Klára K. Csilléry

(1923 - 2002)

Klára Csilléry has departed, this time forever. She has departed as saints do, death comes only for common people. Who met her, even though only a few times, and was not entirely insensible to human spirit knew that she represented one of the great people, an enthusiastic scientist free of any trace of conceit and haughtiness, and a colourful personality. A person who was not biased, a rara avis among us museum people, and who knew not what provincialism was, to which ethnographers are often inclined although not always consciously.

We knew she would leave us, she herself talked about it without restrictions, fear or anger. We knew her diagnosis, which left no doubts about the ultimate end. She did not use grave words even in this grave situation. She was convinced that nothing could harm her immortal soul "and the rest is a pinch of dust". She passed away with such a dignity, a mobile and creative mind unbroken to the last days, that can rarely be found among us, coward, frightened average people who are ready to lose faith. And this fact mirrors the wisdom of folk people, which she knew so deeply.

It is hardly the job of an art historian to analyse Klára Csilléry's professional career, and it seems too early to authentically estimate it even for an ethnographer. The wise time will decide and clarify it, giving stress to some elements of her activity and throwing away others. The former seems more likely. Perhaps we yet have some competence since Klára Csilléry also attended the faculty of art history, the Academy of Fine Arts and very often made use of the knowledge she obtained here, her skills, abilities and evident talent in "fine arts". It was not accidental that she felt attraction to folk art and, within it, to high quality objects. This can only be observed in her papers, since as an enthusiastic contributor to the collection and archives of the Ethnographic Museum and then the Open-air Ethnographic Museum, she did not make distinctions in this respect in her everyday work.

She was most interested in painted furniture and other painted wooden objects. Gothic stalls, an exquisite folk chest or an old bourgeois item meant just as great a pleasure to her as a carved winged altar from Tirol. She was attracted to everything that was new and unknown to her. We felt ashamed as she, already being very sick, walked faster and more tenaciously in the nearly vertical passages of the Transylvanian Saxon churches than the young people, because she could foresee that a secret was waiting for her up there.

Her deep knowledge of the material, the perfect knowledge of the technology of wooden folk furniture and other pieces of furniture destined her to take part in the training of furniture and wooden artefact coservators on various levels. She never forgot to call the attention of the young generation to the unity of "folk" and "high" cultures even if she not necessarily stated it directly. Last time she urged her students to the Gonzaga bridal chest made in the Mantegna circle and exhibited in Vienna. This was her symbolic farewell. She call our attention to the deep honour of high quality, to the sources, the motives of which slowly infiltrated into the folk culture and art. If there is a live message this is certainly one. It would be nice to keep this in mind and remember her, Klára Csilléry.

László Mravik
Art historian

Jenő ZEPECZANER
Udvarhely county and the town of Udvarhely

Székelyföld can be found in the south-eastern part of Transylvania. Its central mountain is the Hargita, the main rivers are the Maros and the Olt. The one-time Udvarhely county lies on the western slopes of the central mountain. The altitude difference in its territory reaches 1 466 (!) m. Udvarhely county as a regional administrative centre was mentioned in the documents in 1448 yet is certainly existed already in the 13th century. The town of Udvarhely was first mentioned in the Papal tithe list in 1332-1333. The county existed until 1876 with two short interruptions. Then it functioned as a county until 1950, when it was turned into a district. It lost independence in 1968 when it was annexed to the freshly founded Hargita county. The town gained privileges in 1557 and 1558, which were regularly confirmed and extended by the Princes of Transylvania. The slowly developing town could be proud of its guilds and schools from the 16th century. The years of the dualism brought the most progressive development. The wars in the 20th century, the leftist and rightist dictatorships influenced the life in the town as well. The population grew four times larger in the years of socialism, industrial plants were founded yet they were not the results of an organic development.
The Haáz Rezső Museum, the scientific-educational institution of the town goes back to 1797. Rezső Haáz (1883-1958) art teacher at the Calvinist College opened his folk art collection in 1913, then became the first director of the state museum. The institution, which suffered numerous vicissitudes, got its first permanent building in 1968. In 1978 it was enlarged with the building of the Permanent Gallery. At present permanent local historical and ethnographic exhibitions, the Permanent Gallery, the Scientific Library and the memorial rooms can be visited. The row of Sekler gates in front of Balázs Orbán's tomb in Szejke-fürdő can be the core of a future open-air ethnographic museum. The permanent museum of balneology and mineral waters will be built also there around an active acidulous water spring, which is the greatest task for the coming years.

