COLOURING SCULPTURE - MATERIAL EVIDENCE FROM BARBARA HEPWORTH'S WORKING SPACES IN ST IVES
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Introduction

Recent years have seen a welcome focus on Hepworth’s preserved studios at Trewyn (the Barbara Hepworth Museum and Sculpture Garden) and a developing understanding of her working spaces. Tate’s Hepworth Studios Conservation Project ran from 2013-14 [https://www.tate.org.uk/about-us/projects/studios-barbara-hepworth-museum-restoration-preservation] resulting in a strategic plan for the care of the Stone and Plaster workshops and stone yard.¹ Tate’s Sculpture and Installations Conservation team continue to implement this care as well as maintaining the sculptures inside the former studio/living areas and in the garden.

The Studios Conservation Project included a research element and it began with a seminar convened by Helena Bonnett, at which Sophie Bowness presented the research which was subsequently published as The Sculptor in the Studio (2017). Consequently, we now have a much clearer picture of Hepworth’s use of the various spaces, including the Palais de Donse across the road from Trewyn and of the extent to which the spaces have altered since Hepworth’s death.² The spaces at Trewyn were altered during the preparations for opening the Museum and those in the Palais by its continuing use by the Hepworth Estate.³ However, areas such as the shelves in the plaster studio, the inside of cupboards and drawers and boxes under tables were left exactly as they were.

Potentially these areas may contain undisturbed evidence which could provide an insight into aspects of Hepworth’s practice which were not made explicit in the organization of items prior to the opening of the Museum (unlike, for example, the construction and surface finishing of the plasters for making bronzes). One such area of practice is the colouring of the sculptural works, especially the bronzes. At the two-day seminar marking the launch of the Hepworth Research Network in March 2020 it emerged that further research into this would be useful for curators and conservators.

Materials in Cupboard L in the Plaster Studio

Cupboard L in the plaster studio has been identified as one of the most authentic areas of the studio. Areas in the stone and plaster studios were given letters to identify them as part of the preparations for the museum opening in 1976; these have continued to be used in all subsequent inventories with the addition of numbers for shelves and individual items.

Cupboard L contains items that we know relate to the making of plasters for casting bronzes such as Gypsona bandage and Calestone fine casting plaster. There are also items which appear to relate to work on finished bronzes as well as plasters, for
example a tin of bronze shavings, bags and jars of unidentified powders and bottles containing chemicals.

The bottles in the cupboard are better preserved than those on open shelves in the studios and most of the paper labels can be easily read. Many were obtained from TC Leddra the chemist, which is still trading in Fore Street, St Ives, and the labels indicate that they contain chemical salts.\textsuperscript{4}

Fig 1 Bottle (labelled ‘Copper Sulphate B.P’) from TC Leddra & Son

The deliberate application of colour to the surface of finished bronzes is almost always by means of chemical patination which is achieved by the application of chemical salts in solution to the surface of the bronze. The salts react with the metal and create new chemical compounds (copper compounds) which are different in colour to that of the untreated finished bronze. The resulting patinas are usually black, brown and greens of varying hues.

There is one bottle of ‘Copper Sulphate B.P.’ (Fig 1), which is a commonly used patinating chemical. (The letters B.P. indicate that the chemical is medical grade, conforming to standards published annually in the British Pharmacopoeia). Copper sulphate is recorded as being used on Hepworth’s sculptures, as one of the ingredients of the Hepworth ‘No. 1’ patina for blue green areas recorded by Morris Singer Foundry, her principle founders after 1959.\textsuperscript{5}

The other clearly labelled bottles contain ‘Iron Sulphate’. On one there is a handwritten addition which reads ‘Green Copperas’ which at first raised hopes that this chemical might also relate to the colouring of bronzes, perhaps indicating that it produced green copper compounds. However, this is not a chemical used in bronze patination and ‘Green Copperas’ is in fact an old name for iron sulphate\textsuperscript{6}. Another bottle in the cupboard has a label on which the chemical name is only barely legible. Although the letters ‘...ide ...P.’ can be clearly seen it looks like it might be ‘...chloride B.P.’ Tate is currently analysing all the unidentified materials in the studios. The report summary for the likely composition, based on the analysis carried out on a sample of this material which had crystallized outside the bottle, suggests it may have contained a corrosive chloride salt. This could be ammonium
chloride, which we know was used by the Morris Singer foundry to patinate Hepworth’s bronzes and is a component in the formula for the green-blue cold patina for the Family of Man. The Palais contents list yields more chemicals potentially used for patinating. There are several bottles of ammonium hydrosulphide present (Fig. 2). This is used to create brown patinas and is often sold as ‘liver of sulphur’ (this common name also refers to potassium polysulphide). One bottle has a handwritten label ‘Bronz Ammo Sul’, suggesting it was for use on bronzes. In Fig. 3 the handwritten label says ‘POISON SAL AMMONIAC’ – this is an old name for ammonium chloride, which is much used in creating blue green patinas and appears in two of the known Hepworth recipes. Other bottles are less well identified but may relate to colouring bronzes – one containing white powder is labelled ‘to stain bronze’ and a bottle of turquoise blue salt solution labelled ‘poison’ could be copper nitrate which looks like this in solution.
**Summary of possible patinating chemicals found**

