INDUSTRIAL ARCHAEOLOGY AND ARCHAEOMETRY NEWS

Vol. IX. English Supplement 1991.

EDITORIAL

In spite of our plans to publish our Newsletter twice a year, the first number of Industrial Archaeology and Archaeometry News for 1991 is unfortunately the only one for this year - and late for that, too. The reason for this is not rooted in the low activity of the members of the Working Groups of Industrial Archaeology and Archaeometry, much rather, constant administrative and financial problems affecting most of our efforts.

Much to our regret, we had to cancel the International Symposium on Archaeometry announced for this year and had to be contented with a 'home session' held on the basis of the Hungarian lectures prepared for the meeting. The moral of the story may be a critical view towards our plans and undertakings and a more intensive effort towards publicity to get support for our plans on behalf of professionals and the 'public' as well.

In accord with our former views, we intend to widen the scope towards archaeometrical and related research outside our Working Groups both on the archaeological and the scientific field. This involves a more intensive interest in palaeo- and archaeo-biological investigation besides 'metric' analyses. The Editorial Board kindly asks foreign colleagues as well to contribute with short and topical reports on their activities and information on forthcoming events.

K. T. Biró editor

Personalia

Portrait of the new Chairman of the Archaeometry Working Group

The Archaeometry Working Group is chaired by, since the end of last year, János Borszéki of the Veszprém University, Dept. of Analytical Chemistry. He was elected to follow Miklós Bakos, founder and first Chairman of the Working Group. János Borszéki graduated at the Radiochemical Faculty of the Veszprém Chemical University in 1970. He obtained doctoral degree as a research fellow at the University in 1972. Following some industrial practice, he was appointed as a teacher of the University in 1977. He spent longer time at the Analytical Department of the Graz Technical University. He received his PhD in 1989 for studies concerning the methodology and data processing techniques of atomic absorption spectroscopy. Member of the Spectrochemical Working Group of the Hungarian Academy of Sciences and the Environmental Chemical Working Group.
His archaeometrical interest started with numismatical problems first. As the Chairman of the Working Group he intends to promote the utilization of scientific investigations in the study of the past.

New members

New members of the Archaeometry Working Group: Pálóczi Horváth András, archaeologist Takács István, archaeozoologist both from the Museum of Hungarian Agriculture.

Activities of the Working Groups

Session of the Archaeometry Working Group, 28th of November 1991.

The program of the session comprised lectures accepted for the International Symposium on Archaeometry. Some of the lectures are summarized below according to the abstracts submitted. A special session will be devoted to papers dealing with informatical approach of archaeometry in 1992, early spring.

Lectures presented during the Autumn session:

E. Berényi–Sz. Honti–B. Kürti–L. Költő:
Archaeological applications of CT (computer tomograph)
J. Csapó–I. Nagy:
Mass spectrometric capillarity gas chromatography for identification of fatty acids from fossile bones
L. Költő–M. Kis-Varga:
Energy dispersive X-ray spectrometer for archaeological use
J. Csapó–I. Papp–Zs. Csapó-Kiss–L. Költő:
Age determination of fossil bone samples by amino acid racemization and oxidation of sulphur containing amino acids
E. Hertelendi–F. Horváth:
Radiocarbon chronology of Late Neolithic Settlements in the Tisza-Maros Region, Hungary
L. Bartosiewicz–A. M. Choyke:
Bone tool typology and procurement of raw material at a Neolithic site
K. T. Biró–A. Vladár:
Quantitative EDS analysis of obsidian samples
F. Gyulai:
Remnants of food from the Bronze Age
E. Jerem–L. Bartosiewicz–F. Gyulai–E. Krolopp:
Paleoenvironment and site formation of a river-side settlement in North-West Hungary
I. Takács–D. Gróh:
On the relation of animal bones found in graves and the direction of the graves
B. Kürti–L. Költő:
Conclusions of analytical studies on the material of the Algyő Early Medieval (Conquest period) cemetery
I. Varga–G. Ilon:
The occurrence of bauxite on a Late Bronze Age site

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J. Csapó–I. Nagy:
Mass spectrometric capillarity gas chromatography for identification of fatty acids from fossile bones

To estimate the age of fossil bone samples which are too young for racemization of amino acids, we determined the composition of fatty acids and the relationship between the age and the fatty acid composition of different bone samples. It was found that the fatty acid content in younger samples was higher than in the older ones. The chromatographic pattern and the ratio of different fatty acid depend on the age of the bone sample, therefore this ratio may be applied for determining the relative age of fossil bone samples originating from the same environmental conditions. Analysing fatty acids seems to be useful for identifying and selecting mixed fossil bones or skeletons of different ages.

