

## Preservation of Cultural Heritage: The Restoration of a Globe in Relief from the Department of Geography, National School of Buenos Aires

### ABSTRACT

The Department of Geography of The National School of Buenos Aires (University of Buenos Aires) has varied collections that reflect the different models of teaching used during the 19th and 20th centuries and that witness and document the progress of education, the scientific discoveries, and the advances in geography, anthropology, archeology, and geology during that period. One of the most important pieces is a globe in relief dating from 1850, which suffered severe damage in an accident. It is of German origin according to the maker's mark "Schotte & Cia" (Berlin), although the topographic information is in French. In the 19th century, Germany and France were the major suppliers of teaching materials for many disciplines in Latin America, and were true purveyors of European innovations in educational systems and policies at the time.

Within the Integral Plan for Preservation of Cultural Heritage in the National School, the Conservation Group, in conjunction with the Department of Geography, presented a proposal for restoration of this cultural asset. The piece had several types of damage caused by different agents of deterioration, resulting in both physical and chemical problems. The proposal sought to reconstruct the damaged area of the globe, clean and consolidate its surface, and correct deformities in its support. The intervention also helped to recover the visual legibility of the globe, which provides varied information related to 19th century cartographic knowledge and political situations and to the scope of exploration and discovery at the time.

### NATIONAL SCHOOL OF BUENOS AIRES

The National School of Buenos Aires is located in the historic center of the city. The history of the school goes back to the Jesuit Missions of the 18th century. In 1863, the school

was turned into a public institution, and in 1911 it became part of the University of Buenos Aires. Presently it is one of the most prestigious high schools in the region.

The school has a diverse collection of teaching tools that reflect its long history. Frequently its teaching methodology was based on foreign models. At the end of the 19th century, Germany and France were the main providers of educational models and materials for schools in Latin America. The topographic globe is an example of the types of teaching aids imported from Europe at the time.

### THE DEPARTMENT OF GEOGRAPHY OF THE NATIONAL SCHOOL OF BUENOS AIRES

The Department of Geography has a vast collection of minerals, fossils, and anthropological pieces. It also maintains a collection of geographical and historical maps, cast topographic relief maps, and various globes, including the globe in relief treated in this project. The Conservation Group, with funding from the Parents Association, has carried out several projects in the geography department. These projects have included the improvement of storage conditions, the preservation of flat maps, and the conservation of this topographic globe.

### CONSERVATION OF THE GLOBE IN RELIEF

The aims of this project were to carry out scientific analysis of the globe, to create a photographic record and written documentation of the globe, and to complete conservation treatment of the piece. The intention of the treatment was to return the globe and its support stand to an approximation of their original appearance and to functional order. The globe stand required treatment because its metal components had been accidentally deformed. A secondary objective was to educate the high school community about the globe's significance and the importance of its preservation.

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## GLOBE AND STAND IDENTIFICATION

The globe consists of three main elements: the sphere, which presents cartographic information, the metal circles or rings around the globe, and the wooden stand that supports the globe. Together, the globe and stand are 52 in. high and 34 in. wide. The stand has a three-legged wooden base topped with four curved iron rods, which support a 12-segmented iron horizon ring featuring astrological symbols. The metal axis of the globe is attached at both ends to a brass meridian ring. The wooden base has a fixed bronze support on which the meridian ring sits, allowing the globe to rotate. The sphere's diameter is 27 1/2 in. The globe was constructed of papier-mâché in two halves, with wooden plugs at the poles; the metal axis, which passes through the plugs, has bronze hour discs on its ends. The topographic relief was molded in plaster and attached to the globe's surface. The relief layer was painted with different colors corresponding to seas and continents, and some countries were outlined. The paper labels were printed in French and attached to the globe. During conservation, dated paper labels and a seal were found inside the globe, indicating that it was made between 1845 and 1847. This allowed the globe to be dated more accurately.

## BEFORE TREATMENT DESCRIPTION

The main problem of the globe and stand was physical damage that occurred in 1997, when someone accidentally fell down the stairs and hit the globe (fig. 1). The impact caused breakage, loss of material, and deformation of the globe, and almost split the sphere completely (fig. 2). The metal structures were also deformed, and the globe lost its characteristic rotational movement because of the deformation of its axis.

The treatment sought to correct the damage to the globe and the metal parts of the stand, returning the globe to working condition. The globe stand, the metallic elements of the horizon ring, which is formed by iron bars and plates, the brass meridian band, and the bronze hour circles at both ends of the sphere were damaged (fig. 3).

The globe and stand had also been subjected to use and wear over the past 160 years. Prior to treatment, the globe had a layer of yellowed, brittle varnish that compromised the general view of the object. There was also an accumulation of surface dirt that made the labels difficult to read. Abrasion and the use of inappropriate cleaning products had caused additional loss of the varnish layer, weakening of the paint layer, and loss of certain labels and the information they contained. Overpaint was also noted in some areas, especially in the Argentinean region (fig. 4).