Jenő Zepeczaner
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Dr. András MORGÓS
On dendrochronology

Dendrochronology, or wood ring dating is one of the most correct dating methods in the world. It can give the age of wooden art objects to the exactness of a year. The method was first applied in America at the beginning of the 1900's, then it spread in Europe in result of research pursued in Germany. The method can be applied in the case of every wooden object made of a tree species that grew in a climatic zone where tree development was interrupted by a rest period (winter) and that contains sufficient rings (about 50) for dating. When the growth is not interrupted by a rest period and growing is continuous, no tree rings develop (e.g. in the tropic zone). The growths of tree rings (thickness) is decisively influenced by climatic factors (precipitation, temperature) beside genetic and habitat ones. The tree ring will be thin within unfavourable climatic circumstances and thick within favourable ones. So the study of the thickness of tree rings informs not only about the age of the tree but also its environment, the climatic circumstances and the weather during its development. Dendrochronology includes the collection of wood samples of known and unknown ages, the measuring of the thickness of tree rings and their comparison both visually and lately on computer in order to find identical phenomena (synchronous positions) in the curves. When a synchronous position is found, dating can easily be carried out with the help of a chronology curve on which the years are marked.
Very little wood used as building material survived in Hungary from before the 17th century, more from the 17th-19th centuries. Much less damp wooden finds have been recovered during archaeological excavations than in Western-European countries. Some of them are not conserved, they dry out and collapse, and they are no more suitable for sampling.
Besides the paper deals with samplings that need specific tools, drills adapted to the properties of the various wooden objects, the preparation of the samples for measuring, the execution of measuring, the analysis and evaluation of the measurement data.
We would like to ask your help in the preparation of chronologies characteristic of the various territories. Please notify us if you have information about any kind of oak or pine object, timber, press, archaeological find, still living or desiccated old trees that contain many tree rings.

Dr. András Morgós
Chemist, wood and furniture restorer artist
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Petronella KOVÁCS

The fixing of detached surfaces of inlayed and painted wooden furniture

The most frequent damage of inlayed and painted furniture is the detachment of ply wood, undercoating, painting and overcoat layers from the bearer. This is caused first of all by the motion of the hygroscopic wooden material, which tends to keep a balance with its environment: it swells taking up moisture and shrinks during drying. If the layers that cover the wood cannot follow these movements, fissures appear, and they can detach from the bearer or each other. The ply wood warps up, crackles, detaches and curls up. Smaller and larger swellings, roof-shaped deformations appear on the painted surface. The detached layers can crackle, slip onto one another and fall off the object when it is moved. Beside the motion of the wood, countless other factors as bugs, damages done by micro-organisms, temperature fluctuation, dust, mechanic injuries, earlier unprofessional interventions and the difference of the hygroscopic properties of the applied materials, their ageing, the production and painting techniques can exercise influence.

At products made of ply wood, a ply wood cover different from the base or other organic and inorganic materials as bone, ebony, horn, tortoise shell, pearl-shell or metal can be glued usually with animal glue. The layers overlap one another on painted wooden objects: 1. The undercoat is between the bearer and the paint layers and plays a mechanic and aesthetic role. Its binding material is usually glue, drying oil, their mixture, casein, perhaps resin. The filling material is chalk, plaster or bolus types, it can contain coloured pigments as well. 2. The paint layers consist of pigments or colouring matters and binding material. The binding materials secure the adhesion and cohesion of the pigments to one another and the undercoat. 3. The overcoat increases the mechanic protection and the optical effect. Although to protect the detached layers they should first be bound, often the gluing of the loosened joints, the solidification of the wooden material damaged by insects etc. must precede it. In such a case, the detached layers should be temporarily fixed from top with glued paper. Synthetic adhesive bands should not be used, the glue that remains on the surface can often be removed only with chemicals that dissolve the overcoat as well. The smaller holes and channels created in the base wood by insects can be filled in with wood-dust, the larger ones with sticks made from the same tree species. The sticks should be glued in the same fibre direction as in the base wood. At the binding of the detached surfaces one must consider the "theory of minimal interference", which, luckily, has lately been accepted in furniture restoration as well. The aim is, beside the preservation of the shape, to protect the materials, including the overcoat, that constitute the art object. So procedures that damage the overcoats sensitive to heat and moisture, as e.g. the dry or damp ironing of the ply wood, can be allowed only when no other solution is possible. The polishing of the uneven layers and the curved up edges of the ply wood is unaffordable. The fixation of the ply wood that was originally bound by glue should be done with warm bone glue or leather glue since synthetic materials react to environmental effects and the movements of wood in a different way and can cause further damage. The application of synthetic materials, which have become popular due to the easier and faster work, should be avoided also because it rarely happens that the documentation is so correct that later the areas fixed with various materials can be identified. In the case of the large-scale shrinking of the base wood, the solution is not the adjustment of the detached ply wood to the new size but the supplementation of the base wood.

