

Ms. Vicen Carrió ACR

Geological Conservator/ Preparator  
National Museums Scotland, National Museums Collection Centre  
242 West Granton Road, Edinburgh EH5 1JA  
Phone: +44 (0) 131 247 4254 Mobile number +44 07931727386  
[v.carrio@nms.ac.uk](mailto:v.carrio@nms.ac.uk)

<https://www.nms.ac.uk/collections-research/collections-departments/natural-sciences/meet-the-team/vicen-carrio>  
<https://twitter.com/NatSciNMS>  
<https://iconscotland.wordpress.com/2020/11/23/an-insight-into-geology-conservation-at-national-museums-of-scotland-with-vicen-carrio-acr/>

## ABSTRACT

The preparation and conservation of specimens are sometimes complicated and difficult. Some techniques are well known in the conservation/preparation of natural sciences collections, but others, even if they are very basic and simple, are less known. In this poster, the simple use of a steam cleaner is shown here on how to clean a brain coral that has been drawn on by children. The damage was done by a mixture of crayons and pencils in different colours on a specimen displayed in a children's exhibition. This technique is very simple and consists of shooting steam into the specimen at a safe distance. Pressure and distance are key to the treatment and only should be used if practiced on a similar specimen before, as the preparator should be able to know the safe parameters to be used. H&S in this technique is very important as steam is very hot and could burn and the pressure can damage the skin. The before and after the preparation is clearly shown in the photographs. The amazing results are seen, giving a clear picture of one good technique that can be used in the conservation/preparation of natural science specimens.

## INTRODUCTION

Specimens in open displays are always a challenge for conservators. In our example, a brain coral, without any data in the museum and kept our education collection, was displayed in the Adventure Planet Gallery, an area in which children will play and enjoy specimens from the collection. For many years some specimens left in the children's galleries have been vandalised. Colour pencils and crayons have been left for the children to do some activities, but instead of using the papers given, they have decided to draw on the displayed specimens. Other contaminants such as dirt and fingerprints are found too. In the case presented in this poster, the brain coral has suffered the most.

## ASSESSMENT

- identify the substrate, its condition and its vulnerability (bear in mind that the contaminant will react differently to the process depending on the fragility of the contaminated part)
- decide whether the dirt is superficial or ingrained
- establish if it is causing damage to the coral
- check if it is the best treatment or if another treatment is more appropriate
- check if it is needed to clean and then allow other treatments

## CONSERVATION OPTIONS

There are four cleaning categories to choose from: mechanical, chemical, water-based and laser radiation, although a combination of them can be used.  
**Mechanical:** air abrasives, vibrator tools, or brushes.  
**Water-based:** steam cleaning, water/clay poultices, rinsing and pressure washing. Water is an effective solvent that can be used cold or hot either as liquid or vapour.  
**Chemical:** include acids, alkalis, solvents, chelating agents, biocides and detergents, being used as liquids, gels or poultices.  
**Laser:** is beginning to be used more widely although it is an expensive tool. It is always necessary to carry out a thorough initial assessment and trials.



Process of conservation of the coral using the steam cleaner

## PROCESS

Here I have used a wet steam cleaner. Steam is a mixture of water vapour and condensate, given that as soon as steam leaves a nozzle it begins to condense. Saturated steam occurs where both the liquid and vapour are in equilibrium, same temperature and pressure. Water boils at 100° C, but it will need some more energy to move from the liquid phase to the gaseous (vapour) phase at the same temperature. I have used what is known as the double-pass technique. In this technique, a first clean of the specimen at a lower pressure was used to soften the different contaminants used and, after 30 minutes, a second pass was undertaken to remove them. In deeper areas, another pass was done to completely remove the contaminant. Using water hotter than 100° C can cause discoloration or streaking. Pressure can be minimized by choosing a nozzle with a wide angle that sprays in a fan pattern. Some trials were done before preparing the specimen to identify pressure and nozzle type to avoid damage.



Photos showing different parts of the contaminated damage caused to the coral

## STEAM CLEANING METHODS

Steam cleaners are widely used in other areas of conservation and have been in use since the beginning of the twentieth century. It is one of the safest options in conservation (liquid permitted). They offer highly controllable cleaning with steam, pressure and heat removing particles from surfaces and cleaning them thoroughly. They are used for cleaning detail materials, some geological specimens (not on alabaster) and for masonry and brickwork. There are different types of steam cleaner available using hot or cold water, hot steam cleaner has a lower surface tension than cold which will help clean more deeply and quickly. Pressure between 60 to 150 bar will rise the water to a temperature up to 90°C and water-use of between 5 and 20 litres per minute. Different detergents or chemicals, if not of risk of damage to the specimen, can be used too. If not used properly, the use of hot water washing can damage the specimen as it is quite an aggressive cleaning procedure due to the high-water pressure and the volume of water "spread". The dimension of the nozzle used, the angle to the specimen, the distance to the nozzle to the specimen and the duration of contact will control the effect on the specimen. Good knowledge of the equipment and practice before acting on any new material is key for a good conservation process. For example, an angle above 35° has been used in the preparation of this coral with great success.

## HEALTH AND SAFETY

Our machine produces wet steam in which there are also droplets of hot water. Using the nozzle inside a big sink will help. The use of goggles and protective gloves is recommended too. The steam cleaner itself has low voltage controls, thermostatic cut out (when water level is too low), water level indicator, a pressure release valve and stainless-steel tank and pipes.



Process of removing the metal stand with Dremel



The final result of the coral after using the steam cleaner



The steam cleaner used in this preparation