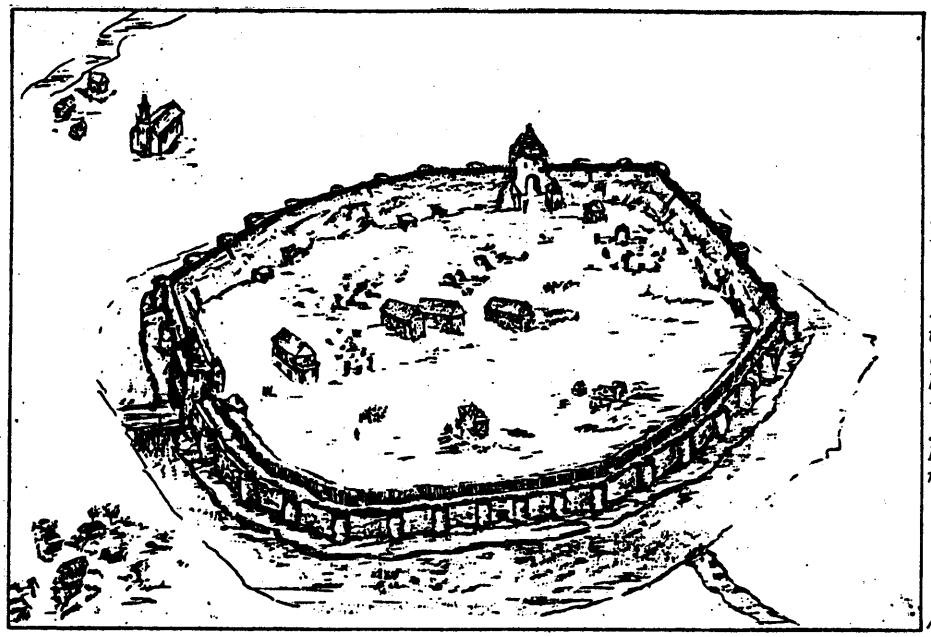
INDUSTRIAL ARCHAEOLOGY AND ARCHAEOMETRY NEWS

VOLUME 5 NUMERO 2 - SUPPLEMENT NOVEMBER 1986

EDITORIAL

We must apologize our readers for publishing the English Supplement of our Newsletter V/2, 1986 with considerable delay. This fact, however, has not only disadvantages, as it offers the possibility to reflect on quite recent issues of importance concerning special problems of Hungarian research. Apart from our usual scope to report on the activities of the Archaeometry Working Group and Industrial Archaeology Working Group we would like to seize the opportunity to ask for international help in an actual problem in art history and conservation which attained much publicity and interest lately. On page 8 we give an account on painting material research project of 19th century paintings included asphalt in their composition. We would heartily welcome comments and advice in this matter.
Among "MEETINGS..." a detailed account on the Red Mound Symposium, held in Sopron, West Hungary in the autumn of 1986 is given with a view of receiving comments on this problem as well. The investigation of "red mounds" is a special problem for archaeological research of Early Medieval Hungary. As it is apparent from the account on the meeting, no universally approved solution has been found for the scientific, historical and technological problems they pose.
Any comments of our readers that might possibly help in our archaeometrical and industrial archaeological problems are welcome, and the Editors would be happy to offer the Newsletter for public discussion in these matters.



The red mound of Sopron /reconstruction of the 11-12th century form by GÖMÖRI J./

Red mounds are huge earthworks with wooden construction, their soil burnt red, uniformly dated to 10-12th century A.D., frequently found in Hungary as well as the neighbouring territories.

/See also Fig.7 on page 6/

ARCHAEOMETRY WORKING GROUP

NEWS

Members of the Working Group generally take part in several projects conjointly with other colleagues in the investigation of objects of eminent cultural value. In the following some information concerning some of these activities will be given.

