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# FROM MARBLE TO MUSSELS: A SIMILAR TREATMENT APPROACH TO DISSIMILAR MATERIALS

JUDY OZONE AND ABIGAIL MACK

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## ABSTRACT

The conservation treatments devised for two important sculptures in the collection of the National Gallery of Art were found to be unexpectedly similar in approach and choice of materials, despite the fact that each sculpture is substantively different from the other in terms of materials and methods of fabrication, as well as in artistic motivation and conception.

Damage to a 1786 marble portrait by Jean-Antoine Houdon rendered the sculpture so physically compromised that even the most careful handling in the course of treatment could cause further damage. The construction of the mixed media *Panneau de Moules* by Marcel Broodthaers had weakened in the forty years since its creation in 1966; thousands of mussel shells held together by polyester resin were tenuously attached to a desiccated particleboard support. The physical configuration of damage in each object presented logistical challenges that made developing an effective yet safe treatment especially difficult.

## 1. INTRODUCTION

The sculpture collection at the National Gallery of Art is built around Western European and American works that date from the 14th century to the present day. From enduring bronze statuettes of the Renaissance to transitory conceptual works of the late 20<sup>th</sup> century, the collection embodies the shift from traditional to non-traditional materials and techniques as well as the evolving role of art within Western culture.

Two important objects in the collection that epitomize such diversity presented the Object Conservation Department with two separate and thought-provoking treatment challenges. The first work, a traditional marble portrait by Jean-Antoine Houdon of *Giuseppe Balsamo*, is signed and dated 1786.<sup>1</sup> Balsamo was more famously known as “Count Cagliostro,” the notorious figure who was involved in the legendary necklace swindle of Marie Antoinette.<sup>2</sup> The second object is a modern composite work of mussel shells and resin mounded on particleboard, titled *Panneau de Moules*, which was created in 1966 by the Belgian poet, filmmaker, and artist Marcel Broodthaers. Materially and conceptually, the enigmatic mussel panel, with its mundane and ephemeral components is the antithesis of the solid, laboriously carved sculpture by Houdon.<sup>3</sup>

At first (and even second) glance, these objects have very little in common (fig. 1). Composed of vastly different materials and made nearly 200 years apart, each was created for a different purpose and represents a wholly different era in art history. The Houdon bust was commissioned to honor Cagliostro at the height of his popularity, before he was exposed as a criminal and charlatan. By contrast, Broodthaers used his work to challenge the mind more than the eye, often using everyday objects that defied cultural status. The culmination of this concept came in a 1972 exhibition in which every object carried the label, “This is not a work of art.”<sup>4</sup>

The critical condition of each sculpture led the authors to devise individual treatments that ultimately united the objects in unexpected ways. Their initial similarity was simply that the structure of each object was so weakened that neither could be exhibited without a comprehensive and potentially intrusive treatment that might significantly alter its appearance. Though conservation treatment of the Broodthaers followed that of the Houdon by over a year,

the results from the material tests and the procedural concepts developed for the marble treatment were entirely appropriate for the mussels treatment. The complete condition and treatment details of each object are not included here; this report will focus instead on their similarities.



Fig. 1. (left) Jean-Antoine Houdon, Giuseppe Balsamo, Comte di Cagliostro. Collection of the National Gallery of Art (1952.5.103). (right) Marcel Broodthaers, Panneau de Moules Collection of the National Gallery of Art (2005.36.1). (Photographs by Lee Ewing)

## 2. CONDITION OF *GIUSEPPE BALSAMO, COMTE DI CAGLIOSTRO*, BY JEAN-ANTOINE HOUDON

The Houdon marble was severely damaged when it fell from a lift during transport within the museum. The top-heavy sculpture landed head first onto a concrete floor, resulting in fragmented and crushed marble, as well as a series of deep cracks and fissures. The most serious damage emanated from the point of impact at the top of the head. A deep and wide crack bisected the head - from the front neck, across the right side of the face, and down to the collar at the back - such that each end of the crack was only inches away from the other within the neck. This primary crack measured 20 inches in length (51 cm) (fig. 2).

The resulting crack was also over 1.0 mm at its widest point, and tapered off through most of its length into a network of hairline fissures that branched up to 10 cm away from the main crack. What made this crack even more troublesome was that, in addition to its substantial width, the marble had sprung, that is, the stone's inherent internal stresses were released, creating a permanently stepped and misaligned surface. This misalignment was especially apparent across the right eye (fig. 3).

