



Preserving Cultural Heritage

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Introduction

In the following chapter measures connected with restoration work realised in the Herat National Museum will be discussed. Tasks included the establishment of a conservation laboratory and storerooms, training Afghan staff in the basics of restoration, conservation and documentation, an assessment of the collection with regard to its present condition as well as conservation and preservation of the objects. Furthermore, preparations for the installation of a permanent exhibition were undertaken, accompanied by considerations of conservational aspects. Apart from a presentation of objectives and an outline of the execution, this contribution describes the problems that appeared during the practical implementation of these measures.



Fig. 1a Documentation in progress (2008)

The Collection and its Preservation: Planning the Conservation Laboratory

During the opening campaign in 2008, the collection was first inspected in order to gain a detailed overview of the scope, type and material groups of objects. It was, therefore, a matter of determining the objects' state of preservation and answering the question, whether conservation measures or interfering procedures of other kind had already been taken in the past (Fig. 1a-b). At the same time previous storage practices and possible risks for or effects on the condition of the objects were closely examined. Apart from the collection itself, the premises were inspected as well. A new spatial concept needed to be developed, power and water supply had to be planned, furniture provided and the building secured against burglary.

The major group of objects in the collection are ceramic vessels of all kinds and sizes as well as ceramic fragments of assorted architectural parts. The second largest material group is represented by metal objects. Besides different types of metal vessels, this group comprises various small-sized objects and coins (Fig. 2a-b). As to the type of metal, they are mainly copper alloys like bronze and brass, but only a few iron and zinc objects. Gold and silver are seldom present, and if so, used as elements of decoration. On the basis of a preliminary examination it can be stated that the coin collection also contains only non-ferrous metals. Moreover, there is a small group of stone objects like i.e. weights and vessels. The collection of tombstones and architectural elements made of stone constitutes a group of its own. The material group of glass is represented by only two small vessels as well as several beads.



Fig. 1b Sifting through boxes and bags at the beginning of the project (2008)



Fig. 2a Group of metal ewers, prior to conservation (2008)



Fig. 2b Group of metal objects, condition of display 2008

From a conservational perspective, the collection of arms should be defined as an independent group, because firearms, cut- and thrust-weapons are composed of different types of material like metal, wood, leather or textiles.

The general conservational state of the objects was good and largely stable. The ceramic objects were covered by layers of sinter. Several vessels had been glued and some subsequently covered with an artificial layer of dirt. The metals showed diverse corrosion varying from thin oxide layers to thick crusts of sediment. Strongly aggressive corrosion could be observed on only few metal objects (Fig. 3). At the moment of examination, however, the corrosive processes seemed to have come to a halt. Some of the vessels displayed damage like deformations and cracks (Fig. 4). A coating of clear adhesives or varnish could be identified on some objects. The weapons were covered with a thick layer of dust; some of them were also slightly damaged from corrosion. The leather was hardened and broken here and there.

After examining the collection the concept for a conservation laboratory was developed. The following criteria have decisively influenced the choice of equipment.

Climate

Climatic conditions have a determining influence on the behaviour of materials. Therefore, factors like the ranges of outdoor and indoor temperatures as well as humidity should be taken into account.

At high temperatures of more than 40° C the adhesive Paraloid B72 cannot be used. Due to its glass-transition temperature at c. 40° C, this adhesive would not solidify or would melt again and again as soon as the surrounding temperature exceeds this level. Adhesives on a cyanoacrylate basis, like i.e. instant adhesives, need a certain amount of humidity to solidify. In a dry and hot climate it can take several minutes to harden. Acetone volatilises so quickly that adhesives applied harden before the parts are joined with glue. The consequence can be insufficient adhesion.