PROSPECTION

Geophysical measurements for exploring hidden treasures of the Nyiregyháza fire brigades in the vicinity of Linz

In the village of Berg, some 20 kms of Linz, Austria, members of the volunteering fire brigade from Nyiregyháza, East-Hungary spent half a year after World War II in a temporary camp. The fact that the members of the brigade had hidden some treasures that belonged to the community became known only in 1972. Because of administrative problems the prospection of these goods took place only in 1986 by a team of Hungarian experts /archaeologist, historian, geophysicist/. The treasure -mainly some silver cups and statuettes- was hidden, according to the data at disposal, into the bottom of a left garbage-pit.

The most suitable process for the quest would be a shallow-depth electromagnetic measurement, for which the team was not equipped. The method adopted -magnetometric measurements on the territory of the former temporary camp- could aim at the exploration of the places of the garbage-pits only. Apart from this a metal detector was used that is effective for a depth of 50 cms, but only for metals that can be magnetized.

After some futile efforts to dig up the latrine of the camp, magnetometric measurements coupled with excavation yielded the desired results: the treasure-chest of the fire brigades was found. To mention only some of the recovered values: 10 silver cups, bronze medals, a silver table and a silvered statue of St Florian, protector of the firemen. The chest was found deep under the present level of water in the soil, thus the restorers have plenty to do on the finds.

Though the nature of this work was not strictly archaeological, it is a good example of fruitful collaboration between the representatives of different branches of science. Last but not least this successful expedition succeeded in regaining important and valuable pieces of the national heritage.

Pattantyus Á. Miklós

DATING

Archaeological dating on the basis of the amino-acid content of the bone finds

Amino-acid racemisation dating was not applied to routine archaeological dating in Hungary up to now.

As the potentials for the application of this method have been raised on behalf of several researchers, the Central Laboratory of the Kaposvár Agricultural Highschool, conjointly with the Somogy County Museum elaborated a procedure matching today's technical facilities of the Highschool Laboratory.

By the help of this we hope to be able for high precision measurement of the D and L amino acid composition of fossils as well as a suitable accuracy in estimating the actual age for large series.

A short description of the methods adopted will be presented here: The sample /in most cases bone/ is cleaned by washing in water, dried and homogeneized in a china bowl. After this the sample is degreased and following repeated homogeneization an amount of cc. 100 mg is hydrolised by hydrochloric acid. Separation of the amino acids are performed by amino-acid analysers, whereas the separation of the D and L type amino acids are performed on a silica gel emulsion. The quantitative evaluation of the silica gel emulsion is carried out objectively by automatized analysers.

As opposed to the general routine reported in technical literature, based on the investigation of 1-2 distinguished amino acids we have extended our studies on all amino acids apart from glycin, which is inactive optically and triptophane that tends to disintegrate among the experimental conditions we use. Thus the basis for dating is furnished by several measurements on the sample. In course of our further research we would like to group the amino acids, based on the specific speed of racemisation in solid state within the bone, as well as preparing some instructions for the extraction of the kinds of amino acids for the samples representing different periods that the ratio of D and L type amino acids be optimal.

At the same time we are collecting bones as control evidence for calibration that were otherwise dated by different methods.

Csapó János - Költő László

MATERIAL INVESTIGATION

Interesting corrosion phenomena of an early 19th century silver brocade coffin lining

In one of our foregoing issues we have already mentioned the scientific investigation of the Üröm grave chapel and crypt erected by Joseph Habsburg, Palatine of Hungary in honour of his wife Anna Pavlovna /daughter of the tzar, Paul I/, who died young, as her burial place.

The mortal remains of the deceased were embalmed and placed into a wooden coffin lined with silver brocade on a "bed" of flowers and scented herbs. The wooden coffin was covered from the outside by red velvet and the whole coffin was put inside another one, made of copper plates and let down from the chapel to the crypt. After a burglary in 1981 the mortal remains of Anna Pavlovna were transferred to the Palatinal Crypt in the Royal Castle, for security reasons.