An additional problem was that the sculpture did not break apart *enough*. Had it split completely apart, it might have been easier to apply adhesive or to pin the sections together. It was the potential depth of this primary crack that most compromised the sculpture's overall stability and created the question of how to ensure sufficient penetration of an adhesive. At the top of the head, the crack measured as much as 3 inches deep.



Fig. 2. Detail of damage: Houdon, Giuseppe Balsamo (Photograph by Abigail Mack)



Fig. 3. Detail of damage through right eye: Houdon, *Giuseppe Balsamo* (Photograph by Abigail Mack)



Fig. 4. Detail of surface loss: Marcel Broodthaers, *Panneau de Moules* (Photograph by Judy Ozone)



Fig. 5. Detail at of resin separation at panel edge: Marcel Broodthaers, *Panneau de Moules* (Photograph by Judy Ozone)

### 3. CONDITION OF *PANNEAU DE MOULES*, BY MARCEL BROODTHAERS

The fragile condition of the Broodthaers work was evident immediately when the object arrived at the museum for purchase consideration. Taped along the inside edges of the packing crate were little packets of detached mussel shells. Many of the shells were broken, lost, or actively separating from its particleboard backing (fig. 4). More seriously, the friable particleboard was prone to flexing and was inadequate to support the weight of the thousands of shells held together in a matrix of clear and tinted polyester resin, all of which is meant to be viewed vertically. Between the shells, it was apparent that the resin was not a continuous film. Also visible were remnants of old paint on the board, along with leaves and other detritus among the shells, which gave evidence to the swift and spontaneous application of shells on a recycled board. The many detached and insecure shells as well as gaps along the edge of the panel called attention to the fact that both the resin and particleboard had shrunk appreciably (and at different rates) in the 40 years since the piece was made, and raised serious concerns about the overall structural integrity of the work (fig. 5).

Even with careful handling, the board would flex and the movement of the shell / resin conglomeration was audible. While there was no way to know where the resin was separated from the support, or even how much was still attached, it was clear that the entire assemblage had the potential to loosen and eventually delaminate. The challenge was to devise a way to re-establish a structural bond at the interface between the resin and board in spite of the fact that the interface was buried beneath five inches of shells and the areas of weakness were not visible.

### 4. SIMILAR TREATMENT CONSIDERATIONS AND APPROACHES

Each sculpture had problematic physical damage that limited the choice of treatment procedures and materials. The very fragile condition and gross structural instability of both objects meant that even the most judicious handling during treatment was an opportunity for increased damage. Complicating matters for each object was that access to the unstable areas was severely limited, and therefore limited the treatment materials and methods that could be used.

At one end of the treatment spectrum is the choice to do nothing. Should the Houdon bust be chalked up as a loss and put into storage forever? If the Broodthaers panel could not be installed vertically on a wall (as the artist intended) without the continual loss of mussel shells, should it be exhibited at all? At the other end, the ultimate goal for each treatment is to ensure that the object is stable enough for long-term exhibition or for travel on loan. After many conversations between curators, conservators, and administrators, the decision was to fully treat each object, acknowledging that a certain amount of creativity and likely irreversibility in the treatment process would be required to respond to each object's physical constraints. Despite efforts to anticipate the steps of treatment, the very fragile condition of both works required constant re-evaluation and the flexibility to change course if needed.

### 5. TREATMENT OF THE HOUDON MARBLE

The marble's physical condition was so tenuous that every effort had to be made to prevent magnifying the damage. To prevent loss, the fragments were contained *in situ* with squares of non-woven tissue and wheat starch paste; the head was then wrapped with cotton cloth to prevent movement of the weakened marble. A wooden cradle lined with foam custom-cut to the

sculpture's contours was fabricated to secure the sculpture during treatment (fig. 6). It should be noted that the marble weighs over 300 pounds, and the cradle was designed so the immobilized sculpture could be turned over in order to access the full circumference of the crack.

Before the primary crack could be treated, the crushed marble and extensive fissure network had to be consolidated. The goal was to find an adhesive that had sufficient cohesive strength to connect the fissures and viscosity low enough to flow through the relatively dense matrix, yet not saturate or darken the marble. A group of low viscosity adhesives was compared for strength and saturation by combining alternative solvents and various resin concentrations that were tested on samples of Carrara marble.<sup>5</sup> The chosen combination proved to be a low concentration of Paraloid B-72 dissolved in di-ethyl benzene (DEB), which was applied by brush.

To increase the penetration and distribution of the resin throughout the marble matrix, the entire consolidation procedure was done in a DEB fume-saturated chamber, after which the marble was kept in isolation in the spray booth for over six weeks to allow for the slow dissipation of solvent (fig. 7).

