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JEROME EXPOSED: TREATMENT OF A 19TH CENTURY ANATOMICAL MODEL

Beth Richwine

In April of 2,000 the National Museum of American History installed a small temporary exhibit called *Artificial Anatomy*. The exhibit focused on the history of anatomical models. The earliest models in the exhibit were made of wax while the modern models were made of plastics. However, the primary material for the models in the exhibit was papier-mâché. Most of the models in this exhibit were manufactured by a company started by Dr. Lois Thomas Jerome Auzouz. Dr. Auzouz started his company in the early 1820's after experiencing difficulties in medical school acquiring and maintaining cadavers for dissection. Eventually his factory was to produce not just human anatomical models but veterinary and botanical models as well. The company still exists today in France but produces models made of plastics.

The most highly visible anatomical model in the exhibit was a full sized male figure made by Dr. Auzouz's company in approximately 1893 and nicknamed "Jerome" by American History staff after one of his maker's given names (Fig. 1). Jerome had been bought by the Smithsonian from Ward's Natural Science Establishment in Rochester, NY, and placed in an exhibit on comparative anatomy by the Smithsonian in 1893 in Chicago at the Columbian Exposition. From there it was also on exhibit in 1895 at the Cotton Exposition in Atlanta, Ga. It may have been on exhibit after this at the Smithsonian's Arts and Industry Building for some years but this is unclear. After coming off exhibit Jerome was put into a crate and stored for years until being used for the *Artificial Anatomy* exhibit. Although the model was generally in good condition and the colors still bright and vibrant, he suffered from imbedded dirt and flaking problems on the unusual surfaces.

For a temporary smaller exhibit such as *Artificial Anatomy*, complex and lengthy conservation treatments are not normally performed. However, in addition to Jerome many of the other papier-mâché models had similar and sometimes more severe problems, and needed treatment just to stabilize them. The Objects Lab had only two full time conservators and one part time term conservator. The part time conservator was tied to special projects and only available to do some treatment on this exhibit. Richard Barden, the other full time objects conservator in the lab, was co-curating the exhibit and most of his time was taken up with curatorial duties.

Given limited staff resources and the exhibit deadline, compromises were reached on the amount of treatment work that would be performed on each model, with stabilization of the flaking layers the primary goal. With Jerome as the featured model of the exhibit (and the largest), much of the 200 treatment hours agreed upon for this exhibit were devoted to him. Despite this number of hours allotted, many difficult treatment choices had to be made on what to treat and what not to treat.

The total height of Jerome is 5'6" tall by himself and 6 feet tall on the stand. The model comes apart to reveal deeper layers. The chest cover, both arms and the proper left leg come off. The organs can be removed singly or in groups from the chest cavity. The deconstruction and

reconstruction is facilitated by an elaborate system of pins and latches. Small paper labels printed with pointing hands alert the student to where latches are located (Fig. 2).

The literature from Auzouz gave the purchaser the option of the figures "after nature" or with "organs of generation". Since this critical part of his anatomy was missing and no extra hooks in that area were apparent we assumed that he was not purchased "after nature". He also was missing his brain although it seemed likely that he had it at one point and it was lost.

We assumed there was an internal armature based on x-radiographs taken of some of the smaller models used in the exhibit and the ferrous metal wires protruding out from some of the fingers (Fig. 3). Molded around the armature was true papier-mâché; masticated paper fibers and a binder. This material was very hard and dense. On top of this there appeared to be one or more layers of smooth paper. Individual muscle fibers were then painted in accurate colors over all surfaces.

The smallest veins were simply painted on but larger veins were created three dimensionally by applying bundles of wires. As the veins split and got smaller the wire bundles were simply separated (Fig. 4). The bundles were further wrapped in fibers and paper and tacked onto the surface. The small tacks are visible on one of the smaller models in this x-radiograph. Both copper alloy and ferrous metal wire bundles were found. Reasons for placement of one over the other in various areas is not obvious.

