Article: Walter Cole Brigham and marine mosaics
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Source: *Objects Specialty Group Postprints, Volume Five, 1997*
Pages: 20-31
Compilers: Virginia Greene and Ingrid Neuman
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WALTER COLE BRIGHAM AND MARINE MOSAICS

Mary Clerkin Higgins

Abstract

The artist Walter Cole Brigham (1870-1941) developed a unique method for fabricating stained glass windows and objects de art using a technique quite unlike the traditional lead-came or copper-foil techniques, where some type of metal provides the structural support for the glass. Brigham’s method relied on the ability of his proprietary lead-putty mixture to hold shells, rocks, glass chunks, fragments of glass bottles, flat glass, and other materials imbedded in it to a transparent plate glass support. The putty network of a large window in the collection of The Brooklyn Museum of Art had weakened considerably over the years necessitating the development of a consolidation treatment using Acryloid B72. As part of the treatment EDS analysis of certain materials was undertaken.

Introduction

Between the years 1900-1915 the artist Walter Cole Brigham (1870-1941) fabricated jewelry, lampshades, fire-screens, and windows using a unique method which he developed and dubbed "marine mosaic". Unlike traditional lead-came or copper-foil techniques, where some type of metal provides the structural support of the glass, Brigham’s method relied on the ability of his lead-putty mixture to hold materials imbedded in it to a transparent plate glass support. To quote Brigham, “It is impossible to use ordinary leading such as most mosaic artists use. I use cement. My uncle has used it for one thing and another for twenty years or more, which proves its durability, but it is a secret of our family.”[1].

Unfortunately, twenty years isn’t fifty years or eighty years, and Brigham may have been blissfully unaware of the serious flaws in his technique. Once the putty dried out and lost its adhesion to the base glass, the materials were only held in place by whatever mechanical hold the shaped putty had. As it dried out further and developed cracks, the work became structurally unsound. Though at least five of his windows are known to survive (and it did take a hurricane in 1938 to knock out three others), all remaining windows show numerous restoration campaigns, some quite intrusive and inappropriate. Three are in churches on Shelter Island, a summer resort off the eastern end of New York’s Long Island where Brigham lived and maintained his studio - ‘Harbor Villa’.

The other two are large landscape windows, approximately 6½ feet square with flattened gothic arches at the top, which were removed from the Charles Merrill Memorial Chapel of the Brooklyn Home for Aged Men. One, from 1915, is in a private collection in Las Vegas, Nevada and the sections in it which haven’t collapsed yet are dangerously close to doing so. The other, the subject of this paper, dates from 1912 and is now in the collection of The Brooklyn Museum of Art (70.3). These were the last two windows Brigham constructed using the “marine mosaic” method.

Considering the materials he chose to use and his artistic goals, Brigham’s decision to embed materials in a pliable putty rather than employing other methods in use in the stained glass field at the time makes some sense. Though he did make limited use of the traditional lead-came which comes in strips of even widths which are cut to size and then soldered together, these strips wouldn’t accommodate his placement of thick chunks of glass and stone next to paper thin shells or have given him the organic lines he was able to create using the putty. With a cold setting material he could avoid the heat and messy flux needed for the copper-foil technique. However, unlike Brigham’s work, copper-foiled windows from the same period are usually still in excellent condition structurally. Leaded windows may or may not be structurally sound, but the method allows for the replacement of the lead if necessary.
Brigham's creations consist of shells, rocks, glass chunks, fragments of glass bottles, flat glass, and other materials. The putty was warmed to a semi-soft state and tinted. It was placed around
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the edges of the various materials which were then pressed onto a piece of 3/8 inch plate glass while it lay flat. The front surface of the putty was shaped by Brigham with tools used for modeling wax and clay. The glass sandwich was put in a bronze frame and held in place by small metal clips and putty. The Brooklyn Museum of Art’s window was made in twelve sections of varying sizes and shapes. Once the putty had set, which took about one week, the piece could be lifted. Final setting took several months.

Friends knew of Brigham’s interest and brought him rocks and shells from all over the world. In his studio were bins labeled “white jingles, small; red jingles, large; red scallops, odds; white cockles; sand mussels; ribbed clams, telegraph glass....”[2]. In the Brooklyn windows (see Figure 2) we see many different types of shells, rocks and pebbles, glass from smashed telegraph insulators and from a variety of bottles. It has been reported that some of the colored opalescent sheet glass came from Tiffany Studios, which is quite possible and helps explain why, along with the fact that the chapel also contained three windows by Tiffany Studios, these two windows were initially identified as products of that studio when they were salvaged and put up for auction. The later of the two Brigham’s also incorporates glass etched with hydrofluoric acid and areas of silver stain, techniques used with great skill by Tiffany Studios.