Once the fissure networks were consolidated, the challenge was to identify the most viable structural adhesive for the primary crack. As revealed by x-radiography, only 6 inches of intact marble separated the new network of cracks through the head and neck, from an old vertical crack that runs from the center of the bust, up through the ruffle of the shirt. The ideal adhesive would have to satisfy three conditions: 1) have a low viscosity in order to penetrate the full extent of the crack; 2) be strong enough to hold the sprung halves together; 3) fill the void created when the marble distorted.

The extremely limited access along the length of the crack required the use of an adhesive with the lowest possible viscosity in order to reach into the depths of the crack. For this reason, Hxtal NYL-1 epoxy was chosen following considerable testing. In order to avoid staining the surface, medical syringes were used to inject the epoxy deep into the crack. Because the crack traversed the entire head, any application of adhesive from one side would likely flow out through the other. To contain the flowing epoxy as it was introduced into ports at the front of the head, the crack at the crown was dammed with a wax-resin mixture (fig. 8).<sup>6</sup> The same procedure was used when the sculpture was turned onto its back.

To control its movement within the marble, the Hxtal epoxy was applied in small increments and allowed to cure in successive stages until the built up layers of epoxy could be seen within the crack (fig. 9). The last half-inch of the gap was underfilled with the slightly more viscous Akepox 5000 epoxy which has less creep, more body, and could also serve as a gap filler. With the primary crack stabilized, the remaining gap was filled level with the sculptural surface using the same wax-resin mixture as was used to dam the crack, tinted to match the adjacent marble surface (fig. 10).



Fig. 6. Wooden cradle for Houdon marble (Photograph by Abigail Mack)



Fig. 7. Fume chamber for marble consolidation (Photograph by Judy Ozone)



Fig. 8. Applying wax-resin dam material around injection ports (Photograph by Judy Ozone)



Fig. 9. Injection of epoxy into crack (Photograph by Abigail Mack)



Fig. 10. Detail, after treatment: Houdon, *Giuseppe Balsamo* (Photograph by Abigail Mack)

## 6. TREATMENT OF THE BROODTHAERS PANEL

Immediately after acquisition, a request was made for loan of *Panneau de Moules* to an outside exhibition, provided the work could be successfully treated. Thus, the treatment plan for the mussel panel had to go one step further and take into account its transport by truck. With the knowledge that the work would be traveling, conservators were impelled to devise a comprehensive treatment that would integrate the need for structural stability, minimal aesthetic impact, and ease of handling.

The initial, though not insignificant step, was to clean away years of accumulated dust and dirt. Historically the panel had been hung from all four sides, so every conceivable surface was covered with dust, giving the panel an overall grey appearance. In the course of cleaning, the full extent of the work's instability became apparent, as did the still brilliant colored resin that Broodthaers used to fill the shells (fig. 11). A reference system was devised to ensure accurate documentation and to track treatment progress. The mussel panel was laid on a temporary support board to which was attached a low wooden upright along each side. Lightweight string was woven around the uprights to create a 64-section grid suspended over the surface of the mussels (fig. 12).

The shrinkage gaps between the resin and support board presented the same access problems as were found in the damaged marble, such that nothing other than a low viscosity adhesive would flow into the constricted spaces. The choice of Hxtal NYL-1 epoxy for this treatment was based on the test results from the marble treatment, the benefits being water-thin viscosity, low rate of yellowing, and high cohesive strength.

Using powerful illumination, areas were located where the support board was visible between the mounds of mussels. These potential injection ports were temporarily marked with bamboo skewers. The use of disposable syringes that worked so well in the Houdon treatment proved to be the best epoxy delivery system for the Broodthaers panel as well. For this treatment, the syringes were modified to form a hybrid of the syringe body fitted with a wide and flexible plastic pipette tip (fig. 13a). The goal of the treatment was to create a web of consolidant, with the expectation that the epoxy would flow over, around, and hopefully underneath the existing resin (fig. 13b). As with the marble treatment, the use of a free flowing adhesive required damming the edges of the panel prior to its application. To create this barrier, more viscous epoxies were first injected along the edges and allowed to set.