Where the interiors of some organs were visible, internal structures were defined (Fig. 5). Examples of this can be seen in the flocked lining of the stomach, the knobby surface of the small intestines as well as thread-like structures inside the heart. A thin tissue covering the muscles was illustrated on a portion of the proper right leg by a thin translucent material, which we chose to call a film. Some of the other films could be seen as flaps sticking out of the organs or connecting two areas. Most surfaces were also covered with a coating, which gave it some gloss. The film material appeared to be the same as the coating separately laid out, painted and applied to the surface.

The figure was presented in various stages of dissection with the proper right side primarily illustrating the surface muscles and the proper left side being interior muscles and bones. Various organs, bones and muscle groups were labeled with small paper labels in either text or numbers and were attached to the final surfaces. The original model would have come with a key to the numbers. The Smithsonian no longer owned the original key but the curators for the exhibit were able to locate and copy one. The original labels were in French. Cruder and larger labels in English were probably applied by the Smithsonian when it was on exhibit.

Structurally the model appeared to be in good condition. The figure was well supported and attached. The chest cavity cover no longer fit on the figure when the organs were in place and had probably warped. The condition of the surface varied.

Some areas of the model were very dirty. These areas tended to be on the upper surfaces where dirt would naturally fall and on some of the organs, which would have had more handling. There were also differences between interior and exterior surfaces. As one would assume, the interior surfaces were considerably cleaner as a whole than the exterior surfaces.

There were sections in which the painted surface and coating appear quite stable and intact. There were scattered areas in which the painted layer was quite cracked and in some areas was lifting. This was especially apparent on the proper left thigh (Fig. 6). In other areas the painted surface appeared intact but the coating was peeling. The peeling was quite scattered and quite widespread. There was also less severe flaking on the interior surfaces probably due to less light damage.

The Smithsonian Center for Materials Research and Education analyzed samples of the coating using protein analysis and infrared spectroscopy and found that it was nearly pure collagen. The coating was also soluble in water. When wet up, the surface had a very distinctive smell of gelatin. We surmised from this that it was probably gelatin. Conversations with Lynne Gilliland, paper conservator at American History led to cleaning tests with ice water and treatment protocols similar to treating gelatin prints and negatives.

The ice water swelled the surface slightly yet allowed dirt to be removed. Little or no surface coating was removed if the proper procedure was followed. A small area to be cleaned was swiped once with the ice water and a swab. A few seconds were allowed to pass and then the swab was rolled or rubbed over the surface quickly. No more than that was allowed or the surface coating would begin to be removed.

The paint on the applied veins and arteries was extremely water-soluble and generally these areas were not cleaned unless they were especially dirty. Only a single quick swipe with the swab was acceptable, as paint would begin to come off. The veins and arteries did not appear to have the same protective coating that had been applied to the other surfaces.

A combination of rolling and /or rubbing was used over the whole figure depending on the surface conditions in each area. For stable areas with little cracking or peeling, rubbing worked well and was an efficient way to cover large areas at a time. Rolling swabs over the surface was more effective in areas with cracking or peeling.

Rubbing over a cracked surfaced tended to embed the dirt into the cracks and by rolling swabs it was easier to maneuver around peeling and flaking. It was also easier to clean both surfaces of some of the peeling, which had collected dirt on the interior surfaces (Fig. 7). Attempts at setting down these areas first and then cleaning was often unsatisfactory because dirt was trapped under the surface. Rolling also helped to partially relax and straighten some peeling areas, which were quite severe.

In general, dirt removal by these methods on Jerome was quite sufficient. Only one other model,

a miniature male figure we called "Junior", had embedded dirt so severe that water with a small percentage of Orvus detergent was used to assist in the cleaning process. He had been well used as a model and there was very little surface coating left. The dirt appeared to be ingrained into the painted surfaces.

There was a variety in severity and location of the flaking or peeling. Some areas of the surface coating were flaking in small, slightly curled flakes or a split with lifting on either side. These could be seen from an angle but more importantly could be felt as I rubbed my fingers over it. This was the usual way in which I found the flaking areas as I worked on the consolidation.