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L. Költő–M. Kis-Varga:
Energy dispersive X-ray spectrometer for archaeological use

In the Institute of Nuclear Research of the Hungarian Academy of Sciences (ATOMKI), in collaboration with the Rippl-Rónai Museum of Kaposvár, composition of archaeological objects have been investigated since many years. Utilizing the experiences gained during this work, a radioisotope-excitation energy dispersive X-ray spectrometer was constructed in the ATOMKI for the Rippl-Rónai Museum.
The analytical equipment is controlled by an IBM AT computer; the ATOMKI Si(Li) detector and pulse processor is connected to it with an analogue-digital converter board developed for the purpose. The data acquisition software performs general multichannel analyzer functions: timing, setting up measurement

parameters, spectrum accumulation, energy calibration, identification of elements by KLM markers, simple peak evalutation by ROI-s, storing stpectra and result files. The installed XRF software calculates the composition of bronze-, silver-, and gold-alloys by using the fundamental parameter approach.

Editor's note:

In the Hungarian version of our Newsletter, a more detailed description is given on the 'history' of the acquisition of the X-ray spectrometer, the first of its kind in the field of Hungarian archaeometrical research.

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J. Csapó–I. Papp–Zs. Csapó-Kiss–L. Költő:
Age determination of fossil bone samples by amino acid racemization and oxidation of sulphur containing amino acids

As the racemization of amino acids is affected by temperature, pH and metal content in the soil, in addition to the period of the effect, these factors were eliminated by referring to the age determined by the radiocarbon method. Determining the D- and L-amino acid contents in samples of known age, and plotting the D/L ratio as a function of time, calibration curves were obtained. These curves can be used for the age estimation of samples after determining their D- and L-amino-acid content.
The D/L ratio for 2-3 various amino acids was determined for each sample, the mean value of ages calculated on the basis of calibration curves was considered in dating the fossil sample.
An additional possibility can be suggested for the age determination of bone samples younger than 2000 years by measuring the different oxidized forms of the two sulphur- containing amino acid. For both cystine and methionine, the different oxidised forms can be easily measured by ion exchange column chromatography. Correlation was found between the age and the different oxidation states of the samples originating from similar conditions.

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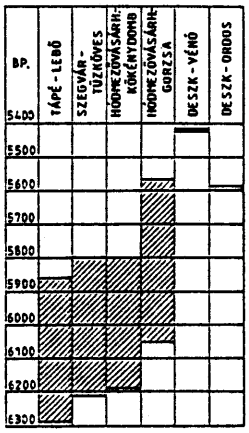
E. Hertelendi–F. Horváth:
Radiocarbon chronology of Late Neolithic Settlements in the Tisza-Maros Region, Hungary

A new research program has been carried out in Szeged during the last 15 years, in order to investigate the chronological questions and the settlement patterns in the South-Central Tisza region, in the time of the transition between the Late Neolithic and Early Copper Age. In course of this project, nearly 50 charcoal and bone samples have been dated from the Neolithic stratified tell settlements of Hódmezővásárhely-Gorzsa, Szeged (Tápé)-Lebő, Hódmezővásárhely-Kökénydomb, Szegvár-Tűzköves and from the single-layer settlement of Deszk-Vénó.

The new data outline the time sequence of the above mentioned settlements in the Hungarian Late Neolithic according to the figure.