Fig. 11. (left) Detail, before cleaning; Marcel Broodthaers, *Panneau de Moules*, (right) Detail, after cleaning; Marcel Broodthaers, *Panneau de Moules*. (Photographs by Judy Ozone)



Fig. 12. During treatment, overall grid system; Marcel Broodthaers, *Panneau de Moules* (Photograph by Abigail Mack)



Fig. 13a. Modified syringes (Photograph by Abigail Mack)



Fig. 13b. Injecting epoxy (Photograph by Katy May)

With the edges securely dammed, each of four sides of the object was propped up sequentially so that as the Hxtal epoxy was introduced, it would flow toward the center (fig. 14). The epoxy was applied until sufficient epoxy “fingers” met or overlapped, as determined by inserting a skewer to see how far the wet epoxy had reached. After each application, the epoxy was allowed to cure fully for two days before the object was turned. Written and photographic documentation was critical to monitor the location of each injection port, the succession in which epoxy was injected from each side, and the direction and extent of adhesive flow (fig. 15).

With the front of the work successfully consolidated, the panel was turned upright and placed in a temporary vertical wooden frame to gain access to the reverse (fig. 16a). This was necessary to accomplish three steps: 1) remove the existing inadequate hanging device (small metal rings attached with short screws) and an aluminum X-shaped brace from the back of the particleboard (fig. 16b); 2) consolidate the entire back of the porous particleboard; 3) attach a rigid support that would inhibit flexing and incorporate a new hanging method.

A new support made of aluminum honeycomb panel was designed to both stabilize the work of art and to facilitate handling and installation. The  $\frac{3}{4}$ -inch thick aluminum honeycomb panel was chosen because its lightweight construction could provide support and rigidity to the fragile particleboard without adding appreciable weight to an already heavy object. The panel was made slightly smaller in dimension than the work of art so that it is less apparent to the viewer (fig. 17).

Because the particleboard panel was too porous and friable to hold the new aluminum support by mechanical means alone, a structural epoxy was used to secure the honeycomb panel to the back of the object. After the epoxy cured, screws were attached through the back of the aluminum panel to provide additional security (fig. 18).

Attached to the back of the new support panel are three sets of aluminum Z-cleats: one for hanging and two for lifting by means of removable handles (fig. 19a). The removable handles were designed so that art handlers would never have to touch the face or the sides of the object, and to distribute the weight of the object during installation (fig. 19b).



Fig. 14. Panel on slant during epoxy application (Photograph by Abigail Mack)



Fig. 15. Annotated photograph showing location of epoxy injection ports, order of application, direction and extent of flow (Graphic by Abigail Mack)



Fig. 16a. Securing art work into temporary wooden frame (Photograph by Judy Ozone)



Fig. 16b. Extant aluminum brace on back of *Panneau de Moules* (Photograph by Judy Ozone)

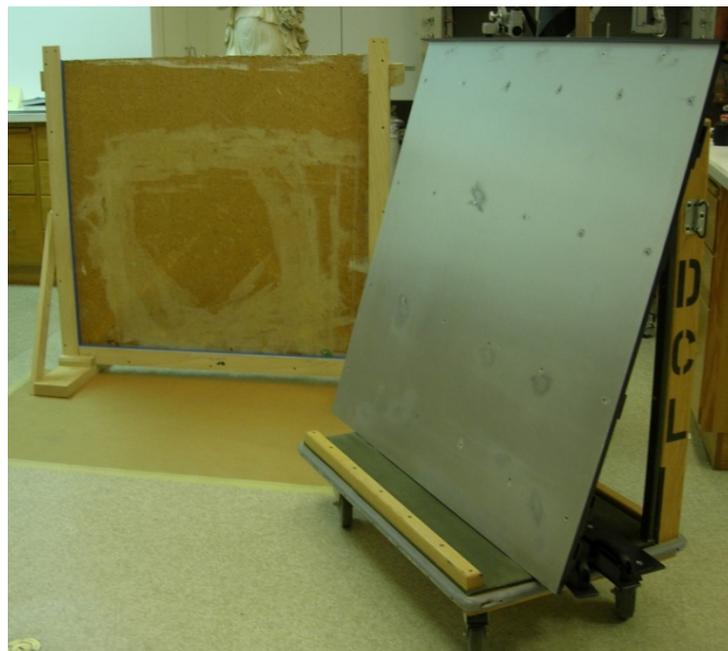


Fig. 17. Back of *Panneau de Moules* (left) and attachment face of aluminum honeycomb (right). (Photograph by Judy Ozone)



Fig. 18. Securing aluminum panel to back of Panneau de Moules, after adhesive application  
(Photograph by Judy Ozone)



Fig. 19a. Mock-up of Z-cleat design for back of honeycomb panel  
(Constructed and photographed by Andrew Krieger)



Fig. 19b. Art handlers lifting newly treated Panneau de Moules by means of lifting handles  
(Photograph by Judy Ozone)

## 7. CONCLUSION

The treatments of two seemingly incongruous works of art were brought together by their like limitations. Having previously tested a wide range of adhesives, adapted various tools, and worked out handling logistics for the marble treatment, the authors were able to apply much of the same methodology in the treatment of the composite mussel panel, executed more than a year later. These extensive though ultimately successful treatments made it possible to install two works that otherwise would have been considered too fragile or disfigured to be exhibited (figs. 20 and 21).



