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# Bringing taxidermy back to life: the conservation of an Aldabra giant tortoise *Aldabrachelys gigantea* Schweigger, 1812

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## Abstract

The University Museum of Zoology Cambridge (UMZC) reopened in June 2018 after a major Heritage Lottery funded redevelopment. As part of this redevelopment the opportunity to display a 19th century mounted giant tortoise presented itself. The specimen had been kept in storage for decades and was chosen to head up the turtles' section in the tree of life display. Badly damaged, both structurally and superficially, the specimen was one of the biggest conservation projects undertaken. The large areas of skin loss was an opportunity to test out a variety of structural fills to find the most sympathetic, stable and visually pleasing result. I will present the results of these tests, and also discuss the stabilisation of the deteriorating internal structure and explain the aesthetic challenge of imitating reptile skin. Affectionately named Susan Mildred by a visiting school group, the tortoise soon became a firm favourite with the public and outreach team. Talks on the conservation project were held in the museum and highlighted during the 'Meet the experts' outreach project. This article will examine both the conservation challenges experienced during the lengthy treatment, and the collaboration with the museum's outreach team that developed.

**Keywords:** conservation, taxidermy, tortoise, structural fills, colour-matching, outreach, engagement, collaboration

## Introduction

Taxidermy is often described as making a dead animal look alive again (OED, 1989 "taxidermy"), which, when skilfully done, provides an engaging and anatomically correct example of that species. Unfortunately, when a specimen suffers damage, the effect can be completely lost. This was the case for a mounted Aldabra giant tortoise (UMZC-R.3812) from the University Museum of Zoology, Cambridge (Figure 1).

In poor condition, this specimen was kept in storage for decades before the museum closed in June 2013. This was to change as part of the redevelopment, when it was decided that a tree of life display to highlight the diversity of the animal kingdom with a selection of impressive animals, including this tortoise, would be created.

The Aldabra giant tortoise *Aldabrachelys gigantea* Schweigger, 1812 is a threatened species, indigenous to small islands in the Seychelles. Being



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Figure 1. Taxidermy of an Aldabra giant tortoise before treatment at the University Museum of Zoology, Cambridge (UMZC-R.3812). © Anastasia van Gaver, 2017.

some of the largest tortoises in the world, this female was a great example to head up the turtle's section in the tree of life case. Her male partner, mounted as a skeleton, was also put on display in another part of the gallery. According to the museum's archives, the pair were originally shipped from the Seychelles alive by Admiral W. Kennedy in October 1894 before becoming part of the museum's collections in 1896.

Since then, the female tortoise had become so damaged that it was questionable whether this specimen could be redeemed. Nevertheless, in August 2017, a long conservation treatment was started to improve its condition. This was followed by several education and outreach activities, which really brought the tortoise 'back to life'.

### Condition

Mounted at the end of the 19<sup>th</sup> century, the tortoise was badly damaged after decades in storage. While there is no written data to confirm what happened, this damage was likely due to poor storage conditions and a fluctuating environment. Indeed, all the materials used to mount this tortoise are especially sensitive to changes in temperature and relative humidity (RH). As an organic material, the tortoise's skin is susceptible to drying and shrinking in a low RH (Graham, 2018). On the contrary, the internal plaster is particularly prone to damage in a high RH environment due to its

support structure of wood and metal which expand and corrode respectively, causing the plaster to crack (Chapman, Smith-McNally and Byrne, 1997). Another potential explanation of the tortoise's condition would be bad handling of this plaster-based object, which is very vulnerable to impact.

As a result, the main issue was the structural instability of several areas, especially the neck and legs, where the original plaster had failed (Figures 2 and 3). The damage was so extensive that the plaster would crack or crumble on contact. The tail had also fallen off and been retained in a separate sample bag, along with many bits of skin. Much of the tortoise skin was splitting and flaking off, with some parts completely missing, resulting in a disfigured specimen.