Tápé-Lebő: 6290 – 5560$BP \pm 60$
Szegvár-Tűzk.: 6210 – 5500$BP \pm 60$
Hódmv.-Kökényd.: 6190 – 5500$BP \pm 60$
Hódmv.-Gorzsa: 6050 – 5570$BP \pm 60$
Deszk-Ordos: 5595$BP \pm 65$*
Deszk-Vénó: 5420$BP \pm 60$
* (Bln-1934)

The duration of Tápé-Lebő fills nearly the whole period of the Szakálhát Culture. Earlier data are known, however, from the site Battonya-Gödrösök (Bln 1970; 6370 ± 60 BP (2). The second date of Tápé-Lebő signs a Late Tisza Culture (Gorzsa D) settlement layer on the top of the tell. This period is parallel with the Vinca A B and C period on the base of radiocarbon dates from Serbia (3). Dates of Szegvár-Tűzköves and Hódmezővásárhely-Kökénydomb belong to the early and classical period of the Tisza Culture and, parallel with Vinca B and C, while Gorzsa - i.e., temproal range of the classical and late Tisza Culture - is synchronous with Vinca C and D. The radiocarbon data from Gorzsa are in full concordance with the dates known from the East Hungarian Herpály and West Hungarian Lengyel Cultures (4). The single date from Deszk-Vénó is belonging to the Proto-Tiszapolgár period, and parallel with Lengyel III Culture in Transdanubia (5420 ± 60 BP).

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3. J. Chapman: BAR International Series 117 (1981) Part I. pp. 17-31.
4. L. Tálos, P. Racky (eds), The Late Neolithic of the Tisza Region. Budapest-Szolnok, 1987 p. 29.

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L. Bartosiewicz–A. M. Choyke:
Bone tool typology and procurement of raw material at a Neolithic site

The quantification of typological criteria is a largely unexplored branch of bone tool studies. The use of metric analyses is usually limited to measurements. Other aspects of statistical analysis are hampered by the lack of samples of sufficiently large size.
The 3844 bone tools from the site of Saint Blaise - Baines des Dames offered a unique opportunity to

study a rather homogeneous large assemblage from the Horgen to the Auvernier period of western Switzerland (ca. 3000 to 2500 B.C.). At this lacustrian settlement on the shore of Lake Neuchatel, a great variety of domestic and wild animals contributed raw material to the bone tool industry.
The planned versus opportunistic use of these raw materials was interpreted by a regression analysis in which the diversity of raw materials (species*skeletal parts) was plotted against the number of tools assigned to traditional types published in literature. Residual values thus obtained could be used as an indicator of variability in raw material procurement thus making the characterization of the tool types under discussion easier and more reliable.

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K. T. Biró–A. Vladár:
Quantitative EDS analysis of obsidian samples

Obsidian samples from archaeological sites and geological sources have been analysed since 1981 by SEM/EDS in the Research Institute for Technical Physics of the Hungarian Academy of Sciences. The analyses were performed till 1989 in a JSM-35 scanning electron microscope using ORTEC-II multichannel analyser and a semi-quantitative evaluation procedure. Due to new facilities installed in the RITPh, we have the possibility for a quantitative standardless analysis by a KEVEX system. Results of the new analyses as well as comparison to former EDS measurements and other chemical data were reported.

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F. Gyulai:
Remnants of food from the Bronze Age
(Lecture presented on the 1991. U.I.S.P.P. meeting, Bratislava).

Balatonmagyaród-Hidvégpuszta is a multiperiod site investigated by intensive methods in the collaboration of the Archaeological Institute and the county museums of Somogy and Zala. In one of the pits associated with late bronze age (Urn-field culture), archaeologists of the Thury György Museum, Nagykanizsa found charred remains of seeds. The age of the finds is estimated for 1200 B.C. The present study intends to give a short account on the investigation of biological remains located in silted and sieved samples recovered from altogether 1500 g sediments collected from the bottom of the Bronze Age pits. Analyses on the samples were undertaken by experts of the Hungarian Museum of Agriculture.

