Preface and Abstracts

The Conference of Transylvanian Hungarian Restorers was first organised in Székelyudvarhely between 4 and 8 October, 2000. Technical programs have rarely been organised in Hungarian language in Transylvania. Hungarian restorers in Transylvania could practise their trade in their mother tongue within the frames of the General Conference of Hungarian Restorers organised yearly in Hungary and on the occasion of the Conference on Wood, Metal and Textile Restoration. Although there is lately more opportunity to travel, financial difficulties always limit participation in conferences organised abroad. Professional and personal contacts formed during programs in Hungary gave the idea to organise a similar meeting in Transylvania. The Haáz Rezső Museum and the connected Haáz Rezső Foundation took the charge of the organisation and gave home to the initiative. This is how the Conference of Transylvanian Hungarian Restorers came to life and we hope that it will be organised annually. It is planned that the first two training sessions will deal with comprehensive topics as preventive conservation and the conservation of art objects made of leather, wood, metal, ceramics, paper and textile. Later, reports on the restoration of individual objects can also be included. The lecturers of the program in 2000 were the teachers of the Object Restoration Department of the University of Fine Arts of Hungary and Transylvanian colleagues who had graduated from this university. Beside restorers, the curators of exhibition galleries, monuments and ethnographic/district houses were also invited, since the basic knowledge of conservation is indispensable for them as well even if they do not get systematic training. Passing technical knowledge was not the only objective of the conference. It also provided occasion at least once a year to meet and talk about the condition of depositories and insufficient equipment of workshops regarding implements and chemicals, the actual state of the profession and many questions that were not discussed in the lectures. The need for the published version of the lectures was raised in the course of these conversations. The periodical is intended to publish the lectures read on the training conference to be organised annually and to offer a forum for restorers to publish their work.

Zita KÁROLYI, Petronella KOVÁCS editors

Dr. Márta JÁRÓ

Preventive conservation in museum exhibitions and storages

Keeping relative humidity and temperature on the appropriate level and an "art object friendly" illumination in the environment of the art object can ensure a long life and stabile condition to the objects. The most important factor to be considered during the establishment of an environment - determination of humidity and temperature - is where the object came from to the museum. Materials, especially organic ones, try to accommodate themselves to the new situation when removed from their usual environment. If this change is great, the process is very fast and deteriorates the object. In the case of combined objects (made from different materials), the parameters must be adjusted to the most sensitive component. The relative humidity must be known before setting the appropriate level of humidity. This can be measured with instruments that do not need authentication (calibration) (the most common one is the Assman Psychrometer) or with instruments that need calibration (hygrometer, thermohygrometer, hygrograph, thermohygrograph). The optimal RH can be set in exhibition spaces and storages using various instruments (vaporiser, air dehumidifier, central air conditioning). If these instruments cannot be obtained, the humidity can simply be raised in close range with placing vessels full of water in places where there are no art objects. Reducing temperature can also help since it increases relative humidity.

The humidity inside exhibition showcases, storage boxes and transporting containers can be set with the position of buffers (absorbent materials: wood, paper, textile) or silica gel the most commonly applied buffer material in museum practice (e.g. the Art-Sorb granulate of Japanese make). This tends to reach an equilibrium with the environment, so it can be used both for keeping humidity balanced and, being dried, for air dehumidification. Within the climatic circumstances of the Carpathian Basin, temperature fluctuation moves within a museum building between 1-2 °C (unheated storage in the winter) and 40 °C (sunlit space in the summer heat). The rise of temperature can cause first of all physical changes (thermal expansion), but it can also lead to the emulsion of photo negatives and the modification of the physical state of bituminous binding materials. It can accelerate chemical reactions, and the ageing of binding varnishes and plastics used by restorers. Art objects, especially those made of organic materials, should not be stored or exhibited close to a heat source, they should not be exposed to direct sunlight and neither a spot-lamp or a luminescent armature should be placed in their vicinity. The objects can be protected from sunlight with heat reflecting foils placed on the windows, which, depending on their type, can also screen the harmful UV radiation. The object must also be protected against air pollution of solid and gas state with placing them in show-cases that can firmly be closed and with carefully chosen exhibition installation. Often the decomposed materials of the inappropriately chosen exhibition facilities and depository shelves deteriorate the objects. From the materials of art objects, paper, textile, painted leather and fur are the most sensitive to light, wood, painted wood, canvas paintings, plastics, bone and ivory are medium sensitive, while ceramics and glass are the less sensitive. Aspects of art object protection must be placed in the focus at choosing the illumination of the art objects. Protection against UV radiation is usually solved with screens, foils applied on glass, and the selection of lamps or special light sources. Neon light contains a lot of UV rays so it is not recommended even in restorer's workshops. To screen IR radiation, drapes, reluxa (louvered) shutters and bulbs with cold mirrors can be applied. Illumination for short periods can also protect against the deteriorating effects of light.