The shell had also suffered damages, mostly on the carapace where the nuchal scute (directly above the head and neck) was missing and several other scutes were lifting off, creating large, unnatural gaps. Additionally, the plastron (ventral surface of the shell) had become loose. Overall, the tortoise appeared extremely unstable and dirty, and absolutely not in a state to be displayed without appropriate conservation. These material issues also meant that the value of the tortoise as a scientific specimen was overlooked and considered insignificant.



Figure 2. Condition before treatment: detail of the detached neck and missing nuchal scute (UMZC-R.3812).  
© Anastasia van Gaver, 2017.



Figure 3. Condition before treatment: detail of the damaged right back leg (UMZC-R.3812).  
© Anastasia van Gaver, 2017.

### Treatment goals

The conservation treatment aimed to fulfil four main requirements:

- Firstly, the specimen needed to be stabilised to ensure it could be displayed safely and stay preserved in the long term. In its current state, it was barely stable enough to begin treatment without plaster and skin crumbling apart.
- Secondly, the specimen's appearance had to be improved for visitors to see the animal with its original beauty and personality. The museum wanted the public to be able to imagine the tortoise alive, rather than seeing it as a broken object.
- Thirdly, any treatment undertaken on the specimen had to be checked not only against general conservation ethics but also against scientific accuracy. As a renowned university museum, UMZC is frequently used by students and visiting zoologists, which meant respecting the true anatomy of the tortoise was especially important. This was even more of a factor considering the vulnerable status of this species: should they become extinct, a specimen like this would be a rare chance to engage with these tortoises.
- Finally, the support on which the specimen was originally mounted needed to be removed. The tortoise was mounted by a metal structure that ran through its body and feet, to a wooden platform which was too wide to fit into the intended display case. This had to be removed without damaging the specimen before the rest of the work could begin.

### Ethics

Considering the treatment goals, it was clear from the start that this conservation project was going to be highly interventive: an object as badly deteriorated as this tortoise would require irreversible restoration. As conservation students, we are taught to always think about minimal intervention and reversibility during our decision-making. However, these principles are rarely appropriate and the belief in reversibility is now considered a “dubious principle” (Muñoz Viñas, 2002) and a “fashionable naivety” (Schinzel, 1999) by many professionals. The treatment progressively grew more and more interventive because the long-term stability of the specimen and the wider benefits for the public were considered more important than the potential reversibility or re-treatability.

In order to achieve an accurate representation of this animal, I needed to conduct thorough research into the tortoise species and its appearance in life. Thankfully, I could consult with departmental specialists and museum curators as well as take advantage of the many literary sources at my disposal. After much testing and experimentation, a representative approach was implemented.

Given the extent of the damage, it was decided, in agreement with the senior conservator and the curator, to fill and paint large areas of loss. Fills were needed to improve the stability of the specimen as well as to make it more accessible for the public. While interventive, this treatment would be documented during each step with written and photographic records to ensure all information is preserved for future conservators, curators or researchers.

## Treatment

After a thorough documentation process, including a detailed condition report, the first step was to remove the tortoise from the large wood and metal mount it was standing on. The museum's mount maker was there to give her input regarding the tortoise's stability and to supervise the removal of excess metal wires. With her help, the tortoise was then placed on Plastazote® and soft bean bags to better support it during conservation. While doing this, it became clear one of the legs was more unstable than the others and would require extra stabilisation to help bear the weight. Dry cleaning was then performed with a museum vacuum and a soft brush initially, followed by smoke sponges. Most of the loose, unstable materials such as broken plaster and straw were removed, as they had failed and were no longer serving their purpose. Flakes of skin that had fallen and could not be put back were collected in sample bags.

## Stabilisation

The internal structure of the tortoise was consolidated by pipetting and injecting 10% Paraloid B72 in acetone. This was successful on the majority of the plasterwork with the exception of two load-bearing areas that kept breaking. For these, stronger solutions of Paraloid B72 were tried but this was still not enough, and it broke again. It was then agreed with the senior conservator to use something stronger: a two parts Araldite®. This epoxy adhesive cannot be removed but long-term stability of the specimen was, in this case, considered more important. Epoxy resins, including Araldite®, are often used in conservation, mostly for glass and ceramics. Their main issue is a tendency to yellow and lose strength over time, due to photodegradation (Coutinho, *et al.*, 2008). However, this was not a problem for the tortoise, as the Araldite® was only used internally: the resin was less likely to degrade as it would not be exposed to light. Finally, to stabilise the skin, Jade R was chosen as it is an acid free, pH neutral, reversible EVA adhesive, which dries clear.