1. Botanical finds

From the 1500 g sample analysed, 500 g was studied under stereomicroscope. Apart from 455 g charred dumb remains, seeds of evenly charred conditions were found, altogether 45 g in the following composition:
Pea (Pisum sativum L.): 678 pieces of seeds
(Vicia ervilia (L.) WILLD.): 271 pieces of seeds
(Lathyrus sativus L.): 37 pieces of seeds
(Papilionaceae): 2614 pieces of seeds
Lenses (Lens culinaris MEDIK.): 4 pieces of seeds
(Panicum miliaceum L.): 660 pieces of nude seeds (caryopsys nuda)+66 pieces of ground seed fragments
(Avena fatua L.): 1 piece with (cum caryopse corticata)
(Hordeum vulgare L.): 1 piece with (cum caryopse corticata)
(Vicia angustifolia GRUFBG.): 1 piece of seeds
(Vicia hirsuta L. (GRAY)): 1 piece of seeds

2. Zoological finds

Zoological finds separated from the sample were analysed by István Takács. The following taxa could be separated:

Shells of mushels (Unio/Anodonta sp.) or snails		
fragment of 1 mm^2	1 piece	1 individual
(Insect sp.)		
1-1,5 mm long wing cover, yellowish red, with black spot in the middle	1 piece	1 individual
Frog (Anura sp.)		
vertebra	1 piece	1 individual
scapula	1 piece	
tibia	1 piece	
metapodium	1 piece	
Fishes (Pisces):		
(Abramis sp.)		
III. vertebra	1 piece	
caudal vertebrae	5 pieces	2 individuals
(Esox lucius)		
dentale fr., dextra	1 piece	1 individual
overgrown tooth	1 piece	
calcinated vertebra	1 piece	
Pisces sp (two species)		
small vertebra	1 piece	2 individuals
very small vertebra		
other bones indet.		
rib fragments	11 pieces	
other fishbone	2 pieces	
Birds (Aves) three species		
small bird (sparrow size) long bone fragment of adult individual	1 piece	1 individual
toe bone of bigger individual and its joint surface - medium size bird (pigeon size)	2 pieces	1 individual
calcinated long bone and caudal vertebra	2 pieces	1 individual
Mammalia (four species)		
left side humerus, of mouse-sized individual	1 piece	1 individual
caudal vertebra	1 piece	

Mammalia (four species)		
long bone of bigger (rat size) juvenile individual (femur?)	1 piece	1 individual
metapodium of adult individual, bigger than mouse	1 piece	1 individual
rib fragment of medium size mammal (cat size)	1 piece	1 individual
unidentified bone fragments	18 pieces	
Unidentified mixed fragments	50 pieces	
14 taxa altogether:	111 pieces	16 individuals

The molluscan fragments and the frog remains were in the fill-up, but could serve for part of the diet as well. The kitin wing covers indicate recent insects rather than subfossil one.
Fish remains comprised 4 species, all of them small sized. The birds are also relatively small. Bigger mammals could be traced in the bone fragments only. Individual number was estimated by standard methods of archaeozoology.
The bones of fish and birds are of brown colour indicating frying. Calcinated bones denote fire sweeping over the settlement or intentional burning. Bones of the mouse-sized individual are lighter; probably it had got into the archaeological layer accidentally from the fill-up of the pit.

3. Studies on the food remains

In the 1500 g of samples obtained for analysis there were altogether 164 pieces (112 g) of charred porose fragments identified as food remains. The possibility that the finds may belong to food - presumably bread - was raised during the excavation. The food remains were identified by the help of Max Währen, Bern, who elaborated special method for the study of archaeological food remains (WÄHREN 1984). Charred food remains were treated in 10 % HCl, and following a surface cleaning, the structure was investigated under stereo microscope. Porosity did not indicate the pattern typical of bread. There were no uneven holes, bubbles, fractures; instead, the food remains contained evenly distributed circular shaped pores of 0,02-0,06 mm. These fine holes could not originate as the result of lactic fermentation but were the product of the backing of a loose evenly stirred cake. The evenly distributed pores indicate that the temperature of the backing oven was constantly about 200 °C during the process of backing.
The cake was made of finely ground flour the quality of which corresponds to modern flour. The grinding stone is documented by tiny fragments the quantity of which do not surpass 0,05 % altogether. Sieving of the flour took place on sieves with hole diameter under 1 mm.
At this stage already, it occured to us that the remains investigated possibly belonged to some sort of fine cake rather than bread. This was further supported by the presence of numerous seeds of Fragaria vesca.
Characteristic lustre of the fracture surface, by empirical observations, indicated the presence of fatty acids 'precipitated' during backing.
The samples of the Bronze Age cake were further analysed by higher resolution microscopy by Benno Richter in Zürich. His studies involved a special adaptation of the methods of Fritz Netoliczky (1926) and Gustav Gassner (1989) to archaeological material (RICHTER 1988).