Present investigations are concerned with, apart from other problems, the reason for the formation of dim spots on the silver-woven lining of the coffin opposite to the corps, under the cover.
The lining otherwise preserved its original glittering shine even today.
X-ray diffraction measurements revealed the presence of silver chloride on the surface of the blackened silver threads.
It seems an interesting problem why at other parts of the textile the silver remained intact, and what processes led to the formation of the above mentioned corrosion products./*Fig. 1,2,3/*

Kriston László - ifj. Papp János

Scientific investigation of textiles belonging to the Esterházy Collection

Sponsored by the Hungarian Academy of Sciences /National Scientific Research Grant/ the scientific investigation of the Esterházy Collection, housed in the Museum of Applied Arts has been started.

The investigation of the dye-stuff will be performed by thin-layer chromatography and spectrochemical methods, the morphological study of the metal threads by scanning electron microscopy, the chemical composition of the metal will be determined by spectroscopical methods.
The first piece to be analysed will be the so-called "Matthias coat" made of silver brocade, traditionally attributed to King Matthias of Hungary /15th century/. */Fig. 4,5,6/*

Gondár Erzsébet - Járó Márta -
Timár-Balázsy Ágnes

INDUSTRIAL ARCHAEOLOGY WORKING GROUP NEWS

First steps regarding a Register for Sites and Monuments of Industrial Archaeology

The Industrial Archaeology Working Group together with the Archaeometry Working Group organized a joint meeting on the problem of the "red mounds" in Sopron, 1986. November. Apart from the scientific agenda reported below in "Meetings, Conferences" an important problem of possibly significant future consequences was discussed, put forward already at some previous occasions for discussion and comments among the members of both Committees.

The Register, by now, has already reached a stage when the collection of actual data can be soon started, especially in case of the Transdanubian counties. The members agreed that for the time being relics of industrial archaeology based on mineral raw material procurement and processing should be focussed on.

EXCAVATION NEWS

Generously funded by the Hungarian Mining and Metallurgical Association, the excavation of two iron smelting furnaces were made possible in different parts of the country:

- Trizs /North-East Hungary/, an iron smelting workshop was excavated with two furnaces. The finds were dated to the Árpád period /11-13th century A.D./;

- Zamárdi /West Hungary/, iron smelting furnace and ore dressing places were excavated. The finds are dated to the Avar period, however its finer dating is essential for the study of the period /Early Middle Ages/. Thus archaeometrical dating by TL and C-14 method will be carried out on the material.

Emblem of the Industrial Archaeology Working Group

MEETINGS
CONFERENCES

In the Hungarian issue of our Newsletter there are news on certain international events apart from those organized in Hungary. We give participants' accounts on the 25th International Symposium on Archaeometry /Athens, Greece/ where Hungarian archaeometrical research was represented by three poster presentations, a detailed review on the Southampton Archaeological World Congress and coming events for 1987, like the symposium on "The navies and commerce of the Geeks, the Carthaginians and the Etruscans in the Tyrrhenian sea", the Jubilee Conservation Conference of the Institute of Archaeology of the University of London, the Glasgow conference on "Science and Archaeology" and the 8th Triennial Meeting of the ICOM Committee for Conservation.
For our Supplement, however, we give only a short account on the foreign conferences, if any, because possibly our readers are already informed on them from other sources.

The editors would be pleased to receive information on conferences, training courses and symposia relevant to industrial archaeology and archaeometry for the information of the Hungarian readers in due time.

INTERNATIONAL CONFERENCE ON PREHISTORIC FLINT MINING AND LITHIC RAW MATERIAL IDENTIFICATION IN THE CARPATHIAN BASIN
Budapest-Sümeg,20-22 May,1986

In the joint organization of the Hungarian Geological Institute, the Hungarian National Museum and the Archaeological Institute of the Hungarian Academy of Sciences, a conference on stone tool studies was held at Sümeg, North-West Hungary, in the vicinity of the most famous and biggest Hungarian flint mine. This event was connected to three major series of lithic studies, the International Flint Symposia, the Seminars in Petroarchaeology as well as the Raw Material Studies in the Carpathian Countries, aiming at uniting different aspects of these related subjects, with special regard to Central Europe, especially the Carpathian Basin. The Conference was held in three sections /Mining, Petroarchaeology and Archaeological Implications/. Hungarian lithic raw material varieties were presented in a display, exchange of samples and possibilities for collecting reference samples was offered to participants from collected material as well as from the geological sources. The display, as well as the hand specimens brought by colleagues from the neighbouring countries and elsewhere are placed in the Hungarian National Museum to set a special collection for lithic reference and comparative materials named "Lithoteca". Enclosed we present the raw material specification sheet. In the next issue we hope to give further information on the actual state of the collection.
The lectures submitted to the Conference were published by the Hungarian National Museum. Additional lectures together with the material of the Discussions are to be published as Vol.II. in the near future.