## Fills

Several materials were researched and tested for fills. They were mostly chosen based on my previous experience and on advice from the senior conservator, as well as on their availability in the lab. The three main requirements for the materials were 1) to be suitable to stabilise the whole structure of the specimen; 2) to be strong enough to hold the tortoise's weight; 3) to be easy to shape, sculpt and paint to mimic reptile's skin.

Tested materials included:

- plaster in water;
- papier mâché in water;
- 50:50 plaster:papier mâché in water;
- glass balls GB03 (micro balloons) with 10% Mowilith 50, in 50:50 IMS:acetone;
- glass balls GB03 (micro balloons) with 35% Paraloid B72 in acetone.

Based on the easiness of application, working time, drying time, strength and aesthetic match for the skin, it was decided to use the 50:50 mix of plaster and papier mâché in water (Figure 4). It was easy to mix to the desired consistency, it applied well and held itself without dripping, and was ideal to 'sculpt' while drying to give a reptile skin effect. It was also compatible with the original plaster and did not emit fumes, as opposed to acetone and other volatile solvents.

Following consolidation, the plaster and papier mâché mix was applied to fill the missing areas, in several layers due to the depth of the losses. Once the fill got closer to the level of the skin, powdered pigments were also added to tint the mix, and moulds of the skin were pressed onto the wet mix to give the right texture of tortoise scales. These moulds were made of Steramould, a silicone based moulding compound which produces fine, flexible moulds which can easily be re-used. Finally, after several tests on practice pieces, the fills were colour-matched with acrylic paints. This was a long process as there were large areas to be painted and they had to replicate the look of the tortoise's skin, with a variety of colours and patterns to imitate real scales (Figures 5-8).

For the carapace, the large gaps between the scutes were filled with papier mâché in water and



Figure 4. During the fill process: detail of the right back leg with final layers of plaster and papier mâché mix (with pigments), pressed with Steramould moulds (UMZC-R.3812). © Anastasia van Gaver, 2017.



Figure 5. Steramould moulds of skin (left) with moulded test pieces in plaster and papier mâché (right).  
© Anastasia van Gaver, 2017.



Figure 6. After treatment: detail of the neck with painted and the replacement scute (UMZC-R.3812).  
© Anastasia van Gaver, 2018.

painted with acrylics. The missing nuchal scute was replaced with some Apoxie® Sculpt. This durable epoxy putty cannot be readily removed but was chosen for its other properties: it is stable and self-adhering, it does not shrink, it can easily be sculpted and painted. Like the rest of the tortoise's treatment, this decision was taken with display in mind, but detailed documentation would allow potential researchers to know the exact positions and materials used if necessary.

In the end, after nearly 150 hours of work, and despite initial doubts as to whether the tortoise was even salvageable, it was ready to go on display. However, more could be done to extend the impact of the specimen and the conservation work it had undergone.

### Education and outreach

Conservation is not only material-based, it also has a social value and can widen the engagement with museums and heritage (Koutromanou, 2015).



Figure 7. Detail of the head before treatment (UMZC-R.3812) © Anastasia van Gaver, 2017.



Figure 8. Detail of the head after treatment (UMZC-R.3812) © Anastasia van Gaver, 2018.

Rather than simply viewing a dead tortoise in a display case, the museum wanted visitors to have a richer experience, to get more out of the specimens and the conservation work, to celebrate and showcase the feats accomplished during the museum's redevelopment. This was achieved through outreach and education.

Collaboration with the education team brought in an extra level of depth to the engagement that visitors and others can have with a specimen, in this case the giant tortoise. Sara Steele, Museum Learning Assistant at the Museum of Zoology, facilitated the tortoise's involvement in a number of outreach programmes.