When a painted wooden object is damaged, the layers can become detached in the undercoat (multi-layered undercoats), between the bearer and the undercoat, between the undercoat and the paint layers, in the paint layers, between the paint layers and the overcoat. The detachments can be conchoidal when the edges of the paint spots curl up along the network of fissures, laminated when the rigid layers (e.g. transparent coating and other paint layers with high resin or glue content) become detached, roof-shaped in consequence of the shrinking of the bearer, pouched when due to the ageing of the adhesive the layers on the bearer (e.g. cloth or paper glued at the joints) raise in an arch or blistered when they develop in effect of extreme heat or corrosive materials.

To bind the detached layers, the solutions of natural (gluten glues) and synthetic matters (acrylates, poly(vinyl-acetates) and cellulose derivatives) diluted in water or organic solvents and their dispersions can be used. For binding materials, only colourless or light coloured, fat-free, elastic materials are suitable that have low viscosity, age slowly, resist the effects of the environment, have a neutral pH, penetrates easily, have possibly small molecular body and bind sufficiently in low concentration as well. They can be applied by a brush or by injection, through the network of fissures or directly under the detachment. After the binding material has been applied, a cigarette or tea filter or Japanese paper should be placed on the surface to absorb the superfluous binding matter and the layer

can carefully be repressed or ironed back through the paper with an appropriate tool or an iron. If acrylates are applied (e.g. Paraloid B72, Plextol), the Japanese paper must be removed before the setting of the binding matter. The treated surfaces should be ironed only after the solvent has totally evaporated. Ironing should be made through silicon or other paper or foil that does not stick to the conserving material (e.g. Melinex). Cellulose-ethers that can be diluted in water and polar organic solvents and solvent mixtures (Klucel products) are also used to fix the crumbling undercoat and paint layers. They are sprayed on the surface.

The fixing of the detached surfaces is one of the most sensitive processes in the course of the conservation of wooden art objects. When detachment are noticed, an expert should be notified, since unprofessional interventions and ill-chosen materials can cause further damages. The exterior causes of layer detachments can be evaded by preventive conservation – keeping a stable relative vapour content in the room stable, excluding the possibility of the settling of wood damaging organisms.

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Cornelia BORDAȘIU

Treatments with the purpose of the conservation and the restoration of the „Saint Mercurius" church in Rădășeni

Rădășeni village was first mentioned in a document on February 16, 1424 in voivod Alexandru cel Bun's (Alexander the Good) deed of gift dated from Suceava, which advantaged a certain Popa Juga. Ten years later, Alexandru's son Ștefan (Stephen) confirmed this deed of gift and repeated the name of the village. These documents exactly mark the name of Rădășeni village and its geographical place on the Șomuz stream. The interpretation of the sources suggests that the church of Rădășeni was built from voivod Ștefan Tomșa's gift. The connection between the foundation and Ștefan Tomșa's name is certainly ambiguous since two rulers had the name in the history of Moldva. The first one ruled from 1563 to 1564, the second twice from 1611 to 1615 and from 1621 to 1623. Tradition holds about the latter Ștefan Tomșa that he donated an inscribed small spoon to the church. The spoon does not exist any more, an alleged copy substitutes it. There is no contemporary written source to justify the tradition. Nevertheless, the voivod appears on the votive picture of the church with his wife, Elena, the two holding the monstrance of the church.

The inscriptions help the dating of the paintings in the interior of the church: "This Saint altar was painted in the year 1873 by God's slaves brothers Iulian, Kelsie and Ioan, three brothers, for the remission of their sins, and Ioan Irimescu their assistant for the salvation of his soul." The analysis of the paintings revealed that the above period matches the second phase of the painting of the church, which means the pictures of the entire body of saints and the votive pictures in the niches of the altar, the nave ("naos") and the porch ("pronaos"). Oil paintings on pressed wooden boards, which were prepared even later (1935-38), can be found on the ceiling of the nave, on the tympanum between the nave and the porch, and in the belts above the curtain that surrounds the stalls that are fixed to the wall. They were made to cover the poor condition of the original painting. These paintings are contemporary to the architectural interventions that modified the original architecture of the church.

In 1997, during an urgent architectural intervention, the earlier painting made with tempera technique was revealed under the above mentioned late paintings. This early painting is similar to those in the Eastern Catholic churches in Maramureș. The paintings were in a very poor condition because of the motion of the wooden bearer, the climatic changes, biological damages and the deposition of impurities (dust, soot). The ground became crumbling, the paint layers were peeling off, the cloth glued on the joints of the wood developed pouches, came off and the paint layers got detached from its surface. The painting was entirely missing from 30 % of the ceiling of the church. To preserve the surviving layers in the hope of a later conservation, the painted surfaces were covered for the time of the architectural interventions with a glue solution of 2-3 % (+0.5 % pentachlorophenol-sodium) and Japanese paper, which was reinforced by a pH neutral foil at the holes.