Other areas were worse where the coating had actually started to curl up. There were some especially large areas like this at the proper right shoulder. The surface coating in this area also had some additional painted designs on the upper surface, which was unusual.

Other more severe flaking, especially on the upper portion of proper left leg included not just the upper surface coating but into the upper layers of paper. These areas were especially stiff although not as curled as some of the flaking that involved just the surface layer.

A variety of consolidants were ultimately used. After cleaning, the surface coating was sufficiently softened so that many of the smallest flaking areas could be set down with finger pressure alone. This had to be done immediately after cleaning. After the surfaces had been allowed to dry naturally for two or three hours it would be evident where this procedure did not work.

Gelatin was used in the areas of small flakes, which would not set down with reactivation of the surface and finger pressure alone. Slightly warm gelatin could be flowed into cracks and under the flakes easily. The gelatin was mixed with a small amount of ethanol to reduce the amount of overall moisture that was applied and thus the amount of swelling to the coating. This worked very well for almost all of the thin surface coating flakes.

The large flakes would distort significantly and it was difficult to get the flakes laid down without wrinkles. Sometimes it was necessary to set down partial sections at a time to reduce the ultimate amount of overall distortion.

The gelatin was not strong enough in the areas of thicker peeling and flaking. Most of these areas responded to a solution of sturgeon glue mixed with ethanol. Sometimes several applications of sturgeon glue were needed in one spot. There were other areas which would still not set down completely.

These tended to be the largest areas of flaking where the upper layers of paper were also lifting. After some trial and error it was decided on Beva 371 film. Tiny strips were cut and placed under the edges of these flakes and then set down with heat.

We discovered that the Beva also worked well for the cracks in the areas that were more film like. I had tried spreading out gelatin on a sheet of silicone-coated Mylar, letting it dry, peeling it up and then cutting it to bridge the splits. I thought at first that if the gelatin had only been recently made it would be easy to use a heated spatula to bind it to the film. This did not work at all. I then tried adding a small amount of fresh gelatin and binding it with heat but this was not good either. Beva turned out to be the best selection.

Since some of these films were suspended in air I could not just press onto them with the heated spatula and to protect my fingers found that I could bend small spatulas to get into almost all areas to press on the either side of the break. I left one side of the carrier on the Beva while using the heated spatula and then just peeled it off when done.

We discovered through trial and error that the Beva was actually more successful with other areas as well. The interior of the stomach appeared to be a thick layer of the coating material with some type of flocking to simulate the lining of the stomach. These areas were not cleaned because it was felt that the flocking might easily be removed.

When the gelatin was applied to the flaking areas it got wicked into the flocking and created unsightly darker areas. At the time we hadn't discovered the full usefulness of the Beva so only minimal setting down was done here. We discovered on a flocked area on another piece that the Beva could successfully secure these areas without darkening the surfaces.

One other type of consolidant was used on Jerome. The proper left shoulder was attached to the figure with two pins and swung away from the body on a hinge. The pins were bent so it was not possible to remove the shoulder from the body to work on it. The swinging action and the weight of the arm had caused the flat plane of muscles to split. There was an old repair of unknown origin at this split already but the area still had a substantial crack and was a bit loose. The old fill material also extended out over into the original surface. Since this area was in the back of the model and the treatment agreement was not to do any compensation this fill was not removed or cleaned up. Hot hide glue was injected into the crack and the crack was aligned with clamps until it set up. This helped to stabilize this area. Attempts were not made to straighten out the bent pins.

Setting down the flaking areas after applying consolidant was usually successful with finger pressure. I found after a while that I could apply consolidant to a number of spots in the same area, apply small pieces of silicone Mylar and using several fingers on each hand to hold down several spots at once. This position was held for about 30 seconds. The slight pressure minimized distortion from swelling and was faster than setting up clamps in so three-dimensional an object. This also allowed me to become very good at pinpointing areas that needed more or less pressure.