### Museum Take Over

Before the museum re-opened, the Museum of Zoology hosted a 'Museum Take Over', in which myself and another conservation colleague gave a talk to a group from a local secondary school. This University of Cambridge Museums (UCM) project

aims to engage with students from low socio-economic backgrounds, to open up museums as a resource and to share with them the range of career possibilities within the sector. To showcase the role of a conservator and share some behind-the-scenes work, we showed some on-going conservation projects, including the tortoise.

The students were all very enthusiastic and full of questions about the museum and conservation; one student even said that she would like to become a conservator. While discussing the on-going project of the half-conserved tortoise, one of the questions was “What’s her name?”. At which point they suggested “Susan” and “Mildred”, so she became Susan Mildred Tortoise. The name got shortened to Susan and stuck with the whole museum team and for all later education programmes. Indeed, naming a specimen is not just fun, it can help to engage and involve visitors.

#### *Meet the Experts*

The second education activity Susan took part in was during the ‘Meet the Experts’ programme, held as part of an after-school science club for students between 11-15 years old. This was a pilot project, with three sessions. Just as with the previous project, students were unfamiliar with the role of a conservator and much of the behind-the-scenes work of a museum.

Susan featured as a case study in the final session. Students were provided with information about the specimen and its prior condition, then asked to match the condition problems with the appropriate conservation treatment with the help of images. The final activity was to practice colour-matching with acrylic paints on some white pieces of plaster and papier mâché to imitate Susan’s skin, using practice pieces made during conservation as examples (Figure 9).



Figure 9. Practice pieces of plaster and papier mâché for colour-matching. © Anastasia van Gaver, 2018.

The feedback for the ‘Meet the Experts’ project was really positive and the teacher said these interactive sessions were “really accessible” and “helped them to engage with science in a different way”. It was also possible to broaden their exposure to young scientists working in alternative jobs, such as conservation.

#### *Curiosities & Conversations*

Curiosities & Conversations was a collaborative project between UCM and Addenbrooke’s Hospital. With a health and wellbeing focus, the goal was to provide a stimulating activity and distraction to patients undergoing dialysis using the museum collections as a tool in the hospital. Again, most participants were not aware of the role of a conservator or the work that they do, but Susan provided an engaging conversation topic.

Sara Steele ran the outreach session which included Susan. Photographs and easily transportable tactile skin samples produced as part of the conservation treatment could be shown to people outside the museum, despite not being able to take the whole tortoise. As a conservator, it was positive to see conservation documentation and samples used for engagement where it would usually be kept unseen.

#### *Plant Patrol*

The final programme Susan featured in was the ‘Plant Patrol’ summer trail at the Cambridge University Botanic Garden (Figure 10). The education team of the garden were looking for herbivorous animals to include in a trail exploring the plants they may feed on. As Susan and her partner used to live at the garden in the 19<sup>th</sup> century, they were enthusiastic to include her. Susan created a connection between the Museum of Zoology and the Botanic Garden: visitors would do the trail, learn about Susan, collect a badge of her, and then go to the Museum of Zoology to see the real specimen. This really brought her story to life.

#### **Conclusion**

From a conservation perspective, the treatment was successful as it fulfilled its four aims. The tortoise was stable enough to be displayed (Figure 11) and has since been enjoyed by many visitors to the museum. The value-based approach Appelbaum, 2007) to the conservation of the tortoise not only restored its physical stability but also its value as an important heritage and scientific specimen. Additionally, Susan proved that damaged or bad taxidermy has a lot of potential in museums, not