The detached and crumbling layers were later secured in several phases according to the type of the damage. 1. Laminar and crumbling detachments were first moistened (with vaporized distilled water) then they were coated subsequently with a thinner and a more concentrated glue of yolk base, finally they were dried in the open air. 2. The impurities were removed from under the pouched and detached cloth, then a soft undercoating of rabbit glue and chalk-dust was injected under the layers. The pouched layers were smoothed after this treatment under a special wooden press. 3.

The paint layers that became detached because of the crumbling ground were consolidated with warm fish glue of 0.3 % solution, which was applied on the surface with a brush, then the necessary adhesion was reached by tamponing with Japanese paper and blotting paper. The process was repeated several times until the layer got saturated with the new binding material. The final drying was carried out in the church where instruments helped the regulation of airing and temperature (18 °C). 4. The joints that had opened up were filled in with wood sticks cleaved in fibre direction, the binding material was bone glue. Finally, it was filled in with a putty of fish glue, chalk-dust and fine saw-dust until the level of the original undercoating, while the level of the paint layer was completed with a putty of fish glue and chalk-dust.
The replacement of the small and medium large missing parts created the base of the aesthetic completion and restoration of the paintings.

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György MÁTÉFY
Remarks on the protection of Anatolian carpets from the 16th-17th centuries in Transylvania

A traveller can meet one, sometimes more Anatolian carpets and carpet types from the 16th-18th centuries in the churches and museums on the way from Kalotaszeg through Kolozsvár to Segesvár, Berethalom or even to Brassó and Nagyszeben. Eastern carpets and European tapestry played an important role in the castles, palaces, manors and rich homes of citizens in Transylvania and Northern Upper Hungary during past centuries. Most of the carpets were made in the Minor Asian territory of Turkey and arrived in Transylvania and Northern Upper Hungary on various commercial routes with the mediation of Greek, Serbian and Saxon tradesmen. The followings can be read in Mária V. Ember's work: "Minor Asian carpets can be divided into two groups after their ornaments. One contains objects with stylised, quasi geometrically rigid patterns, the so-called "Holbein" carpets, the usaks of arabesque motives, carpets with birds and balls. The representatives of the other group are ornamented with rich stylised plant motives, as prayer carpets: Ghiordes, ladik, kula – one of its variant the mourning carpet, the cemetery kula, the small and large usak. One of the subtypes of the usak is the so-called Transylvanian carpet, which was named in the scientific literature not by the production technique but after its richest occurrence." (Régi textíliák. Budapest, 1980. p.35.)
The condition of the carpets in smaller Transylvanian collections is very good as compared to their age, but their storing, hanging, however, is not ideal even though they are evidently highly estimated.
Most of them are hanged from small rings sewn on the carpet. In result some parts of the textile can be strained, perhaps damaged. The items often placed in hip or shoulder height can easily be touched and become dirty. In effect of light filtering in through the windows spots that are longer exposed to the light can fade, heat and light can make the wool threads brittle and lead to the development of cracks and fissures in the carpet. The walls that touch the carpets are mostly damp, moist, the carpet takes over the moisture and the wool starts rotting. The carpets kept in darker places become excellent homes for moths, other insects, mould etc.
With a more careful storage of textiles, which is not so much a financial problem as care, with preventive conservation the above listed damages could be evaded. The less damaging velcro solution can be suggested for the hanging of the carpets. The looped part of the velcro should be sewn on the upper part of the carpet with the insertion of a textile band using large stitches that keeps the carpet at the warp threads. The sewing thread should possible be wool and never a synthetic fibre. The hooked part of the velcro can be glued or nailed to a lath fastened to the wall.
Although the carpets are obviously kept clean, they need watery cleaning (certainly after colour probe).
The old repairs, completions, extensions on some carpets mean another problem. They were often made so that the damaged parts were cut straight and the frayed ends were unbound. The completions, due to the poor quality colouring matters, soon and strongly faded. This method should be evaded because of ethical and also aesthetic reasons.
Before any intervention with the aim of preservation of the condition or restoration, the condition of the carpet, the degree of physical and chemical damage has to be evaluated, the characteristics of the production technology has to be determined, the materials and the colouring matters are to be identified and all these have to be registered in a written form completed with drawings and photos. The purpose of the intervention must be defined – scientific elaboration, exhibition, conservation, completion, complex restoration or copy making – and the persons who will collaborate must be named accordingly. The restoration plan should contain the ethic problems to be considered, the methods and materials (cleaning and washing matters, chemi-

cals, fibrous and textile materials, colouring matters, exhibition aids, storage aids) that seem applicable judged after experiences and the technical literature. Carpet restoration has the following steps: dust removal, stain removal with organic solvent, cleaning with water, perhaps long lasting protection against insects, shaping, drying; choosing supporting materials and threads, their cooking, dyeing; preparation of conserving stitches; stretching the carpet on a frame, its sewing for further operations: replacement of warp threads, completions of the weave and the sides, replacement of the weft threads, reknotting; preparing the hanging aids, preparation of the storage and wrapping materials, preparation of storage suggestion. Documentation must contain, beside the applied methods and materials, the good and bad experiences and information gained during the conservation/restoration.