Burning certainly causes lasting changes in organic matter structure, but at the same time, incomplete burning means a sort of conservation for the organic materials. Microscopic analysis has to be content with, for most cases, the study of leaflets remains rich in phytolits. If parts of the organic remains is still not completely charred, chemical treatments can help in revailing certain plant tissues. Chemical treatment is necessarily determined by the state and character of the sample.
Plant tissues rich in phytolits are made visible under light microscope by the help of great refraction index embedding matter, i.e. naphrax (nD= ca. 1.7) (PIPERNO 1987).

Results of the analysis of the two samples investigated are the following:

1.a. treatment: boiled in cc. chloralhydrate, embedded in naphrax.
Found: 1 piece of charred animal hair, 1 piece of longish wool thread, phytolits and tissues of different cereals and grinding stone remains.
1.b. treatment: treated with potassiumchlorate and 65% nitric acid embedded, in naphrax.
Found: phytolits of cereals, aristae of wheat and/or strawberries, plant tissues, remains of emmer.

This means that for the production of the cake, wheat flour was complemented by essential amount of emmer flour as well.

2. Boiled for longer time in cc. chloralhydrate, subsequently placed in cc. hidrogen peroxide + cc. ammonium hydroxide, embedded in naphrax.
Found: plant tissues, wheat epidermis, fishbones, animal hair, fragments of pine-needles, freshwater diatomes and relatively large amount of grease- or wax globules.

Instrumental analysis

In the followings, further information was expected from chemical analysis of the Bronze Age strawberry-cake. The analyses were performed at the Animal Breeding Department of the Pannon University of Agriculture, Kaposvár (Hungary).
Let us note here that chemical analysis of archaeological food remains are pioneering efforts in Hungarian archaeology and related sciences.

The remains of the cake are distinguished with high amount of Ca, P and Cu. The high concentration of

the two former elements can be explained by the material of the pastry, i.e., wheat and emmer flour rich in calcium and phosphorus, comprising the Ca content of the grinding stone as well. High Cu content may be explained with the archaeological context (found not far from bronze objects). The sodium content of the sample is fairly low: our cake was salted, at the most, very moderately.

The analysis of fatty acids corroborated the empirical observation on the presence of grease. The fatty acid composition of the sample reflected high amount of palmitine acid and oleic acid.

Investigations of the amino acids lead to unexpected results. The fact that amino acids could be traced at all clearly demonstrate that the cake was not burnt completely because the charred remains would not yield amino acids and compounds with high N content, respectively (raw protein); this latter in fairly high quantities. We can suppose a mild, slow, burning affecting the complete mass of the cake and not only its surface.

Supposing that the food remnants did not get in contact with material of rich N content (e.g., artificial fertilizer), about 85-90 % of the amino acids present in cereals is getting decomposed during 400 years, while in course of 1700-2000 years, some 93-95 % is decomposed (unpublished data by J. CSAPÓ). In course of the decomposition of the amino acid, ammonia is formed, indicated in our sample by the presence of nitrogene.
The mixed composition of the cake and the use of eggs is reflected in the rather complex amino acid composition and the presence of sulphurous compounds.

Evaluation of the results

The organic remains found in the Late Bronze Age pit can be considered without doubt as food remains. We can suppose that they got into the deposits simultaneously. Maybe they got spoiled or stained already in course of cooking.
Anyway, we can undertake the task of describing a Bronze Age menu and give the recipe of a bronze-age strawberry cake.

