologijo oziroma Sekcija za arheologijo, ki se je leta 1997a preimenovala v Institut za arheologijo.

Leta 1953 je J. Korošec kot ustanovitelj in vodja Sekcije za arheologijo zastavil obsežen program izkopavanj na Ljubljanskem barju. Vseko se je zavedal, da je pri tem projektu z obliko izkopanega materiala organskega porekla potrebni tudi naravoslovi. Tako je poleg paleontologa k sodelovanju povabil tudi botanika. Vseskozi se je zavedal, da so pri takem projektu z obilico arheologijo zastavili obsežen program izkopavanj na Ljubljanskem barju. Vodil je tudi arheološka literatura namreč ni zaznali poročil o arheobotaničnih raziskavah, kar verjetno kaže na časovne razlike nastajanja naselb.

REZULTATI ANTRAKOTOMSKIH IN KSILOTOMSKIH ANALIZ

Ljubljansko barje

Paleobotanike izkopavanja koliščarskih naselb na Ljubljanskem barju so vrsto let potekale vzporedno z arheološkimi izkopavanji, ki jih je tedaj vodila T. Bregant. Sprva so bila najdbe semen in plodov, potem so se pregledovali manjše ostanke in plodove (Deschmann 1875; 1878). Vodil je tudi arheološka literatury namreč ni zaznali poročil o arheobotaničnih raziskavah, kar verjetno kaže na časovne razlike nastajanja naselb.

Redno so bile narejene tudi pelodne analize sedimentov iz vrtin ali iz profilov. Iz vseh pelodnih diagramov je mogoče zaznati človeka vpliv na okolni vegetacijo, se bolj pa njegovo takratno poljedelsko dejavnost, saj je v kulturnih plastah vedno prisoten pelod žit (Culiberg 1978; 1980a; 1980b; Šercelj, Culiberg 1978; 1980).

Precej manj pa je bilo pri začetnih izkopavanjih narejenih karpoloških raziskav. Sprva so bile le posamične, bolj naključne najdbe semen in plodov, potem so se pregledovalo manjše ostanke in plodove (Deschmann 1875; 1878). Vodil je tudi arheološka literatury namreč ni zaznali poročil o arheobotaničnih raziskavah, kar verjetno kaže na časovne razlike nastajanja naselb.

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Arheološka izkopavanja v letih od 1982 do 1990 so poka-zala, da gre za največjo jamsko nekropolo v Sloveniji, ki je bila obiskovana od mlajše kamene dobe ali celo paleolitika do poznega srednjega veka. Pomemben je zlasti drugi kulturni hori-zont s posamičnimi grobovi (radiokarbonska datacija: 5625±130 BP), kar kaže na to, da je bila jama v tistem času grobišče in kulturni objekt.

Med zeliščnim pelodom dominirajo košarnice, kobulnice in ščetnice, poleg velikega števila praprotinskih spor. Ta pelod, kot je tudi spore praproti, ni mogel priti v jamo z vetrom, ampak so ga vanjo verjetno zanesli medvedi ali človek. Pelod povečni anemofilnih košarnic po vsej verjetnosti izvirja iz ekskrementov medvedov, ki so po zimskem spanju obžirali sveže želence na planoti nad jamo. Zelo podobne razmere so bile ugotovljene tudi v jami Vindija na Hrvaškem (Draxter, 1986).


Kot je bilo v zgodovinskem pregledu že omenjeno, se je zelo večja števila praprotinskih spor v paleolitiku in neolitiku kot tudi v bronasti in železni dobi uporabljali za izdelavo orodja in orožja.
Vsekakor pa je razveseljivo, da se pri večini sedanjih arheoloških del ves izkupani material temeljito pregleda. Najdbe so vse številneješe in kaže, da tudi pri nas arheobotanika doživlja svoj razcvet.

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