Consolidation of Putty

It is very unusual to have putty actually holding an art glass window together - it usually plays a secondary, though still important role of waterproofing and strengthening the ensemble, and when it dries out and ceases to function it is replaced. In this case, the putty had dried out, but being an integral part of the artwork, it could not be replaced.

The first priority was to develop a treatment to stabilize the entire putty network. Two areas had collapsed and needed to be re-established and other areas were extremely weak. Past repairs needed to be assessed, both aesthetically and structurally. Cleaning was also an issue: the front and back of the sandwich would be cleaned, but gaining access to the interspace between the art glass and the plate glass to remove disfiguring dirt and drips depended on the success of the consolidation process.
Various materials were considered for the consolidation of the putty, ranging from several of the acryloids to conservation epoxies. Acryloid B72 (ethyl methacrylate copolymer) was determined to be the most appropriate. Although used extensively in the conservation field it has not had many uses in stained glass conservation beyond consolidating paint.

Once dissolved as a 20% solution (w/v) in ethyl alcohol it was applied around the edges of each of the different materials where they met the putty and onto the surface of the putty using eye droppers. One could see through the plate glass that the consolidant traveled through the cracks to the back of the putty. It proved to be very effective in holding all the materials together. Any excess was cleaned off the front surface of the glass, stones, and shells. For strength, very minor amounts were allowed to remain in places on the front of the putty, which was then brought to a matte surface using fiberglass brushes. Over the years some areas had bowed out of a flat plane. While it was possible to consolidate some small, partially collapsed areas and then, with the Acryloid B72 somewhat set, move the material back into plane, it was considered too risky to
flatten the larger bowed areas and they were consolidated as they were.

It should be noted that this treatment is not proposed for putty which has dried out in stained glass windows. Since the putty in those situations is not providing the actual structural support, but rather waterproofing and supplementing the strength of the lead (or other metal), its consolidation could significantly impede the proper treatment of the lead and glass when that proves to be necessary. In such cases, if it has been determined that the lead is still strong and need not be replaced at that time, the dried-out putty should be carefully removed and fresh putty applied.

Separation of Layers

Once it was determined that the Acryloid B72 was effective in the consolidation of the putty it was possible to consider separating the plate glass support from the art glass layer in order to remove the unsightly drips and dirt trapped between them. The most disturbing areas were those above the horizon line (see Figure 4). Four of the 12 irregularly shaped sections were removed from the bronze frame. These sections had first been consolidated with the Acryloid B72 and selected areas were then further supported using a coating of silicone rubber (Dow Corning, 3110 RTV), which locked the materials in place but which readily separated from them afterward.

Figure 4. Disturbing vertical drips trapped between art glass and supporting plate glass.
Photograph - M.C.Higgins
Once apart, the back of the art glass was also consolidated with the Acryloid B72 and the interspace surfaces were cleaned. While the consolidation significantly strengthened the putty matrix (see Figure 3), it was still considered too risky to separate any panels where it was not essential to clean the interspace for aesthetic reasons, and so none of the panels below the horizon line were separated. On the separated sections the decorative layer was secured to the plate glass around the edges with clear silicone (GE RTV 118). The largest of the removed sections was also attached to the plate in several places toward its center by drilling holes through the putty and forcing in small amounts of clear Acryloid B72. The Acryloid B72 was also used to consolidate an unstable glass which had developed numerous cracks.

Missing Putty

All of the fragments of old putty from the collapsed section were kept and laboriously sorted through to be matched up with the glass chunks, stones, etc., that had also been recovered (see Fig. 5). This was very important in re-establishing the layout, since many pieces of glass had been inserted on their sides or overlapping slightly, which couldn’t be seen in the documentary photograph, and many of the rocks appeared interchangeable. Nestling the materials in the three dimensional putty fragments helped establish their locations and the pieces they abutted and greatly aided the reconstruction.

Figure 5. Collected fragments of putty, glass, stones, etc. Photograph - M.C.Higgins
Some of the putty had completely crumbled and was unusable, and in other areas of the window some original putty had been replaced with inappropriate materials (i.e. lead). Various materials were evaluated to determine what would best replace putty lost in the collapsed and previously repaired areas and Dap 33®, consisting of linseed oil, calcium carbonate, vegetable oil, talc, and petroleum oil, was chosen. It was developed from linseed oil putty, but is meant to dry more slowly and thus avoid the same degree of cracking, which was felt to be desirable here. A test section was fabricated and proved to be very satisfactory. The Dap 33® could be readily colored with powdered pigments to match the front surface color of adjoining areas - the color of the original putty is not uniform throughout - and tooled as necessary to match the look of the existing putty. For strength in the areas of collapse many of the rocks and heavy glass jewels were attached directly to the base plate glass using Acryloid B72 in acetone (50% solution w/v). The new putty was then worked around the materials to look like the original.