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Katalin OROSZ
Deterioration of archival documents and the possibilities of prevention

All the documents that can be found in archives are composed of organic – paper, leather, colouring matters, glues etc. – and inorganic – pigments and metals – materials. Paper is a sheet made of vegetal fibres, its basic material is cellulose. The long cellulose chains secure the mechanic stability of paper, the cohesion between the chains, and incorporated water molecules provide elasticity. Leather used as the raw material or the cover of archival documents is an organic material of fibrous structure, its basic constituent is protein (collagen). On the joint effect of heat and moisture, both leather and parchment disintegrate quickly, decomposition into glue.
Textiles can be divided into two main groups: woven materials based on cellulose or protein. Flax, hemp and cotton cloths are made of cellulose fibres, their chemical composition is identical with that of paper. The basic constituent of silk, silk velvet and wool is protein. Silk is an elastic, enduring material, stabile in acidic environment. Wool is also stabile in a slightly acidic environment, while it is sensitive to alkalis. Its protein contains sulphur.
The disintegration, ageing of organic materials is a slow, natural process, which can be accelerated by environmental effects. Disintegration is a series of chemical reactions, which needs energy. Every organic material is capable of absorbing radiation with the same energy as the chemical bonds contain. Light sources (Sun, bulbs, fluorescent or neon light) emit so-called electromagnetic – visible light, ultraviolet (UV) and infrared (IR) radiation. On the effect of the absorbed UV radiation, the cellulose chain in the paper and the protein chain in the leather becomes segmented, the mechanical stability decreases. Written, painted or coloured and mass produced (lignin-containing) paper is sensitive to visible light as well.
The rise of temperature, the differences in thermal expansion can cause physical damages in objects of mixed composition (e.g. the paint layer fissures on the surface of paper or parchment). A change in consistency can also happen (e.g. the wax seal melts). The rise of temperature accelerates the process of ageing.
Water can appear in a liquid or gas state in the environment of the documents. Paper and leather are porous materials and they tend to keep a balance with the humidity of the air. Humidity swells the fibres, so oxygen, micro-organisms, acids, salts etc permeate more easily and the oxidation disintegration accelerates. On the effect of humidity, the impurities and disintegration products in the paper gather to one place and a so-called water spot develops. The most damaging is when the relative humidity of the air constantly changes because paper, leather and parchment tend to follow it. It means that the fibres incessantly move and the stability of the chemical bonds decreases.
Acids and alkalis segment the cellulose chain, solve out the tanning materials from leather and so help the disintegration of the protein chain.
Gassy pollutants are acid gases, ozone and hydrogen sulphide. Ozone is a strong oxidising gas, it dissolves the organic materials, paints, inks and pigments. Hydrogen sulphide attacks first of all silver, copper, lead and lead white pigments.
Dust, which contains solid pollutants creates an alkali with binding the humidity of the air, which fades colouring materials and inks, and further weakens the material of the poor quality mechanically produced paper.
The spreading of micro-organisms - moulds and bacteria – can lead to the total disintegration of the material of archive documents.
The damage of archival documents has been caused by improper storage and treatment. The unsuitably lighted storage space, the extreme environmental factors, careless moving, the containers made from inappropriate material, size and shape cause chemical, biological and mechanical damages to the documents. They can be evaded by proper storage. Metal shelves coated by hammer varnish, the distance between which

can be adjusted (Dexion-Salgó) are the most suitable for the storage of documents. They do not emit damaging materials and are inflammable. The so-called solid stand that can be moved on rails fixed to the floor is an ideal solution. If wooden shelves are used, they should not be made of a tree type that contains a high proportion of resin. The lowermost shelf and the back plate of the stand should be placed at least 15 cm from the floor and the wall to secure air current. Light sources should not be placed very near to the documents and illumination should be proportioned. No unknown cleaning materials should be used. Instead of the old "bunched" storage, the documents should be placed in buffered, well closed boxes free of acids, which protect them from dust, light and mechanical injuries. Maps, designs, photos and documents with suspended seals should be kept separately. Well closed metal cabinets are the best for large objects, although containers made of paper plates and covered with acid-free paper are also suitable. Thin, acid-free paper should be placed between the documents. The large items can be kept in acid-free cylinders measuring at least 20 cm in diameter. The rescue plan should be elaborated in case a pipe breaks or water appears in another way. If the damage has been done, the moist material should be taken out and quickly spread in a well aired, cool place. No hot air should be used for drying because warm humid air helps the settlement of moulds. If water appears in winter, the heating should be switched off. The very wet sheets must be blotted with blotting paper, the books must be stood on their feet and opened in a fan-shape. Help the air current with ventilators. Leather strongly shrinks during drying, so it should be deep frozen in a polyethylene bag. This method cannot always been applied, since e.g. painted coats of arms and wax seals can be damaged during freezing.