Some of the larger areas of peeling and the thicker areas of flaking which required stronger consolidants would not set down with simple finger pressure. A heated spatula with a small tip

worked very well for the most part to do this. A temperature of about 130 degC worked the best. It gave gradual softening of the layers and reactivation of the consolidant and did not melt the gelatin surface coating. One of the most important procedures to remember was to wait at least one to two hours and sometimes overnight after applying the consolidant before applying the heat. If done before there was still sufficient moisture in the consolidated areas to re-solubilize the gelatin and create an uneven surface texture.

There were no structural repairs to Jerome other than the crack in the shoulder but there were other anatomical models in the exhibit that did have some structural problems. The turkey had probably been dropped at some point. It was attached to its base through the feet and legs and when it dropped one of the legs split open. This allowed us to see some of the interior structure and the density of the papier-mâché material. The turkey had been small enough to x-ray so we had a good image of the internal armature. We explored some ways of closing up the split and eventually decided against it. We felt that we would probably have to soften up the papier-mâché in order to realign the leg. We felt that it was too risky with the metal armature, the applied ferrous metal wires and the layers of paper and we might make the situation worse if things began to rust. The bird could still stand on its own with a little assist from the bracket maker and on a whole the split was not readily apparent to most visitors.

In addition to the consolidation of the flaking the attached metal parts such as the pins and the hooks were cleaned with Petroleum benzine and waxed with Renaissance Wax to give them some protection from fingerprints and changes in humidity.

Each one of the models presented the conservators with different challenges and we learned techniques and tips from each other as we progressed with the treatments. We also had to keep special track of the humidity in our lab. We were experiencing problems with the humidity control on a daily basis. There were days when I would spend a couple of hours consolidating one area of the object only to come in several hours later or the next morning to find the curls back up. We attributed all of this to our bad lab conditions and there were days when I did other types of treatments because I knew that I could not work on Jerome.

The choice to leave some areas uncleaned was especially difficult for me since I feel that this might have been the only chance to work on Jerome with our heavy exhibition schedule and our staffing situation as well as just wanting to complete the whole object. The areas of loss on the legs was also visually disturbing and it would have been nice to have filled and inpainted those. These models were also so beautifully made that we all would like to have worked on more of them and made them as presentable as possible for the exhibit.

Acknowledgments

I want to thank Richard Barden and Judy Chelnick, co-curators of *Artificial Anatomy*, for giving me this opportunity to work on some really cool objects; and Catherine Williams and Elizabeth

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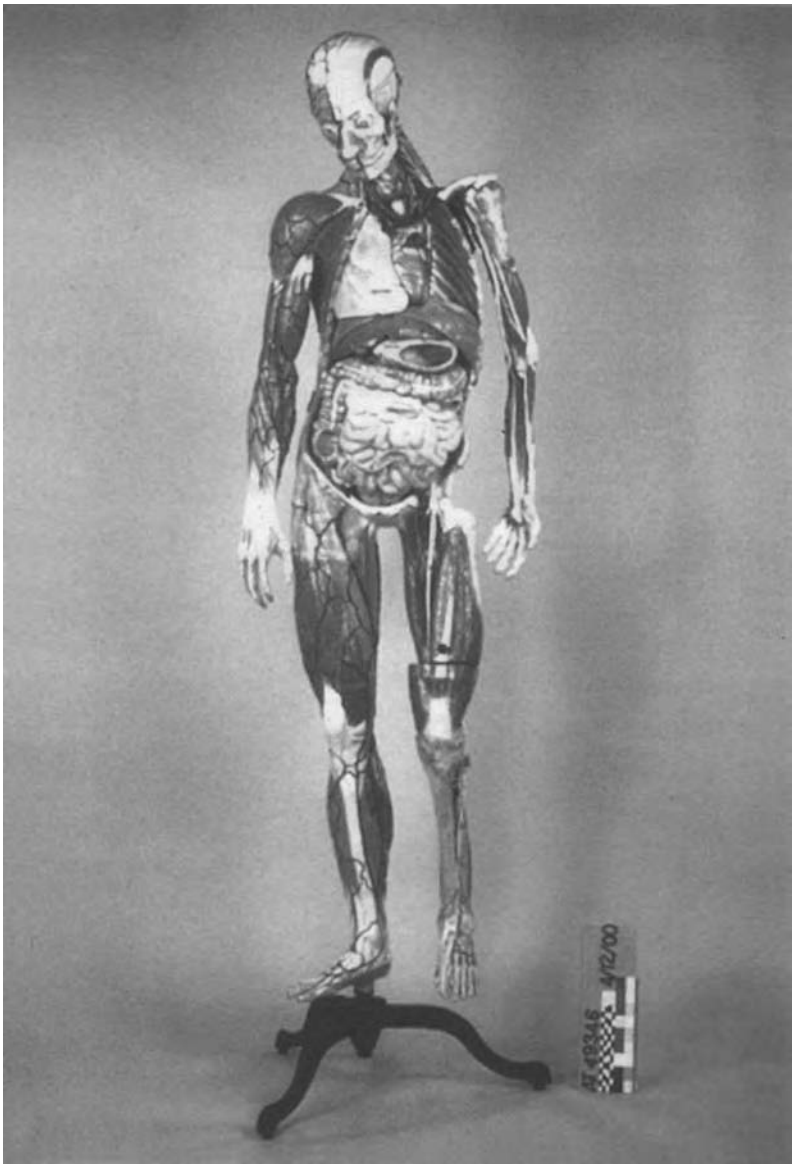