This new putty will, of course, also dry out in time, though the panel is now exhibited under museum conditions. No sections were completely re-puttied and the weight of some of the materials is now supported by the Acryloid B72. The conservation staff will periodically examine the re-established areas and may, in time, consolidate the Dap 33®.

Analysis of Putty

Table I. Energy dispersive X-ray spectrometry compositional analysis (EDS) of two putties.

<table>
<thead>
<tr>
<th>Weight %</th>
<th>Na</th>
<th>Al</th>
<th>Si</th>
<th>S</th>
<th>Cl</th>
<th>Ca</th>
<th>Fe</th>
<th>Zn</th>
<th>Ba</th>
<th>Pb</th>
</tr>
</thead>
<tbody>
<tr>
<td>Brigham</td>
<td>-</td>
<td>&lt;1</td>
<td>1</td>
<td>9</td>
<td>-</td>
<td>4</td>
<td>&lt;1</td>
<td>7</td>
<td>5</td>
<td>73</td>
</tr>
<tr>
<td>La Farge</td>
<td>4</td>
<td>&lt;1</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>82</td>
<td>&lt;1</td>
<td>3</td>
<td>-</td>
<td>4</td>
</tr>
</tbody>
</table>

Energy dispersive X-ray spectrometry compositional analysis (EDS) [3] shows that Brigham’s putty contains a high proportion of lead and sulfur, with significantly less calcium (Table I). Barium sulfate or lithopone (barium sulfate and zinc sulfate) may have been added as filler. This can be contrasted with the analysis of a putty taken from a John La Farge window (The Metropolitan Museum of Art, 30.50) wherein calcium comprises 82% and lead only 4% of the whole, by weight. The La Farge uses the more traditional linseed oil putty, which is primarily whiting (calcium carbonate) mixed with boiled linseed oil. A small amount of powdered lead was frequently added as a drying agent, though in New York State that is now prohibited. Other ingredients, such as plaster of Paris as an extender and lampblack as a colorant, are also listed in contemporary recipes [4]. Brigham’s recipe appears closer to ones for aquarium cement which contain litharge, plaster of Paris, sand, rosin and boiled linseed oil [5]. The uncle Brigham attributes his recipe to was a naval engineer and Brigham’s two brothers ran a shipyard in
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Greenport, L.I. It may well be that Brigham’s recipe derives from a maritime one, and the name “marine mosaic” may refer to more than the profusion of shells.

Various Repairs

A variety of repair methods had been used to either replace missing putty or to fill light leaks and consolidate original putty. Each of these needed to be assessed to determine whether: it was adequately holding the materials in place and could continue to do so; it had a positive, negative, or neutral effect on the aesthetic reading of the window; it could be safely undone if the effect was negative.

One restorer abandoned Brigham’s putty method altogether and used lead-came for a small collapsed area to the upper right of the window. Most of the original glass must have been lost since new, replacement glass had been used in the fill, which had been toned down with a “cold” (unfired) green paint. When this was taken apart and cleaned it became obvious that the replacement glass was not a good match for the original and that there was not nearly enough of it to fill the hole. New glass chunks were found to replace those missing, using remaining original glass as a guide for color, size, and design. A few pieces of the old replacement glass were used where appropriate. This was puttied in place as it had been originally.

Cleaning

Cleaning involved not only removing the dirt that had settled on the front and back surfaces of the piece, but removing or minimizing the various materials which had been used in previous consolidation attempts - from shellac to hot melt glue sticks (ethylene vinyl acetate and hydrocarbon resin). The artist himself maintained that the shells and pebbles “are used in their natural state, no artificial coloring being added, nor any chemical brought to play to diminish or soften these quiet tones and delicate shades”[6]. While the artist’s own statements cannot be completely relied upon, since at times they may state the ideal rather then the real, and they came two years before this piece was made, they nonetheless did reflect what was found on the panel. Where shells were now coated with what looked to be darkened shellac and others had a light white wash, these materials were found on the surface of the putty and in dried out cracks, indicating they were not original. They were removed.