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E. Jerem–L. Bartosiewicz–F. Gyulai–E. Krolopp:
Paleoenvironment and site formation of a river-side settlement in North-West Hungary

In 1990-91, a large scale rescue excavation of a multi-age settlement was carried out at Ménfőcsanak-Szeles in the vicinity of Győr. More than 700 structures - extended within 2 ha large area - have been uncovered.
A variety of techniques was applied to reconstruct the site formation processes and the past use of the former habitations. Remote sensing, core drilling helped us to define the geomorphological and microstratigraphical conditions. In situ soil development profiles and cultural fill were examined in order to observe the local evolution of the sediment. Many samples were taken from each level for micromorphological and chemical investigation (ICP-OES, X-ray diffraction). Water movements had an enormous impact on the landscape. Occasional floods and stagnant water played the biggest role in site modification and determined the soil conditions.
According to our sampling strategy a significant amount of wet sieving and flotation took place to recover molluscan, microvertebrate and botanical remains from both cultural layers and off-site deposits. Based on the results of palaeobiological studies we have traced changes of climate and ecological conditions from the Middle Bronze Age up to Early Medieval Period.
For mapping the excavation area and that of the surroundings of the site, G.I.S. in connection with Data-Base was used; this system facilitated the handling of a large amount of information. The project involves 16 experts from five different scientific institutions.

Current analyses

Archaeometrical analyses in Kaposvár

The Pannon University of Agrarian Sciences dispose of various analythical equipments which can be used, and in fact have proved to be most useful in archaeometrical analysis of archaeological material. Dr. János Csapó, leader of the Department of Chemistry presented a list for possible users on various facilities he thinks to be useful in analysis of archaeological material.
The range of objects that can be successfully analysed by the facilities in possession of the University is very wide, comprising in the first place, different organic matters (protein content determination by Nitrogene analysator; amino acid composition determination and related age determination on the basis of amino acid composition; determination of fatty acid composition of organic samples by the help of gas chromatography and mass spectrometry). The range of the object analysed is not restricted to organic matters; ICP and atomic absorption spectrophotometry are suggested for high precision determination of

macro- and microelements both in organic and inorganic samples. One of the fields seemingly very promising for field archaeologists is the computer tomograph analysis of archaeological object, e.g. vessels recovered 'in situ' with the original infilling preserved.

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G. Ilon:
Interdisciplinary collaboration on the excavations at Gór-Kápolnadomb, West Hungary

Since 1988, continuous excavations have been carried out at Gór, on a small hill called Kápolnadomb over the river Repce, conducted by J. Dénes and G. Ilon in collaboration of the museums of Pápa and Szombathely. The multi-period site is excavated on the financial basis provided by the Western-Hungarian Environment Protection and Water Management Center, offering the possibility of wide multi-disciplinary collaboration.

On the area of the site covering 3 ha, finds of 7 periods have been discovered as yet. Since 1991, inventorizing objects and site register is performed on spot - not directly on the field, but at the excavation base camp.

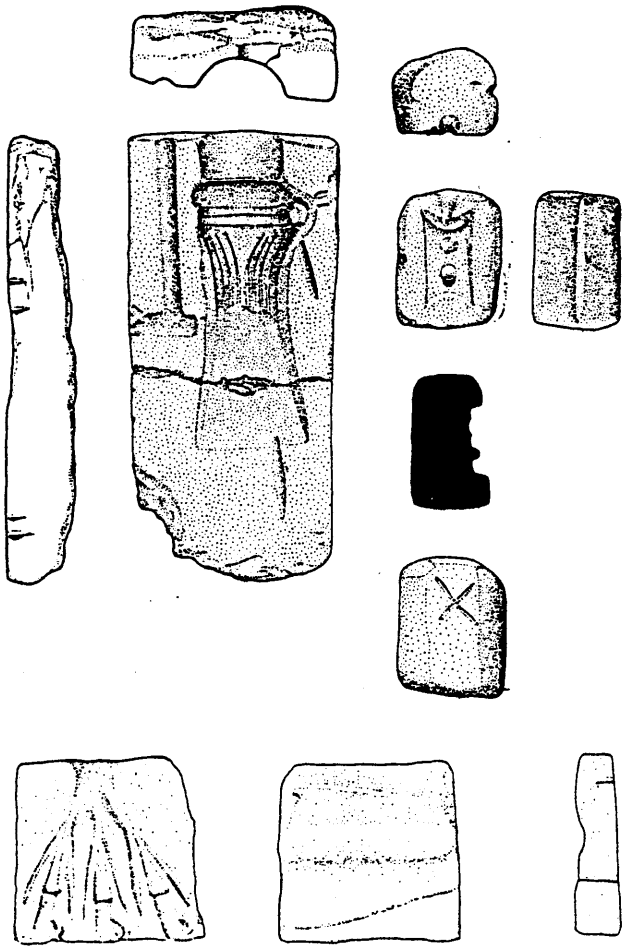
Prior to excavations, air photography, geodesian and geophysical survey of the area took place (Team lead by I. Almási, Szombathely).