Figure 1. Full frontal view of "Jerome" without chest cover.

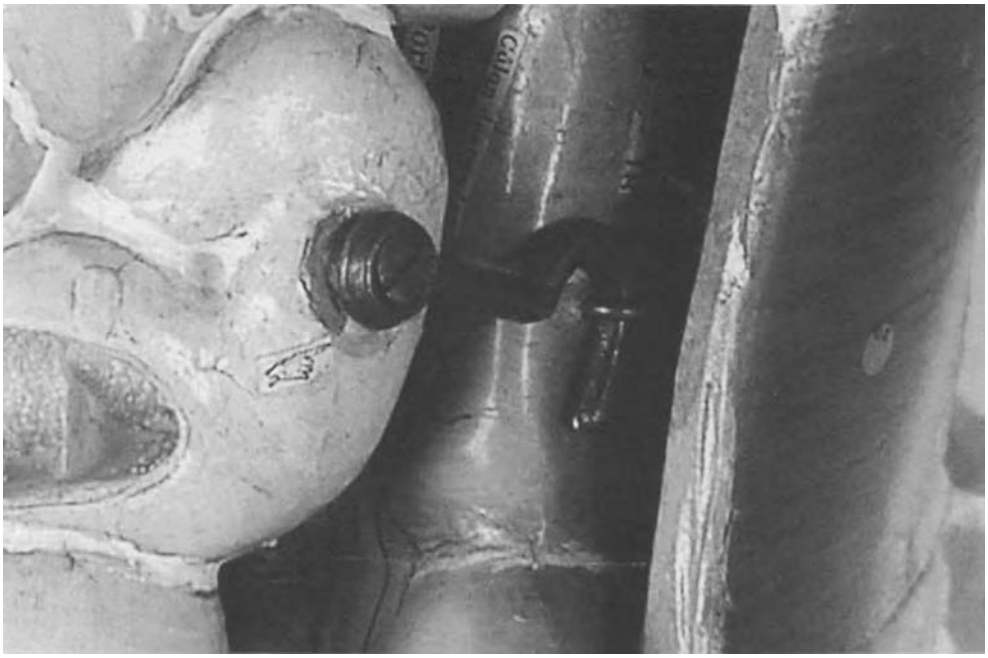

Figure 2. Labels and latch.