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Current disinfection methods of art objects

Disinfection as a defensive treatment can be preventive, arrestive or combined in relation to the time of deterioration. Preventive conservation can be solved with the regulation of humidity and tempe-rature, various architectural means or treatments with preventive protective agents. Arrestive protection can be done with liquids, fumi, physical or biological methods. The advantage of fumigation is that gas can penetrate wood easily, fast and deep. From among the reactive gases, hydrogen cyanide (HCN) was first used in the disinfection of wood since it had good disinfectant properties in a short time. Its drawback is that in a humid environment it takes a long time until it leaves the objects and it reacts with metals and even precious metals. At present it is rarely used. The disadvantage of methyl bromide is that parallelly to the development of an ill-smelling product it reacts with some organic materials (e.g. leather and rubber), corrodes polished metal surfaces and can change the colour of some pigments. In reaction to phosphine (phosphorus hydrogen) copper and its alloys can blacken, gold and silver objects of low precious metal content can discolour, the colour of paints with copper components can change. The highly disinfectant ethylene oxide creates double bonds between the cellulose chains of materials containing cellulose, increasing their rigidity. It hardens leather and decreases the binding properties of casein and egg-white. It can change the colour of some pigments with lead and tin components. The application of the above listed gases has partly been or will shortly be banned due to their strong poisonous properties. At the same time, the use of inert gases - nitrogen, argon, carbon dioxide - has become more common. In the case of nitrogen and argon, no deteriorating effect has so far been observed on art objects. Carbon dioxide used in an environment of high humidity can cause changes in the colour of some pigments, the transparency of linseed oil varnish, gum arabic and shellac layers because of the development of carbonic acid. Fumigation is carried out in well isolated containers, chambers or in impermeable foil tents. Traditional foils (e.g. polyethylene) are inappropriate, only special, so-called laminate foils made of several layers are suitable. Foils containing a polymeric or copolymeric sealing layer of ethylene-vinyl-alcohol, chlorine-trifluor-ethylene, chlorine - vinylidene or acrylic-nitrile (propylene nitrile) can be effectively used. Gas containers of liquid nitrogen or a nitrogen generator can be used as nitrogen sources. Oxygen can deteriorate art objects. The Ageless® product (with finely pulverised iron (II) oxide as agent) can be used for protection due to its oxygen absorbent property. It helps to reduce the oxidation of metal objects, the ageing of art objects made of organic materials, the growth of aerobic microorganisms and the damage caused by insects. The packets of Ageless® sold in commercial circulation must not be placed directly on the objects since in consequence of binding oxygen in exothermic reactions, the packet becomes hot. Ageless® can be combined with Art-Sorb, which helps to set the humidity of the air in the packet to the necessary value. RP System TM is a system that binds oxygen and deteriorating materials, which has more use than disinfection, it also protect art objects against oxidation and corrosion. Vital abilities of insects cease on a low temperature, while in a temperature higher than optimal (usually above 50 °C) they usually die of heat. In the case of art objects disinfection with heat can only be used if it can be solved that the humidity of the object does not change during the treatment. Fungi also survive only within limited temperatures. From the respect of protection, it is important to know the temperature at which their mycelia die. It is usually between 40-60 °C depending on the species. Freezing is not effective against fungi, but it can be applied in the case of insects. They can be killed within -14 and -20 °C.