Ideal storage needs a lot of money. With care and the exclusion of factors that can cause damage, the condition of archival documents can be increased at low costs as well.

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Márta KISS-BENDEFY
Restoration of historical leather objects

Leather is a protein-based, sensitive organic material. The fibrous structure makes the removal of chemicals used in former treatments difficult. So it should be carefully considered what materials will be used at the restoration of leather objects.

The first steps of restoration are the followings: the thorough analysis of the production technique and the condition of the object, the review of the technical literature, the analysis of the material of the object, the planning of the possible methods of cleaning, conservation/restoration with regard to their advantages and disadvantages.

Restorers themselves can make some of the analyses. The more exact instrumental analytical methods can answer specific questions but they are more expensive and the experience of specialists is necessary. The following analyses can be carried out by restorers: 1. Microscopic analyses – the animal species can be determined and damages that cannot be seen by bare eyes can be identified, 2. pH determination with indicator paper or an electric pH-meter (the optimal pH value for leather is around 5). 3. The determination of the moisture content of the leather (optimal moisture content: 12 %). 4. The determination of the free fat content (optimal fat content: 5-6 %). 5. The determination of the tanning matter with drop probes (iron salt probe to demonstrate vegetal tan, alizarine probe to demonstrate alum in the leather). 6. Burning probe to determine if the tanning matter was organic or inorganic.

Beside the analysis of the materials that constitute the object, the type of the impurities must also be identified. Cleaning is irreversible, so the impurities and depositions that have historical, ethnographic or other significance should not be removed. The dust can be cleaned from the surface with careful application of a vacuum cleaner, while more bound impurities need the application of special erasers. Impurities that are strongly adhered to the surface can be removed only by an emulsion or solution treatment: the non-polar impurities can be treated with non-polar, the polar ones with polar organic solvents. To evade the darkening of the surface and the development of spots, the most efficient method to remove greasy impurities is the application of mineral spirit mixed with some kind of absorbent matter (saw dust or cellulose dust).

The pH of the cleaning liquids must always be checked before use! The leather cleaning mixtures that are sold in commerce were developed for new leather and industrial purposes, they are often alkaline, their application is not suggested. Restorers themselves should prepare mixtures and emulsions as it is demanded by the specific art object.

Leather objects were very often prepared combined with other materials (metal, wood, textile etc). Metal parts corrode on the effect of high relative humidity and the corrosion products stain and damage the leather. In the course of the mechanical removal of the corrosion products the leather should be covered to protect it from injuries. If the leather can be isolated

from the metal, a paste made of methyl-cellulose and the 4-5 % solution of complexing agents (EDTE, tri-ammonium-.citrate, etc.) can be applied on the metal surface. The corrosion products should not be washed into the leather! Some materials used to soften the leather (glycerine, PEG) retain moisture in the leather and thus can advance the corrosion of the metal constituents. Leather that is in contact with metal should not be treated with greasy or oily matters since the free fatty acids can also cause corrosion in the metal.

With softening, the deformed leather objects can often be adjusted to the original shape. Softening can be carried out in a humidification chamber using an ultrasonic device, with cold water or with the application of saturated salt solutions. If the object cannot be placed into a humidification chamber because of its size or constituents sensitive to moisture, local vaporisation can be applied e.g. with Gore-tex semi-permeable membrane. To evade shrinking, the drying of the vaporised leather objects must be carried out with caution after it has been adjusted to the shape.

If tears or holes are in the leather object or the glue has released, the material needs to be supported. For mending fresh leather, not woven textile (Vetex), Japanese paper are usually used, although special objects may benefit from animal intestine or bladder. The motion of the supporting material caused by the changes of moisture content should be considered since the ill chosen material can corrugate or even tear the leather. Tears and holes are usually mended from the reverse side. When the supporting material or the completions are cut, not only the measurements of the tear but the weak territories around it should also be calculated. The shape drawn on transparent film or tracing paper has to be cut from previously damped and dried leather lest later the colouring matter or the glue shrink it. The edges must be thinned, if possible from the skin side since the obliquely cut edge distributes tension. To increase adhesion, the surfaces to be glued are usually slightly raised.