T. Biró Katalin

THE RAW MATERIAL SPECIFICATION SHEET

HNM Lithoteca

Rock sample specification sheet

Name of the rock
-petroarcheological term
-geological term
-synonyms

General data on the rock
-occurrence
 (region, mountains, country)
-geological age
-genetical group
-discriminative features
-analyses
-references

Hand specimen in the HNM

-Inv.nr.
-collected by
-provenance
 (locality, district, country)
  primary source
  secondary source
  archeological piece
-geographical coordinates
 long.
 lat.
-macroscopic description
-analyses
-references

Archeological data

-evidences on exploitation
-evidences on utilization
-distribution
 (local, meso-local, long distance transport)

Specification sheet filled in by

The World Archaeological Congress

1-7 September 1986
Southampton and London
Patron: H.R.H. The Prince of Wales

Archaeometrical and industrial archaeological events on the World Archaeological Congress

The Southampton Congress can be probably best characterized by a marked advance of environmental archaeology and social anthropology versus archaeology s.s. Archaeometry, on the whole played a rather modest role in itself, however papers on various subjects did incorporate a lot of archaeometrical data. Industrial archaeology, especially technological studies both on relatively recent ethnographical data and prehistoric evidence did play a much more significant role, mainly in the frames of the section "The Social and Economic Contexts of Technological Change", organized and chaired by S.van der Leeuw, R.Torrence and B.Hayden. Lithic specialist could have a sort of "workshop meeting" of their own. In course of the sessions, some rather general talk on the innovation process, procurement, exchange and intensification took place, however, the papers submitted for publication and available so far in pre-print version did furnish valuable empirical data on lithics, pottery and metallurgy, as well as land exploitation, utilisation of natural resources and related traditions.

GDCh

GESELLSCHAFT DEUTSCHER CHEMIKER

Arbeitskreis "ARCHÄOMETRIE" in der Fachgruppe "Analytische Chemie"

Annual meeting of the Archaeometrical Working Group of the GDCH

In the frames of the Analytical Chemistry Division of the Association of German Chemists an Archaeometrical Working Group was organized with more than 180 members by 1986. Regular information on their activities are presented by the newsletter of the Analytical Chemistry Division, issued twice a year.
The Working Group organizes annual meetings for which foreign participants are generally invited as well. The last meeting was held in Mainz, 11-13 September 1986. Lectures were presented in the following themes: Pottery and ceramics; Glazes and glass; Metallurgy; Metals and metal objects; Pigments, dyes and adhesives; Building materials and the activities of the Plinius-team.
There were two Hungarian experts present on the meeting, lecturing on authenticity studies of terracotta of the Budapest Museum of Fine Arts and analyses of the binding material of a Medieval Church from Hungary, respectively.

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Archaeometrical study of "Red Mounds" Symposium, Sopron, 10-11. November 1986

Can Archaeometry help? - this question was raised in the III/1 issue of our Newsletter in 1984, concerning the "mysterious red mounds". Based on the Sopron meeting, we can certainly answer in the affirmative. Even more: only archaeometry can help, especially in the reconstruction of the intentional or accidental burning of the earthworks, whereas a constant collaboration and observation of the archaeologist should supply the underlying facts.

The above meeting was organized by the VEAB Committees of Industrial Archaeology and Archaeometry, the Central Museum of Mining, the KBFI Petrological Dept. and the Sopron Liszt Ferenc Museum, conjointly, with the participation of 45 experts from all over the country as well as from neighbouring countries.