Fig. 20. After Treatment: Jean-Antoine Houdon, *Giuseppe Balsamo, Comte di Cagliostro* (1952.5.103); Collection of the National Gallery of Art. (Photograph by Lee Ewing)



Fig. 21. After treatment: Marcel Broodthaers, *Panneau de Moules* (2005.36.1); Collection of the National Gallery of Art. (Photograph by Lee Ewing)

## ACKNOWLEDGEMENTS

Both treatments required collaboration from numerous departments within the museum, the work of many hands, and more than a little choreography. These treatments would not have succeeded without our talented colleagues: Steve Wilcox, Senior Frame Conservator; Hugh Phibbs, Head of Matting and Framing; Andrew Krieger, Senior Art Handler, all from the National Gallery of Art, as well as Van Wood, of Smallcorp, who fabricated the aluminum panel.

## NOTES

1. Jean-Antoine Houdon, *Giuseppe Balsamo, Comte di Cagliostro* (1786), marble. Collection of the National Gallery of Art (1952.5.103); dimensions: 62.9 x 58.9 x 34.3 cm.

2. According to popular theory, Cagliostro rose from poverty by assuming a false lineage; he is believed to be the Sicilian petty criminal, Giuseppe Balsamo. This bust was carved during the height of Cagliostro's popularity in Paris just before a legendary and notorious necklace swindle involving Marie Antoinette and one of her admirers, Cardinal Rohan. It is believed that Cardinal Rohan commissioned Houdon to create the bust.

3. Marcel Broodthaers, *Panneau de Moules* (1966), mussel shells, resin, wooden particleboard, paint. Collection of the National Gallery of Art (2005.36.1); dimensions: 115.8 x 123.1 x 12.8 cm.

4. In 1972, Broodthaers installed *Musée d'Art Moderne, Département des Aigles, Section des Figures* at the Städtische Kunsthalle Düsseldorf, one of a series of exhibitions in his *Musée d'Art Moderne* project, a conceptual museum that appeared in numerous locations between 1968 and 1972. Every object in the exhibition bore a label, "This is not a work of art," in various languages.

5. Adhesives tested included: Paraloid B-72 (ethyl methacrylate and methyl acrylate copolymer), Butvar B-98 (polyvinyl butyral), Hxtal NYL-1 epoxy, isinglass, Rhoplex AC33 (acrylic copolymer emulsion).

6. The wax-resin fill material contains poly (vinyl acetate), Irganox, and ethylene acrylic acid copolymer.

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Gänsicke, S., and J. W. Hirx. 1997. A translucent wax-resin fill material for the compensation of losses in objects. *Journal of the American Institute for Conservation* 36(1): 17–29.

McCalman, I. 2004. *The last alchemist: count Cagliostro, master of magic in the age of reason*. New York: Harper Perennial.

Walker Art Center. 1989. *Marcel Broodthaers*. Minneapolis: Walker Art Center. 51.

## SOURCES OF MATERIALS

Paraloid B-72 resin (ethyl methacrylate and methyl acrylate copolymer)  
Manufactured by Rohm and Haas North America  
100 Independence Mall West  
Philadelphia, PA 19106  
(800) 967-7704

Akepox 5000 (flowing) epoxy resin; Akepox 5010 (knife grade) epoxy resin

Manufactured by Akemi, Nürnberg, Germany; available from:

INNOCHEM

4030 Pleasantdale Road, Suite F

Doraville, GA 30340

(877) GO-AKEMI

Aluminum honeycomb panel (designed by NGA staff and fabricated by Smallcorp)

SmallCorp

19 Butternut Street

Greenfield, MA 01301

(800) 392-9500 (US only); (413) 772-0889

Disposable polyethylene transfer pipets

Fisher Scientific

300 Industry Drive

Pittsburgh, PA 15275

(800) 766-7000

Disposable syringes

BD Syringe, Luer-Lok

Manufactured by Becton, Dickinson and Company

1 Becton Drive

Franklin Lakes, NJ USA 07417

(201) 847-6800

Hxtal NYL-1 epoxy resin, available from:

Talas, 330 Morgan Avenue

Brooklyn NY 11211

(212) 219-0770

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