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Solidification of damaged wood

Different methods are needed to solidify damaged wood depending on the quantity of water trapped in the wood. From the respect of water content, wood can be divided into two main categories: water logged wood or wet wood and dry wood. In the first case water fills in the walls of the cells (bound water) and partly or entirely the cell cavities (free water), while dry wood contains only bound water. The micro-spaces of the cell walls originating from the biological structure of the wood or from damages caused by fungi can be filled in with materials of small molecules that fill in the cell walls. The methods of filling in the cell cavities aim at the prevention of the collapse of the cells and the increase of the mechanical properties of the wood. The solidifying agents substitute the free water of the cell cavities in the case of wood saturated with water, while at dry wood damaged by insects or fungi, the materials that fill in the cell cavities build a new interior solid skeleton within the wood structure. One has to be careful at the solidification of wood that the solidifying agent does not change the colour (invisibility) of the object, if possible, it should be irreversible and have sufficient solidifying properties. The possibility of the repetition of treatment and the aesthetic appearance of the wood surface are important aspects. Before treatment, the type of damage - caused by fungi or insects - must be determined. Consolidating resins are usually applied in a diluted state. The molecule size of the resin is the most important factor from the respect of consolidation. The solvent influences the permeation of the solidifying agent. Polar solvents swell the wood fabric and thus prevent deep permeation. Quickly evaporating solvents result in the accumulation of the resin on the surface. According to chemical classification, the consolidating agents can be acrylates (Paraloids and Acryloids B66, 72, Elvacite 2013, 2044, 2045, 2046), poly(vinyl acetate)s or poly(vinyl butyrate)s (Butvar 72, 76, 98, Mowital B30H, B60H). The consolidating agents can be transferred into the wood through the butt-edge with impregnation using high pressure ampoules, with injection, with boring holes, or with impregnation using vacuum or vacuum and pressure alternately. It is suggested to pre-climatise the object in 50% relative humidity and carry out solidification in 15-18 °C watching the appropriate prophylactic instructions.

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Cleaning of painted surfaces

The cleaning of painted surfaces is one of the most spectacular steps of restoration both for specialists and the public since the removal of a relatively thick dirt from the surface leads to very impressive results. Not to mention the vivid colours surfacing from under old, darkened coatings and perhaps the appearing of motives that were covered until then. Being so spectacular, cleaning is the most popular but, at the same time, perhaps the most dangerous intervention. Cleaning, the removal of a layer is an irreversible process, so the necessity of intervention is to be considered each time. Damage can be done even by the mechanical removal of superficial impurities. The loosely bound pigments can be damaged, the surface can be scraped so it is suggested to use a magnifying glass or a microscope. Superficial impurities can be removed by liquid cleaning materials (tenzides diluted in water), which, however, effect not only the surface. They can permeate into the paint layers and the alkaline or acidic solutions can cause lasting damages to their constituents (pigments, binding agents). Aqueous solutions of complex forming agents - salts of EDTE with two or four sodium atoms and the water soluble salts of citric acid as tri-sodium citrate, tri-ammonium citrate etc. are widely used for the removal of superficial impurities. Using complex forming agents one has to take care of paint layers that contain pigments of high copper and iron content in little binding substance because the complex formers can quickly bind copper and iron ions. Old and cracked resin coatings and oily binding substances can also be sensible to water. It is suggested to use the foam, gelled or pasty varieties of the cleaning substances to decrease permeation. It is important to know the context and composition of the layer structure of the art objects at the removal of coatings and secondary paint layers. Restorers can also investigate them with infra cameras, in UV shots and polished cross-sections. Another important task is to determine the type of the binding agent both of the substance to be removed and the layer to be preserved, since it helps to choose the appropriate cleaning substance. Each substance can be characterised by the solubility parameter calculated from the force acting between the molecules. Interaction happens only between substances that have identical or similar solubility parameters, that is a similar substance can only dissolve a similar substance. Test series of solvents and solvent matures are provided for restorers to help the delimitation of the solubility range of the unknown substance to be removed and the determination of the probable binding material They can be illustrated in a Teas triangular diagram. With this, solvents can be chosen or mixtures can be composed the solubility points of which fall within this range and which will be suitable for the cleaning and the removal of the unnecessary layer. Choosing the solvents, their penetration and retention properties and viscosity must also be checked. One must be very careful at every cleaning process, since the solvents effect not only the surface and the substance to be removed but also the deeper layers they can reach through fissures.