An exhibition of the "red mound" samples from different parts of Hungary was displayed by the Committee of Industrial Archaeology. The research history of Sopron earthwork studies was also displayed.

Presentations as well as comments provoked a lively discussion.
NOVÁKI Gyula and SÁNDORFI György were the first speakers arguing that the amount of timber built in the earthworks could not be sufficient for the burning of such a great mass of soil. Their opinion is based on their archaeological experiences mainly from the excavation of Sopron and Zalaszentiván red mounds. In their opinion the earthworks were intentionally burnt by consuming significant amount of fuel /wood/ in the vicinity of the earthwork. The aim of the process was a strngthening of the walls by burning them as hard as brick.
TOMKA Péter argued for the opposite: presenting his excavation results on

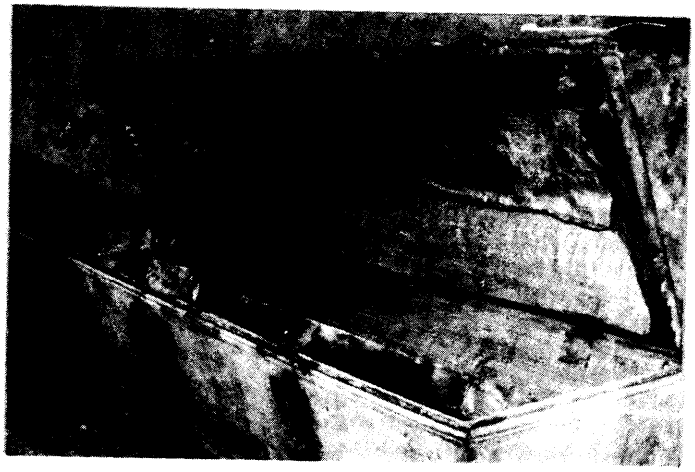
Sopron, Moson and Győr mounds he rejected the idea of intentional burning of the earthworks. In his opinion such a process would only weaken the walls instead of strenghtening and would lead to a rapid disintegration of the mounds. In case of Győr a series of wooden buildings used to stand along the inner base of the mound.

Further archaeological presentations tended to support one of these extremes.

Some further points were raised by BAKAY Kornél on account of his experiences on the mounds of Somogyvár-Kupahegy that is the utilization of written records, mainly charters of the Early Medieval and Turkish periods.
KOVÁCS Béla gave a most systemathical interpretation on the possible reasons for burning of mounds including preventive burning against later military accidents. In course of his lecture on the Gyöngyöspata mounds "flues" were mentioned for the first time that are seemingly very important for the understanding of the burning process. Excavations at Gyöngyöspata therefore would be very promising. Several important issues far beyond local interest only could be expected from the joint study of the Pata, Heves and Abauj mounds.

Presentations from abroad on the burnt mounds of the adjacent territories complemented the meeting.
Karl KAUS from Eisenstadt, Austria gave an account on three forts of the former Hungarian frontier, the western "gyepü" in todays Burgenland: Darufalva /Drassburg/, famous of a silver hoard find from the 11th century, Locsmánd /Lutzmannsburg/, a fortified settlement from the Árpád age /Hungarian Early Medieval Period/ and Pinkaóvár /Alte Burg/, a multi-period fortress.
Ferdinand BARG gave an account on the world-famous excavation at Stillfried conducted by the Vienna University under the auspices of Prof. Felgenhauer. In this huge fortress of the Hallstadt period burnt mound parts with wooden constructions were found.
Tatjana STEFANOVIČOVÁ from the University of Bratislava presented a paper on the 9-11th century mounds in the vicinity of Bratislava, Devin and Trencin.