Natural and synthetic materials are used alike in leather restoration. Most of the collagen-based glues become rigid and brittle after drying. So gelatine and parchment glue are used first of all on parchment and pelt. They do not provide a flexible enough bond on tanned leather. Fish glue, although it is relatively weak, can be used to fix the detached, peeling layers due to its high penetrating power. Polysacharide based glues (wheat and rice starch and replaced cellulose derivatives) have the advantage that they do not make the leather rigid after drying. Nevertheless, they bind weakly. Hydroxy-propyl-cellulose dissolved in organic solvents can be used to reinforce crumbling, weakened leather surfaces. From among synthetic polymers, dispersion glues of poly(vinyl-acetate) base (Mowilith, Hewit 155, Planatol BB etc.) or the acrylic-based ones (Lascaux 498HV) are the ones most commonly used for leather gluing. Their advantage is that they are ready for use, they bind sufficiently and the leather can relatively easily shaped during gluing. Combining the advantageous properties of natural and synthetic glues, their mixtures are also used in leather gluing. If the tear is large, gluing should be made in steps. The glued surfaces should be fixed until the glue sets. The aim of the gluing and the supporting is that the art object can keep its shape as long as possible, so stuffing, a protecting case or a bag should be used.

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Katalin T. BRUDER
Pottery restoration II

The study is the continuation of Pottery restoration I. published in the previous volume of Isis (see Isis 1. Magyar Restaurátor Füzetek 1. P. 81-87).

Two extreme tendencies have developed in pottery restoration in the last decades concerning completions. One is based on the theory of “minimal intervention” and leaves the completion of the objects to the visitor’s imagination, while the other one tends to only slightly indicate the difference between the original and the completion.

It happens even in our days that art objects need to be reconstructed. When large ceramics, e.g. an urn, is reconstructed from sherds, the completion is based on a skeleton built from strong copper wires or a copper mesh covering the skeleton, which is made after the reconstruction drawing. The existing sherds can be fit to their exact place on this base.

At completion, the evident ornaments can be finished. The plastic ones should be made at the time when the plaster is put on the skeleton. At of incised linear ornaments, posterior correction can be evaded if the tool has an appropriate profile. The causality of the incisions has to be followed. The chinking of glued fragment is judged diversely. It is more and more accepted that chinking should be not only static but also aesthetic.

It can happen in the case of very fragmentary ceramics e.g. wheel-thrown bowls, that the inner core is made on a wheel with the help of a model shaped to match the interior profile of the object. The model of the exterior shape is made, the fragments are placed on the core, then the moist plaster is applied, and the reconstruc-

tion is formed on a wheel wit the help of the exterior model made in the original size and matching the original shape.
At the completion of stove tiles with plastic ornaments, it depends on the character of the object, the size of the missing elements and the type of the ornament which of the numerous methods can be applied. The simplest case is when the object has a symmetrical decoration and the pattern can be mirrored with the help of a negative. It happens that the pattern can be calculated, but there is no sample for making a negative. In such a case a copy is made of the original fragments decorated by high plastic ornaments and the completion is added to the copy. Then a silicone negative is made of the whole piece furnished with a plaster base. Carving into negative can be used especially at low-relief tiles, e.g. from Gothic and Renaissance periods. The ornament is calculated from the fragments. A negative is made about the existing parts, which is cast into a plaster base so that they lie exactly on the same level. The design of the ornament is copied on it and carved into negative. In the carved negative coated by form release agent, the original elements are fit to their exact places. Coloured or white plaster can be used for completions. The latter ones is coloured with tempera bound by acrylic dispersion (usually Plextol). Ceramics with graphitic ornaments can be completed with plaster coloured as dark as possible. The appropriate shade of Samian wares can be reached with adding iron oxide and burnt sienna dust paint to the plaster. The characteristic lustre is the easiest to reconstruct with waxing. Potter's wares glazed on one side can be completed with coloured plaster. The painting of wares with transparent glaze should be started with the preparation of the colour of the slip and the ornaments under the glaze with a Plextol-based tempera, then, after drying, the surfaces are coated with undiluted Plextol. Ceramics with coloured glaze can be painted with artist's oil paint, white or uncoloured varnish coloured with colouring paste and tempera mixed with much Plextol. Some filled synthetic varnishes can also be used for completions, their use, however, needs a lot of experience.
China wares were formerly completed with dentist's hard plaster, which often detached from the breaking surface. The completions were usually painted with oil paint, sometimes covering even the original. This cannot be excepted, yet we can often meet such objects in museums. To date, various synthetic materials are used for the completion of China wares. Their disadvantage is that although their ageing gets longer and longer parallelly to the higher quality, their colour fades, becomes yellowish and they shrink. A wax or silicone form gives the base of synthetic completions. The materials used for completion can be coloured with colouring pastes, dust paints etc.
The deterioration of ceramics can be ascribed to four main effects. 1. Physical corrosion: in which water and salts play an important role. 2. Biological corrosion is caused by micro-organisms that settle on the surface of moist objects. They hinder the drying of the ceramics and emit deteriorating metabolic products (nitrates etc.) 3. The appearance of chemical corrosion is influenced by the environment prior to restoration as e.g. the chemical properties of the soil. 4. Damage caused by unprofessional treatment or human corrosion can be grouped among the former types, yet it should be mentioned separately. Often such materials are used during cleaning that can dissolve components from the ceramic material that should be necessary for a thorough archaeometric analysis. If the cleaning method cannot be later reconstructed, the analysis will give false results.
Former unprofessional surface treatments, cleaning with drastic scrubbing, and surfaces polished beside the completions all leave lasting traces.