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Györk MÁTÉFY
Flags, their conservation and restoration

Flags, especially the painted or embroidered ones pose one of the most complicated tasks to textile conservation and restoration. The raw materials are easily decomposing organic materials as silk or flax, and time, use and storage all leave their traces on them. Regarding the shapes of flags, they resembled the modern ones already in the 9th century. They are usually rectangular and the textile is fixed directly on the flag-pole, that is they compose a single unit. The large ones were fixed to rings, sometimes to mobile cross-bars and hauled up on the flag-pole with a cord. Banner as the use of a symbol was of great importance already at the beginning. The medieval Hungarian flag also functioned as the national colours. Painted flags were commonly used in the 14th century. In the 14-15th centuries painters and craftsmen appeared whose main profile was to prepare various flags and coats-of-arms. In the 17th-18th centuries large guilds of banner makers and painters were established and functioned on the territory of Hungary and Transylvania. In the 18th century flags with painted coats-of-arms of families appeared already even at the funerals of the nobility. Large painter guilds functioned in Kassa, Lőcse, Nagyszeben and Nagybánya in Ferenc Rákóczi II's time. The Hungarian national flag was introduced at the time of the revolution of 1848. The most complex task is the conservation of painted flags since the painted and not painted surfaces deteriorate in diverse ways and need totally different treatments. Most of the flags are also ornamented with some embroidered inscription. The embroidered area behaves different from the textile base. Organic fibres of the embroidery need a different treatment than the metal fibres. Accordingly, the knowledge of the production technique and the materials used is very important at choosing the appropriate treatments. It is often considered what and to what degree should be completed without endangering the historical document value of the flag. Flags can be conserved with sewing conservation (supporting or covering them) or with lining. The use of the latter is suggested only in ultimate cases. Pure silk, cotton, flax, silk crepeline, regenerated cellulose and polyester crepeline can be used for conservation, and certainly not polyamide or other nylon-like fabrics or fibres. The basic theory says that the thread used for sewing should possibly be weaker than the material we wish to sew. No direct colours should be used or ones that are of poorer quality than the one originally used on the art objects, since they reduce the possibility of a later treatment. It is suggested to protect the painted parts before washing in the alcoholic solution of poly(vinyl-butiro-acetate) (Regnal). Lining foils can be made from the **1:1:5** mixture of Mowilith DMC2, Mowilith DM5 and water, which is to be mounted on a moist crepeline stretched on a table that was earlier coated by polypropylene foil. After drying, the adhesive surface develops on the side of the crepeline that is contacted with the polypropylene foil. This foil can be ironed to the art object through siliceous paper. If the doubled fabric needs to be dismantled, the object must be placed on blotting paper and one must wait until the two layers separate without intervention. Flag must be stored horizontally. The ones with a single facet that are not doubled, not painted and do not have inlays can be stored rolled up if there is no possibility to keep them horizontally. Lined fabrics must not be rolled up.