Concerning methodological problems a special beaked borer of Hungarian design was presented by TROGMAYER Ottó on the example of Kapolyvár, Somogy county for the prospection of red mounds destructed by modern agricultural activity.
The lecture of VERŐ József focused on prospection problems, too. His geophysical measurements on the Sopron red mound revealed its high magnetic value, that makes it possible to detect details not visible on the surface any more.
GÖMÖRI János gave an account of the recent studies on the Sopron red mound the remains of wooden buildings found in the interiors of the mound. An archaeometrical trial section was deepened in 1985 to reveal the sequence of construction and burning. Etymological questions concerning the Sopron earthworks were also touched upon.
IVANCSICS Jenő reported on his mineralogical-petrological studies performed on 7 samples from Sopron, Moson, Zalaszentiván, Sály and Gyöngyöspata. According to his results we can exclude the possibility of self-ignition, because the material the mounds were made of contain no sufficient combustible material, and there is no sufficient reason to suppose self-ignition for all mounds just in the 10-11th centuries. There is no glassy layer found on the surface that would have been produced by a spontaneous burning. The samples analysed were subjected to some 500-700°C heat.
JÓZSA Béla contributed to the problem of the burning of the Sopron mound by the special aspects of timber industry offering a most plausible reconstruction for a possible burning of casette-structured timber construction within the mounds. In his opinion the earth was only put amidst the timbers to prevent inflammation. In his opinion the indirect burning of the mounds lasted some 2-3 weeks. He proposed 1:1 size experiments for the study of this process.
KRISTON László gave an account on the X-ray diffraction study of the Sopron red mound. According to his results the earthwork was subjected to relatively uniform heating /700-800 to 450-500°C in the different sections/. In his opinion the burning of the mounds was by no means a direct process and it did not aim at strengthening them.
GÁDOR Judit presented some new data concerning red mounds based on her excavation experience at Sály. In her opinion the őrsurvár of Sály was artificially and intentionally burnt and fire proceeded not from the interior onwards but the opposite. Timbers of the mound were connected to each other.
FEKETE Mária gave an account of the new red mound-parts discovered at Velem, St. Vid Mt. The triangular form of the Velem mound reminds to that of the Pinkaóvár Burg. The St. Vid church of the fortress can be connected to that of the Locsmánd fortress.
TÓTH Endre and KISS Gábor furnished some important data for the agenda of the meeting by reporting on the "Roman mound" of Vasvár. The discovered red mound phase came to light in course of roman road research survey. The earthwork of the Middle Ages was planted on the "gyepü", the border defence system of the early medieval Árpád dinasty for the controll of the roman military road. Apart from experiences of the excavation written



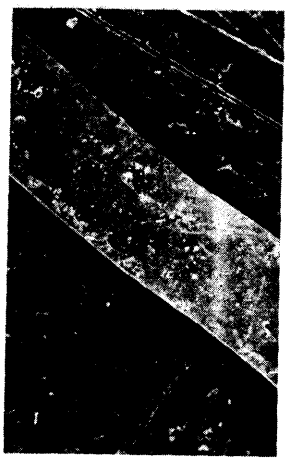


Fig. 1: The opened coffin of Anna Pavlovna
Fig. 2: Scanning electron micrograph of the uncorroded silver strip woven into the brocade lining
Fig. 3: Scanning electron micrograph of the corroded silver strip

Fig. 4,5,6: Scanning electron micrograph of three metal embroidery threads of a 17th century coat /Esterházy Collection/