At some point glass chunks near the horizon of the water had been re-adhered using a hot melt glue from a glue gun. While it is not an original material, it is holding the glass chunks securely in place and there was a danger that its removal could cause damage to surrounding areas or cause material to fall between the 2 layers. Its color was not a problem since it should actually be opaque, rather than a translucent milky-white. Putty was placed over it to outline the individual glass chunks. A dark, opaque plumber’s epoxy-putty had also been used in this area, though not
applied with anything like the care of the original. Again, because it was so well bonded with the
glass beneath it, it was left in place, but excess material was removed using a Dremel Moto-tool®
to bring it more in line with the look of the original. Some plumber’s epoxy was inaccessible and
had to be retained.

Table II. EDS of blue consolidant.

<table>
<thead>
<tr>
<th>Weight %</th>
<th>Na</th>
<th>Al</th>
<th>Si</th>
<th>S</th>
<th>Cl</th>
<th>K</th>
<th>Ca</th>
<th>Ti</th>
<th>Cr</th>
<th>Fe</th>
<th>Zn</th>
</tr>
</thead>
<tbody>
<tr>
<td>Blue</td>
<td>11</td>
<td>12</td>
<td>69</td>
<td>1</td>
<td>&gt;1</td>
<td>&gt;1</td>
<td>&gt;1</td>
<td>&gt;1</td>
<td>&gt;1</td>
<td>3</td>
<td>1</td>
</tr>
<tr>
<td>Consolidant</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
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</tr>
</tbody>
</table>

An opaque blue consolidant was found in a number of places on the window, on both the putty
and the glass, to which it had bonded well, sometimes etching it. From its analysis (Table II) it
appears to be a sodium silicate which is an ingredient in various sealant recipes and is known to
have been used to restore other Brigham windows, though not with the blue colorant, and not
very successfully - it had etched the glass in those windows, permanently damaging it. Why it was
blue on the Brooklyn window is not clear. Since it was also found in the interspace at the
perimeter of the lead repair, it was clearly done at that time and it may have been used as a binder
to help hold the lead repair to the plate glass. Adjacent areas have the heaviest application and it
certainly helped the inferior lead repair fit in better by masking original glass. After toning that
area down it may be that the restorer continued to use it to fill in “light leaks” all over the panel.
If the windows were seen primarily with light coming through them and not reflected off of them,
it may not have been disturbing. It is possible that the material wasn’t originally blue, but
discolored dramatically over time. At the time of treatment it was still well bonded to the glass,
though it easily flaked off the putty and shells. It was removed.

Conclusion

Walter Cole Brigham was innovative and ambitious, but his chosen material, while generating
attention at the time for its uniqueness, ensured his relative obscurity as his works crumbled and
disappeared. In his landscape window in the collection of The Brooklyn Museum of Art the
consolidation of the putty matrix using Acryloid B72 proved to be very effective and allowed the
retention of his original material with no significant alteration of its appearance. Cleaning of the
outer surface and selected areas of the interspace was extremely important to return the “quiet
tones and delicate shades”[7] of the shells and stones and to allow the glass to sparkle once again.
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Acknowledgments

My thanks to everyone who helped with this project. Ken Moser (Chief Conservator), Ellen Pearlstein (Conservator of Objects), and Kevin Stayton (Curator of Decorative Arts) of The Brooklyn Museum of Art guided the project from start to finish. Mark Wypyski, Associate Research Scientist in the Sherman Fairchild Center for Objects Conservation of The Metropolitan Museum of Art, performed the EDS. Jack Cushen discussed his experience with other Brigham windows and provided some helpful references. The treatment itself was carried out by the author with the assistance of fellow conservators Marie P. Foucault Phipps and Elizabeth Ryan.

Endnotes

1. Dr. Stewart W. Herman, “Marine Mosaic... The Lost Art of Walter Cole Brigham,” Stained Glass Quarterly 72, Spring (1977): 34.

2. Ibid., 33.

3. The EDS analyses were performed by Mark Wypyski in the Sherman Fairchild Center for Objects Conservation of The Metropolitan Museum of Art. A Kevex model Delta IV energy dispersive X-ray spectrometer attached to an Amray modified model 1100 (1600T) scanning electron microscope (SEM) was used for the analysis.


7. Ibid., 23.


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Materials

Acryloid B72 is manufactured by Rohm and Haas Company, Independence Mall West, Philadelphia, PA 19105 and is available through Talas, 568 Broadway, NY 10012.

Dap 33®, manufactured by Dap, Inc. of Dayton Ohio, is generally available at hardware stores.

3110 RTV Silicone rubber is manufactured by Dow Corning. It is available at art supply stores.

RTV 118 Translucent, a general purpose self-leveling silicone, is manufactured by the General Electric Company, 260 Hudson River Road, Waterford, NY 12188.

Dremel® Moto- Tool is available in hardware stores.

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