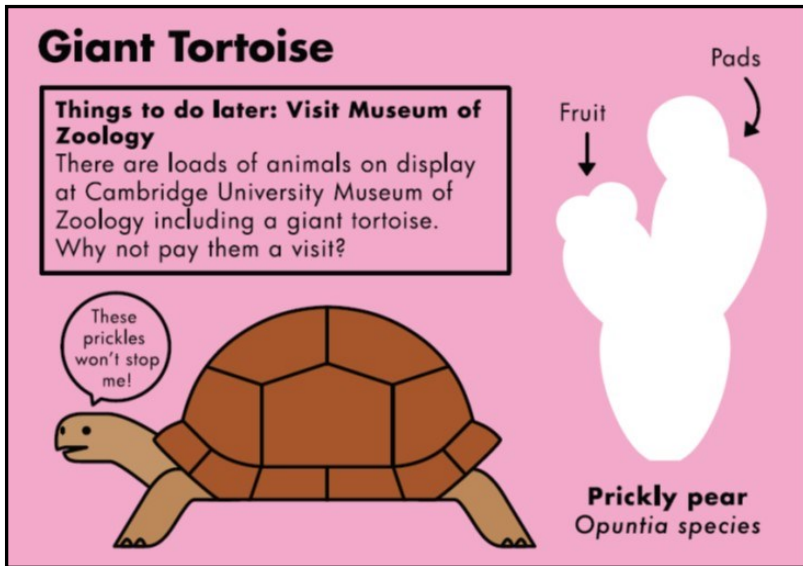


Figure 10. Detail of the 'Plant Patrol' booklet showing the giant tortoise with a prickly pear cactus. © Hannah and Holly for Cambridge University Botanic Garden, 2018.

only for interesting conservation treatment but also for public engagement.

Indeed, what was especially interesting as a conservator was to take part in education and outreach activities. This was a different experience than benchwork in the lab and I personally learned new skills with support from expert colleagues. This project was an example of the social value of conservation (Koutromanou, 2015), showing how conservation and education programmes can go hand in hand. Susan's journey in the education programmes revealed that the public are not always aware of the role that conservation plays in museums, but that given the opportunity there is often interest and relevance to be found, and as a

result a greater depth of engagement. It also brings a level of awareness for the problems museums and museum professionals face which may open up opportunities for funding.

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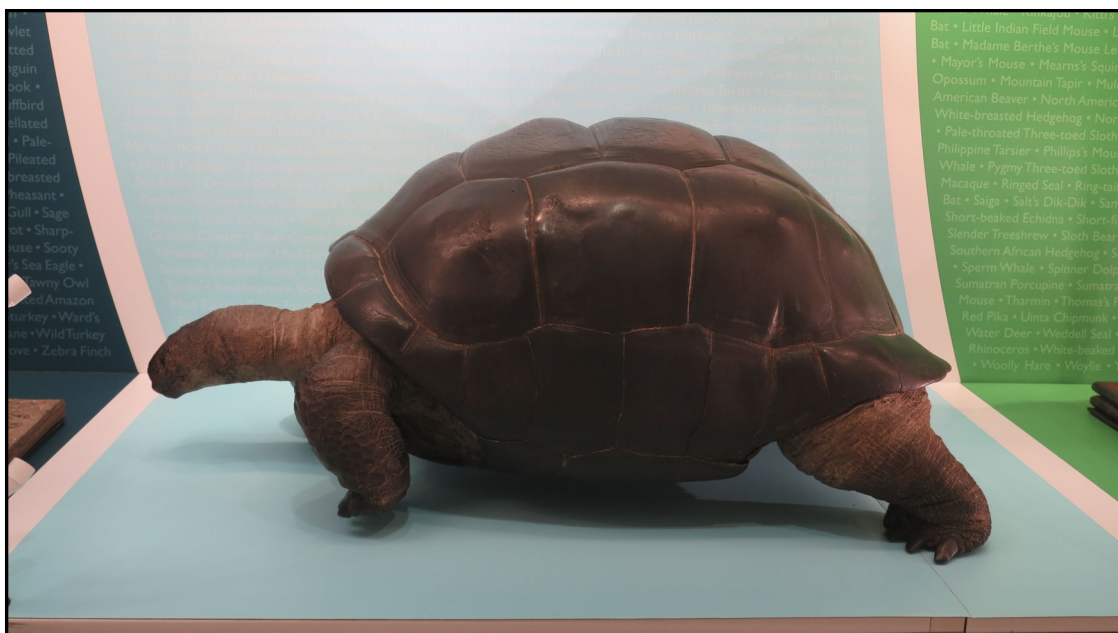


Figure 11. After treatment: the giant tortoise on display in the tree of life case (UMZC-R.3812) © Anastasia van Gaver, 2018.



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