Fig. 1. The globe before treatment



Fig. 2. Detail showing breakage and structural loss



Fig. 3. Detail showing the damage suffered by the metal horizon ring



Fig. 4. Detail showing aged varnish layer



Fig. 5. Sphere separated into two halves



Fig. 6. Paper used as part of the papier-mâché structure printed with the date 1845

#### SCIENTIFIC RESEARCH

Scientific analysis of the pigments, varnish, and structural materials was carried out in the National Institute of Industrial Technology in Buenos Aires. FTIR was used to identify the varnish and the binder of the paint layer. The results matched the initial hypothesis that the binding medium was oil and the varnish was a natural resin.

The solubility tests carried out in the studio determined that the adhesive used for the labels was water sensitive. Tests of the paint layer and the label text showed that they were not sensitive to water. Therefore, a 1:1 solution of water and ethanol was used with extreme caution when cleaning the labels.

#### TREATMENT

The treatment focused mainly on correcting the damaged support and bent metal components to allow the globe to rotate as before. Cleaning the globe's surface and correcting

its deformations were also of primary importance to allow the globe to function and increase the appreciation of its original aesthetic. The treatment was completed in a period of six months.

The first step was to separate the sphere from its support and to remove the damaged metal components, or the meridian and horizon rings. The two halves of the sphere were separated in order to work on them separately (fig. 5). In the process of separation, a first consolidation step was done to avoid further loss of material. To return the globe to its original spherical shape, the broken half sphere was reconstructed and re-enforced with papier-mâché. In this process, conservators followed the original manufacturer's technique from 1845 (fig. 6), using wheat starch adhesive and thick, long-fibered paper that was strong enough to correct the deformations.

The following steps included the consolidation and relocation of original broken pieces that were detached from the globe. All treatments were carried out with reversible,



Fig. 7. Consolidation of broken pieces



Fig. 8. During the cleaning process



Fig. 9. Re-attachment of the two halves of the sphere

conservation-quality materials. For the broken pieces and consolidation of the original plaster, a neutral-pH ethylene-vinyl-acetate (EVA) adhesive was used (fig. 7), which was chosen for its strength and reversibility with water.

The surface of the globe was cleaned with a solution of distilled water and ethanol, both in liquid and gel form. The gel was formed using Klucel G (hydroxypropyl cellulose) and was applied mainly in areas where a great accumulation of varnish was found. The original labels and the overpaint were also cleaned with this solution, taking special care due to the solubility of the adhesive used on the labels (fig. 8).

In order to re-establish the original shape of the sphere, papier-mâché in the broken half of the sphere was reconstructed and re-enforced. For the other half, a system of cotton bandages was used to correct the deformations, and the interior was humidified slowly in order to achieve controlled movement and controlled tension of the material.

After cleaning, consolidation, and structural correction, the two halves needed to be re-attached. This was done using the same EVA adhesive with an inert ground of calcium carbonate. The area of attachment was re-enforced with a web of cotton wool to support the adhesive (fig. 9).

Once the two halves were united, areas of loss were filled. First, a barrier layer of shellac was put between the papier-mâché and the new material. The areas of loss were filled with a layer of plaster and then a thin layer of calcium carbonate in animal glue to imitate the original surface texture (fig. 10). The fills were retouched using watercolors. The objective was for the retouching to be recognizable from a certain distance without interrupting the general view of the object (fig. 11).

A final layer of ketone resin dissolved in white spirit was used to varnish and protect the retouched areas of the globe. Regrettably, two years after the treatment, there has been a slight darkening of these areas. This is attributed to the quality of the varnish and the ketone resin, which is softer than



Fig. 10. Detail, filling losses



Fig. 11. Detail, retouching

acrylic resin. An acrylic resin was not chosen at the time of treatment because any solvent used to remove this type of varnish would also endanger the paint layer and the printing ink from the original labels. There is currently a project to eliminate the ketone resin from the whole surface of the globe and to apply acrylic resin (Paraloid B72 dissolved in butyl acetate) only in the retouched areas, avoiding damage to the original oil paint and the labels' ink in case of removal.

#### SUPPORT AND METAL TREATMENT

The treatment of the support and the metallic elements was performed by metal conservator Iván Casime. He corrected the bent, deformed metal pieces of the support, horizon ring, meridian, and bronze hour discs. The bent and deformed metal parts were treated very slowly using a system of localized pressure. The pressure used was determined by the type of metal. The goal was to bring all the elements into working order and to prevent further deformation.

Some cleaning was carried out on these metallic elements, focusing on the elimination of corrosion on the bronze elements. This cleaning was not very deep, given the instability of the painted metal. After the metal had been brought into



Fig. 12. The globe after treatment

plane and cleaned, a layer of acrylic resin varnish was applied to protect the metal and prevent corrosion. Once all the pieces were ready, the globe was re-attached and mounted to the stand (fig. 12).

#### CONCLUSION

After a lot of hard work, it was a pleasure to see the gratitude of the community and school when the globe and stand were returned to the geography department. The same year the treatment was completed, the department organized an exhibition entitled *Didactic Material Used in Teaching Geography During the 19th and 20th Centuries*. This exhibition included a video of the treatment of the globe.

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## FURTHER READING

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