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Katalin OROSZ

Storage, exhibition and conservation of ethnographic leather objects

Leather has always been regarded as a useful and valuable material, and people tried to dress the skins of a great variety of animals and use them for different purposes. In Europe, however, the skin of cattle, sheep, goat and pig was most frequently used. Cowhide was used first of all for shoe soles, harness and cart gear, while calf-skin, having a softer surface, was the raw material of shoe uppers, upholstery and book bindings. Pigskin is very strong and accordingly it was preferred for the binding of large archives volumes subjected to strong wear. Sheepskin, feeling softer by the hand, served mainly for the raw material of articles of wear and book bindings. Goatskin was used where durability was just as important as aesthetic appearance, e.g. for shoe uppers, book bindings, coating of cases and boxes and for mounting. Rawhide is perishable, it is attacked by microorganisms, it stiffens after drying and shrinks in cause of heat. So rawhide is to be conserved and stored until the sufficient quantity is collected. Two methods have been used for this purpose: salting and drying. The next steps of tanning are soaking, liming, scudding, decalcification, drenching, tanning, dehydration, colouring, greasing then surface treatment, softening. Vegetable tanning was most common in Europe, when tannic acid gained from various plant parts were used. In the Carpathian Basin, the most frequently used vegetable tanning substance was gained from the bark and the apple of robur. Besides, mineral tanning with alum was significant since the white leather objects in ethnographic collections ("suba", "melles", bagpipe, tobacco pouch) were tanned with alum until the recent past. Aluminous leather is soft and one must be careful during its treatment, since alum is not strongly bound to the fibres and it can easily be removed during soaking in water. The Hungarian way of skin dressing arrived in France in the 16th century and was given the name hongroyeurs. Tanning with grease was widespread in Central Asia, in the Far East and in areas of cold climate. Glaced tanning is the combination of aluminous and grease tanning. Smoke tanning is an ancient method. Chrome tanning and the use of artificial tanning substances are the most common methods in modern industry. The deterioration of leather objects can originate from the dressing or the use of the objects and environmental factors. Objects made of leather usually have complex materials, they can contain metal, textile, wood or glass beside leather. At storage, the environment must be adjusted to the demands of the organic components. Leather objects must be kept in boxes protected from light and dust. To prevent insect contamination it is suggested to use insect repellents. Occasional insect contamination can be detected by insect traps available in commercial circulation. The mechanic dry cleaning of the contaminated leather objects can be made with a brush, a vacuum cleaner or rubbers of various hardness. Furs, objects combined with textile can nicely be cleaned with sawdust or bran saturated with white spirit. Leather of vegetable tanning can also be cleaned with fat liqours and those of solvents. It is worth moistening the hardened leather objects in vapour chambers to help the correction of the shape. An ultrasonic vaporiser is the most suitable, although, if it cannot be obtained, leather can also be moistened on a piece of blotting paper placed over the dish of cold water. The sufficiently soft leather must be set to the right shape and slowly dried wrapped up in paper wadding. The shrinking of the leather can be prevented by stretching it with the help of rustproof insect pins. Some objects were greased during use. Too much grease hardens the leather and cracks the grain. To protect the object, the superfluous grease must be removed with a wrapping saturated in white spirit.

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Restoration - ceramics I.

In order to learn the restoration of ceramics, the basic properties of the clay types and the production technologies must be known. Clay minerals are divided into three main groups: kaolinite, illite and montmorillonite. Regarding their practical use they are divided into the following groups: kaolinites, combustible and incombustible clays, bentonite clays. Ceramics can be moulded with different methods: band raising, turned on a wheel, moulding in a model, free moulding, casting and pressing. After drying, baking can be made in ovens of various types on different temperatures: pottery on 800-1000 °C, stoneware, china ware, clinker and hard tile on 110-1300 °C, chamotte on 1300-1500 °C. Most of the finds unearthed by excavations are pottery fragments. They are usually washed in water on spot before the water soluble salts transform into calcium and magnesium carbonates, which do not dissolve in water. Weathered, poorly preserved, fissured ceramics have to be transported into the restorer's workshop together with the earth around it in an appropriate wrapping, unless sufficient conditions are provided for conservation at the site of the excavation. Depending on the condition of the object, fixing can be made with wrapping gauze around it, or using chemicals: 10 % Paraloid B72 diluted in toluol or 3-5 % poly(vinyl-butirate) diluted in alcohol. The object can also be removed after being fixed with a plaster bandage or polyurethane foam in situ. After sufficient cleaning and the removal of the earth, the inside of the vessel can be solidified with solutions of Paraloid B72 or PVB. PVB solution is suggested for glueing since it gives an indistinctive trace of glueing, it is thermoplastic (which means that glueing can be readjusted) and cheap. Diluted Araldite varieties can be applied to glue china ware and fine ceramics. Completions are usually made from coloured plaster. Pulverised paints deteriorate binding properties, which can be neutralised with the addition of dental hard plaster. Additives as plasticine or dental wax can be used for completions. When the plaster is mounted from the edges inwards, the development of air bubbles on the joining surfaces can be evaded. Another study will deal with the solutions of more complicated problems as the completion of plastic, open-work tiles, glazed wares and china wares and reconstruction.

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