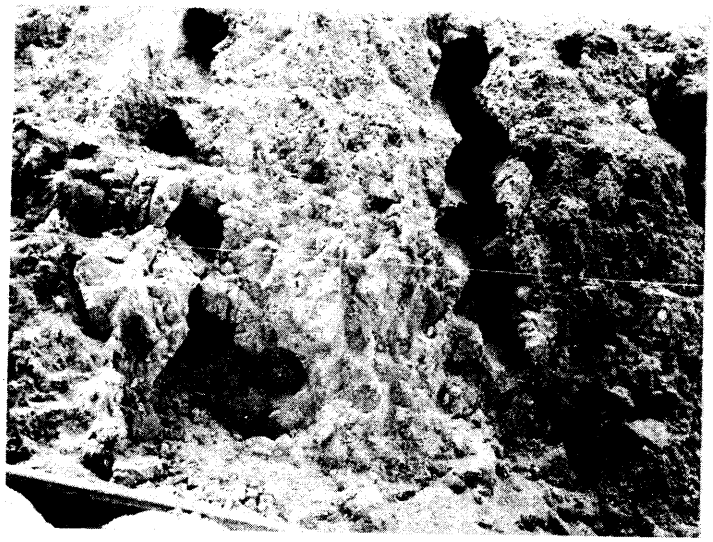


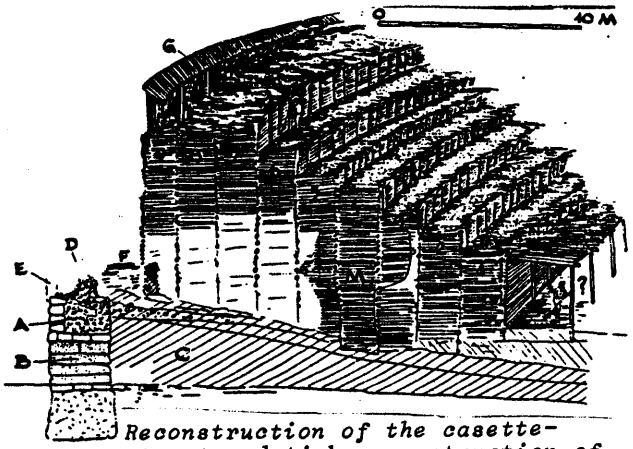
Fig. 7: A part of the Sopron red mound with remains of the wooden timber construction

records especially charter evidences were also utilized.

In the topic of physical methods for age determination of the mounds three lectures were presented.
In the paper of MÁRTON Péter potentials of archaeomagnetic dating of the burnt mounds were discussed. Sampling in this case is very important: the sample should be taken from a part of the mound that was not moved since its burning. The samples examined from the Sopron mound yielded results of 961-1170 A.D. Samples collected from Sály yielded results of very large scattering probably due to improper sampling. The Sopron data agree well with the archaeological evidence. Thermoluminescent dating of the Sopron mound agree well with these data.
BENKŐ Lázár presented his results as well as the TL dating method emphasizing that the mound samples are suitable for TL dating because of the large content of quartz grains on one hand and the sufficient effect of heat the earthwork was subjected to on the other hand. TL age of the sample examined was 1151 A.D.
HERTELENDI Ede discussed further possibilities for the age determination of the mounds by C^{14} method. The timber sample examined from the base of the Sopron mounds yielded a date of 780 A.D. /measurement of SZ.CSONGOR Éva, Nuclear Research Institute/.

In the general discussion it was obvious that the time for the disposal of the participants is not sufficient to clear all problems but certainly enough for setting a course for further research. The lectures presented on the meeting are intended for publication by the Committee of Industrial Archaeology and the Sopron local publishing media. On the whole the meeting represented an important step in the study of red mounds as well as industrial archaeological research in Hungary.

Gömöri János



Reconstruction of the casette-structured timber construction of the Sopron red mound by J. GÖMÖRI

1988

University of Toronto

INTERNATIONAL SYMPOSIUM ON ARCHAEOMETRY

May 16-20 Toronto, Canada

Paintings endangered

A team of conservators, chemists and physicists set up for preventing further damage of, and possibly aiming at completely restoring, a most valuable part of our national cultural heritage seize the opportunity to ask for help from the readers of our Newsletter.

Possibly one of the most outstanding Hungarian painters, Mihály Munkácsy /1844-1900/ used to learn painting in the art schools of Munich and Düsseldorf, where he adopted a technique, extensively used by some painters of these schools, which proved to be disastrous for the state of his masterpieces today. He painted with brown pigments containing asphalt. These paintings are today in a terrible state: shrinkage, alligatoring and dislocation of the pigments took place.

A research program is beeing established concerning the investigation of the exact causes of deterioration and possibly finding the proper conservation treatement to prevent further damage and restore these outstanding pieces in their original beauty.

We would like to ask colleagues probably faced with this problem to contact Ms K.Török and Ms M.Bendefy. Address: National Centre of Museums, 1476 Budapest 100, P.O.B. 54.

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