Age determination was aided by radiocarbon dating (E. Hertelendi, Debrecen, ATOMKI). Units belonging to Late Bronze Age 'Urnenfelder' complex were dated between 1260-992 BC; Early Iron age units between 806-128, the Early Medieval (Árpád-Age) fortress was dated between 1036-1147 AD.

A detailed geological study of the site environs was supported by a series of shallow borings in 1990. Interpretation of the results is expected from K. Ferencz (Budapest).

Malacological study of the molluscan fauna is performed by L. Füköh (Gyöngyös, Mátra Museum). Preliminary data denote contemporary vegetation and local climate around the site. Apart from their role as elements of the microfauna, snails were probably consumed by the habitants of the site. The zoological elaboration of the vertebrate fauna is performed by I. Vörös (Hungarian National Museum, Budapest). Surprisingly, he could demonstrate the dominant role of elk in the fauna (based on the material two excavation seasons). Human bones found on the settlement are elaborated by I. Pap and L. Józsa (Budapest). Archaeobotanical vestiges are recovered by wet sieving; the remains are analysed by F. Gyulai (Museum of Agriculture, Budapest).

Lithic artifacts are analysed by K. T. Biró (Hungarian National Museum, Budapest). The area involved in the raw material supply embraces wide regions (Tokaj Mts., Slovakia, Bakony an Mecsek Mts apart from local resources). This year, the local production of the casting moulds could be proved. In view of the large number of cast mould fragments (see figure) this fact gives a special importance to the site among the Late Bronze Age-Early Iron Age settlements in Hungary. Chemical analysis of casts, bronze objects and pottery is performed by I. Varga (Ajka). The archaeological interpretation of the site is also done on a multidisciplinary collaboration basis. Neolithic and roman relics recovered are elaborated by colleagues specially involved for the purpose.



One of the aims of this article - apart from drawing attention to this important project - is to invite further colleagues for collaboration. Excavations are continued in 1992-1993 as well.

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M. Járó
Morphological and chemical analisys of metal threads recovered from excavations

In frames of the Hungarian research program for the investigation of metal threads, a detailed study of archaeological metal thread findings have been started in 1991. Methods used as rutin means of analysis for similar samples coming from material preserved in different collections cannot be applied on the heavily corroded earthy samples covered quite often with remains of organic matter (textile, leather etc.).

Thus we have to develop a complex analytical method for the study of these threads. Using different investigation techniques we intend to gather

the most possible information on the production technique of these threads. On the basis of the results, our knowledge on ornamental wear of the 15th-17th centuries can be completed, and data can be compared with material coming from ecclesial and palatial collections.
So far, samples from 40 graves of 18 sites have been analysed offering apart from technical data some chronological implications as well that can help in dating.

According to the analysis of excavated metal threads, the ornamentation of the burial costumes were mainly of copper and copper alloys, in some cases gilded. On the material preserved in collections from the same period gilded silver is dominating as raw material for the metal threads. A possible reason for the difference can be in the lower social status of the deceased or we can suppose that vestiges of lesser value were placed in the graves. Results will be presented in details later.

Hungarian Academy of Sciences
Academic Committee of Veszprém

Edited by Katalin T. Biró
Published by the Hungarian National Museum
H–1450 Budapest 9. Pf. 124.