Fig. 3 Example of aggressive corrosion that has partly destroyed the object (HNM 010.05.07c, cat. no. Pr13)



Fig. 4 Lampstand with thin layer of corrosion, deformed and with cracks (HNM 02.18.86d, cat. no. M70)

In humid climates more problems with insects may occur; moreover, there is a higher risk of mold growth. Objects need to be stored accordingly by means of ventilation or with the help of dehumidifiers in order to protect them from mold. The material used for packaging must be waterproof or suitable to form buffer zones. When using foil, the risk of condensation build-up and consequently also of mold formation has to be considered. Objects must be kept dry. Materials with natural moisture content, such as some organic materials, should be packed breathably, ideally with a buffer zone providing a constant, slow exchange of humidity and temperature equalisation.

Equipment and Supplies

The choice of equipment must be planned considering aspects of sustainability. It should be suited for use in the prevalent climatic conditions, and easy to maintain. Spare parts should be available on-site; otherwise sufficient supplies should be brought along.

Good lighting conditions are essential for restoration work. Furthermore, many devices, especially those for metalworking, run on electricity. Most mobile equipment with rechargeable batteries is not suitable, because it shows lower performance and discharges more quickly. In the case of poor power supply, the acquisition of a generator as well as stabilisers is necessary.

After compiling a list of necessary material and equipment, it had to be checked what was available on-site and what had to be imported from Germany. Generally, the procurement of solvents is particularly problematic, because their transportation by air is not allowed. As there were no chemical companies or distribution systems in Afghanistan, the only remaining possibility for acquisition were 'medical shops', where alcohol was available, because it was used for medical purposes, like disinfection. Acetone is offered in these places as well, but often only in 50-ml bottles, mostly labelled as nail-polish remover and of low quality. Pure petrol could not be purchased; so, in the end, ordinary petrol from the petrol station was tested for suitability in conservation and then used for the objects. Specialised material and parts of the equipment had to be imported, for example pigments and paper.

Chemicals and Adhesives

The chemicals, adhesives and solvents were selected according to the material groups to be restored. The basic equipment of restoration workshops should ensure that all conservational and restorative measures can be carried out during the campaigns and thereafter.

Apart from the above-mentioned solvents, two different chemicals for dissolving lime sinter were chosen: citric acid in the form of crystalline powder to be mixed with water and the complex agent EDTA (ethylene-diamine-tetra-acetic acid), also as a powder. Chemicals that are supplied in powder or granulate form have the advantage that they can be stored for longer periods of time without loss of quality. Mixed liquids, adhesives and pastes can dehydrate and harden, or, as a result of long storage periods, become ineffective.

If, as in the present case, the procurement of specific material is difficult, adhesives should be used that are as multi-functional as possible. The following acrylate co-polymers are suitable for almost all material groups: the polymethylmethacrylates (PMMA) of Paraloid types B 72 and the ethylacrylate/methacrylate Paraloid B 44 or polyvinylbutyral (PVB) Mowital B 30 H.

	Paraloid B 72	Paraloid B 44	Mowital B 30 H
chemical name	ethylmethacrylate/methacrylate copolymer	ethylmethacrylate/methacrylate copolymer	polyvinylbutyral
material form	clear, colourless, thermoplastic pure acrylate	clear, colourless, thermoplastic pure acrylate	fine, white powder
properties	light- and ageing-resistant, remains reversible, good adhesiveness	light and ageing resistant, harder than B 72, strong adhesive force, remains reversible	light resistant, reversible, good adhesiveness
suitable solvents	ethyl acetate, toluene, acetone, xylene, 96 % ethanol	acetone, toluene, xylene	alcohol, acetone, toluene, xylene
suitable for	impregnating, strengthening, adhering, conservation	impregnating, strengthening, adhering, conservation	impregnating, strengthening, adhering, conservation
material type	all kinds of material, i.e. glass, metal, pottery, wood, stone	all kinds of material, i.e. glass, metal, pottery, wood, stone	all kinds of material, i.e. glass, metal, pottery, wood, stone
glass transition temperature (Tg)	40° C	60° C	68° C–70° C

Tab. 1 Comparison of adhesives

In particular cases it is imperative to use specific adhesives. Thin metal sheets usually do not allow for adequate structural stability, because the adhesive joint is too narrow to bear the load. Here, epoxy resin can be recommended, as, due to its good penetration properties, it is suitable for infiltration gluing of glassware and for fine cracks in metal objects. It consists of two components that are mixed together (resin-hardener combination); after 24 hours it hardens to a very hard and rigid substance. Epoxy resins must be used very carefully, as these compounds are hardly reversible.