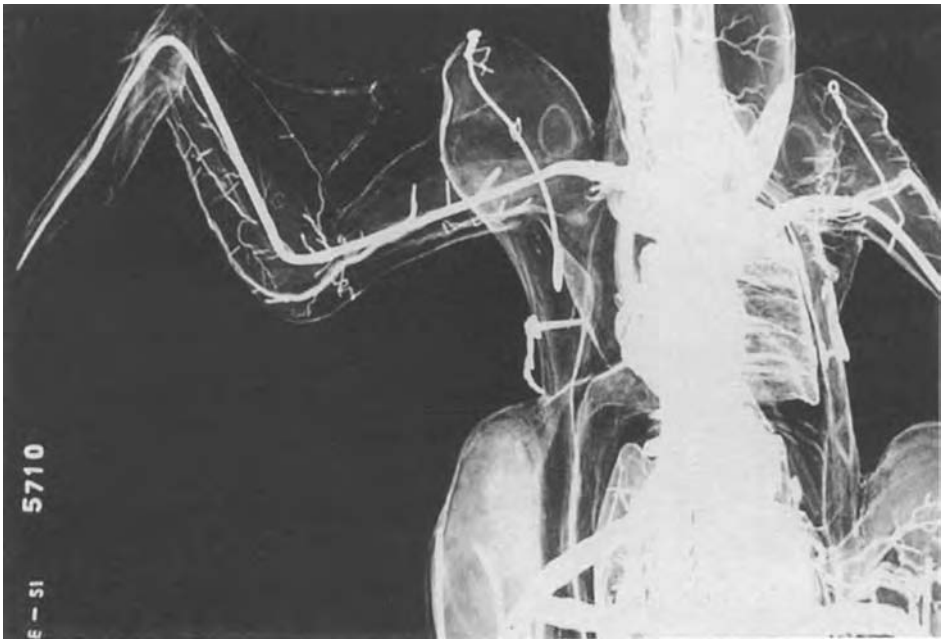

Figure 3. X-radiograph of turkey showing wires, tacks and armature.

Figure 4. Closeup of veins showing division of wires and tacks.

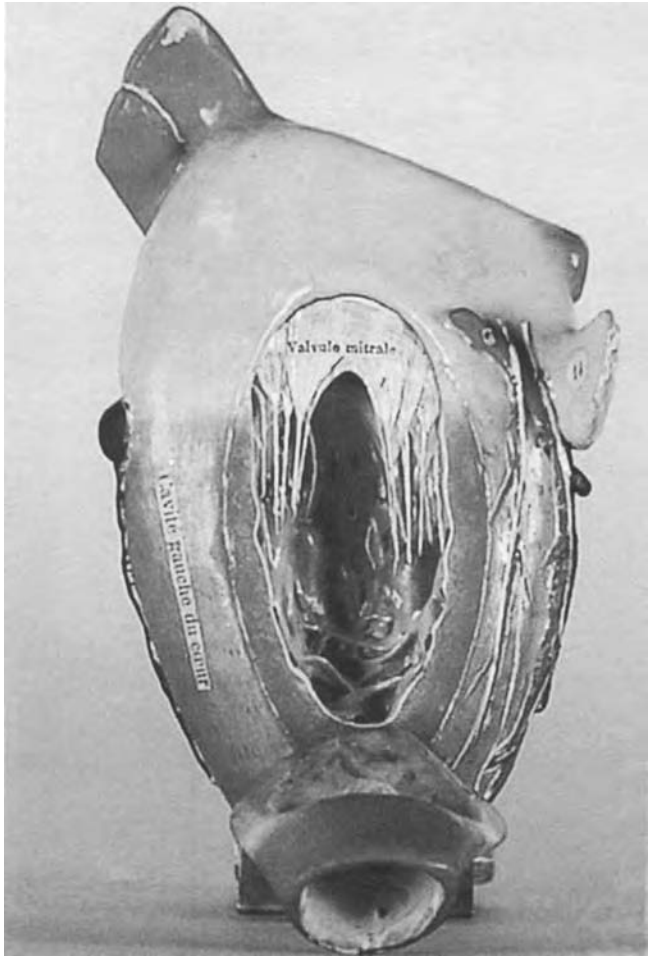

Figure 5: Portion of heart, partially open to reveal internal structure.

Figure 6. Curling of surface layers on upper left thigh.

Figure 7. Badly peeling surface layer at upper proper right shoulder of figure.