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Restoration of outdoor metal statues and sculptured ornaments

The raw materials of outdoor metal statues and sculptural ornaments are copper and tin alloys, which have traditionally been used since the classical times, and the cheaper zinc, which was generally applied in the 19th - 20th centuries. The main component of the various bronzes is copper (Cu). Its stability is increased by composition elements, with which it creates stabile solutions. The main composition metals are tin (Sn), zinc (Zn) and aluminium (Al), the accessory ones are lead (Pb), nickel (Ni) and manganese (Mn). The colour of bronze can vary from red through golden to greyish-white depending on the composition of the alloy.
Earlier, when environmental pollution mainly meant carbon dioxide produced by heating, alkaline copper carbonates covered the surfaces of the bronzes as corrosion product. They took a long time to develop and created a so-called verdigris on the surface. The most common versions are similar to the azurite and mala-

chite ores. To date, environmental pollution exercises a similar corrosive effect not only in cities but, carried by air currents, also in areas free of industry. The salts, antlerite, brochantite and calcantite, that appear in consequence of (sulphuric) acidic rains that develop from sulphur dioxide lend a greenish appearance to outdoor statues. This patina, which can partly be kept and conserved can cause further damage in response to aggressive effects and some of its constituents, completed with the soot that precipitates from the air, can smudge the surfaces of the statues. Several methods and solutions can be applied to clean outdoor statues. The object need and should not be cleaned to the metal level if after the removal of the unstable, corrosive or aesthetically disturbing components, a uniformly patinated surface can be reached. The so-called patina-preserving method can be carried out with chemical and mechanical means as well but only on surfaces where the corrosion layers cannot be preserved. Cleaning to the metal level can be suggested only if the aggressive components appear on a large surface, the aesthetic unity of the surface cannot be restored and major sculptural and welding intervention is needed in the course of the restoration. An accepted and popular method of cleaning to the metal surface is grain spraying. In the process the quality and size of the grains, the diameter of the nozzle and the intensity of the spraying can be chosen.

In the case of casting or plate holes, appropriately cut materials should be used, which resemble the original one in its material composition. The same applies to soldering and welding materials. The completion of the missing areas, the fixing of fissures and cracks can be made with argon-protective gas arc welding. When an entire cast unit has to be exchanged, the element can be fixed with screws as well.

To give a greenish patina to the completions, a layer has to be created on the surface, which is similar in composition to the alkaline copper sulphates. Ammonium bicarbonate is suitable, which creates an alkaline copper carbonate layer, which turns into sulphates in an acidic environment. To protect the surfaces of outdoor bronze statues, the 1:1 mixture of Combat A88 and teflon-containing wax (special Turtle wax) has proved useful. For the sake of continuous protection of the condition, the surface treatment should be repeated at least once in two years.

The surfaces of fountain statues are usually thickly scale-coated where the water hits them. The chlorine content of water deteriorates metals during the development of hydrochloric acid, it causes hole corrosion, then perforation. Pollutants that contain lime dust turn into calcium-sulphate on the effect of sulphuric acidic rain. The development of gypsum crystals exercises a serious expansive force in the pores of the objects, in fissures and in the details of the ornamental elements. At fountains, beside creating modern protective covers, another preventive conservation can be the construction of a water cleansing and turning apparatus, which can be attached to the water supply system of the fountain.

The composition of tin alloys also shows a varied picture. In case of works made at the end of the 19th century or at the turn of the 19th and 20th centuries, it is the ratio of composition elements that can be different.

The negative environmental changes in the 20th century strongly deteriorated the condition of outdoor art objects made of tin. The acids and the alkalis quickly dissolve the natural protecting layer that develops on the surface of tin, or they hinder its development, then the acids can attack the metal itself. Mechanic damages, injuries, cracks mean an even greater danger than corrosion to the condition of tin. A deformed material is barely possible to be mended, the individual elements often have to be formed, cast and soldered again. After soldering, the acidic surfaces must be neutralised with soda solution (Na_2CO_3). The iron braces applied to reinforce the statues from the inside can start electrochemical corrosion processes at the joint of the two metals . So after the iron has been passivated, the braces must be coated with protective synthetic resin layer. It is advised to treat the statue composed by soldering with grain blasting then to polish so that the traces of soldering would not be conspicuous. The above mentioned mixture can be used for coating.

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