Fig. 5 Theory lesson in the new laboratory



Fig. 6 Member of the Afghan conservation team, working with health- and safety protection

For strengthening and adhering leather, cardboard, textile and wood, synthetic resin dispersions like Primal WS 24 or pure acrylate dispersions like Primal SF 016 (former AC 33/AC 35) can be used. They form a flexible film, are free of solvents, formaldehyde and ammonia, and consequently are also low in odour and environmentally friendly. This type of synthetic resin provides, among others, a small degree of protection against UV radiation. It is permanently weatherproof and has a high level of powdery resistance, which allows pigments and powdering surfaces to be consolidated. In special cases hide- and bone glue can be the better choice.

Conservation Training Programme

Participants in the programme had to be trained in basics and techniques of restoration work with the objective of being able to continue the restoration work and maintenance of the exhibition after completion of the project. On-



Fig. 7a-b Bowl reassembled with sherds belonging to different objects, before and after conservation (HNM 01.35.86c, cat. no. SP73)

site training of restoration staff began with the spring campaign in 2009 and ended with the spring campaign in 2011, followed by the tasks of setting up and maintenance of the permanent exhibition as well as management of the museum's depository.

In addition to on-site training, restorers and conservators from Herat and Kabul received further training at the University of Applied Science, Conservation Department (Berlin), and at the Museum für Islamische Kunst, Staatliche Museen zu Berlin.

The museum was assigned two staff members from the Ministry of Information and Culture in Herat; furthermore, two staff members of the National Museum in Kabul participated in



Fig. 8 Vessel reassembled with sherds from different objects.



Fig. 9a-b Original sherds of a bowl; restored after cleaning and removal of adhesives (HNM 88.010, cat. no. SP75)

the training programme. The instruction was conducted in English, because no specialist literature on the subject was available in Persian. The English language was also chosen with regard to international co-operations and the participants' intended visits to Germany. To improve their English language and computer capacities, the participants took part in training courses in local institutions.

The basic difficulty of the training programme proved to be the communication of theoretical knowledge about restoration matters (Fig. 5). Since elementary knowledge in the technical subjects of chemistry and physics was lacking, teaching on the causal connections of underlying chemical and physical processes was possible only to a limited extent.

Safety at Work for Staff and Objects

The following basic precautionary measures were specified:

- Wearing gloves and masks while exposing metal objects helps to prevent staff from being exposed to harmful dusts from corrosion products, at the same time protecting the metallic surfaces from harmful sweat of the hands (Fig. 6).
- When handling ancient books, cotton gloves should be worn in order to protect them. Hand sweat and fat can easily be absorbed by the old paper.
- During dust-producing activities a respiratory mask should be worn. It protects the respiratory tract from fine dust particles and reduces the risk of allergic reaction. When handling solvents special masks should be used, i.e. with active carbon filters against organic gases and vapours. When using higher concentrations or specific solvents, appropriate respiratory masks with correspondent filters must be worn.
- During grinding activities it might also be advisable to wear safety glasses in order to prevent the eyes from being irritated by dusts or abrasive particles.
- As a further important safety measure, hearing protection should be mentioned. Continuous stress caused by the ultrasonic descaler, the grinding machine and eventually even a compressor can lead to irreversible hearing damage.

Handling of Objects

A further issue that had to be communicated at the beginning of the training are rules regarding the handling of objects. Apart from wearing gloves it is important that objects be carried in an appropriate manner. They should always be held in both hands with one hand supporting the bottom, in order to prevent the objects from being dropped. When moving vessels with handle(s), the staff must pay attention to small cracks and parts that have been glued, as these are predestined breaking points. For this reason the vessel has to be held by the body. Objects with cracks or objects that have been reassembled have to be treated with special care as they can be very fragile.