<table>
<thead>
<tr>
<th>Documented as used by Hepworth</th>
<th>Studio Cupboard L</th>
<th>Palais</th>
</tr>
</thead>
<tbody>
<tr>
<td>potassium polysulphide ('Liver of Sulphur')</td>
<td></td>
<td>ammonium hydrosulphide ('Liver of Sulphur')</td>
</tr>
<tr>
<td>ammonium chloride</td>
<td>ammonium chloride? (label partly illegible)</td>
<td>ammonium chloride</td>
</tr>
<tr>
<td>copper sulphate</td>
<td>copper sulphate</td>
<td></td>
</tr>
<tr>
<td>copper nitrate</td>
<td></td>
<td>copper nitrate? (unidentified turquoise blue liquid with salts crystallizing out)</td>
</tr>
<tr>
<td>calcium carbonate (whiting)</td>
<td>calcium carbonate (unlabelled white powder, analysed 2019)</td>
<td></td>
</tr>
</tbody>
</table>

**A Discussion of the Material Evidence**

It is important to remember that the two spaces where chemicals that could have been used for patinating works on site have been identified differ in their use since Hepworth’s death. After 1967 when she broke her femur Hepworth did not work in the Palais much, although, according to Bowness her assistants continued to use the lower workshops. After her death it continued as a working space for the Estate, including maintaining works going in and out for loan. Materials put there during Hepworth’s lifetime remain but were often overlaid by later accumulations of materials; some areas contain only more modern items while some almost certainly remained undisturbed. Unlike the materials in Cupboard L in the Plaster Studio we cannot be certain that the materials in the Palais were used by Hepworth or at her behest.

The amounts in which the chemicals are found in both places also differ; very small amounts in the Studio (individual small bottles or jars) and much larger quantities in the Palais, especially of Ammonium Hydrosulphide (multiple large bottles). This suggests different types of use and is in line with the character and workings of the two spaces.

Ammonium Hydrosulphide might have been used to maintain brown patinas which tend not to last long outside as bronze naturally weathers to a green/blue colour. *River Form* in the garden is a good example of this, frequent treatment being needed
to maintain the rich brown outer surfaces. It could also have been used to patinate the bases for bronzes. These sorts of maintenance and display preparation activities would have been carried out by Hepworth’s assistants in the Palais.

The small amounts of chemicals found in cupboard L in the Plaster Studio suggest Hepworth perhaps experimenting with patination or colouring works herself. Regarding the small quantity of copper sulphate, the upper studio was where the sheet metal works were made according to Bowness.11 These must have been coloured on site and possibly copper sulphate was used along with ammonium chloride, as in one of the known patina formulas used at Morris Singer. Hepworth had a close relationship with her foundry,12 would have known the chemicals they used and likely have obtained the same ones if she planned to try patinating her own works. Two chemicals very commonly used for patinating - ferric nitrate and copper acetate - are not found in labelled bottles in either of the spaces and it is interesting that they also do not appear in any of the patina formulae from Morris Singer.

(Having said that, both these chemicals are easily homemade. It is possible that Hepworth saved bronze shavings to make copper acetate by adding white vinegar. The studios abound in rusty nails which can be used to make ferric nitrate. Ammonia also present in the cupboard can be combined with vinegar and salt to produce blue/green patinas on sheet copper.)

Finally, although the paper has focussed on patination, there are other items in the plaster studio cupboard that may relate to Hepworth’s use of colour on sculpture. Pigments found in the cupboard were probably used for colouring plasters, as a guide to the founders,13 although they could be connected to other activities, given that Hepworth used the upper studio in a flexible way. Iron sulphate (Green Copperas) was used to create Harewood, the green stained wood used in marquetry or parquetry since the 17th century and to give a silvery hue to maple wood. It can also be used to stain concrete and some stones giving a range of colours from yellow through red and brown by creating natural iron oxides. The cupboard also contains liquid ammonia which can be used to colour wood and a small test tube of Potassium permanganate which is used to impart a pleasing nut-brown colour to hardwoods. All have other more common uses, iron sulphate as a biocide (usually to kill moss in lawns), liquid ammonia for general cleaning and Potassium permanganate as an antifungal agent and disinfectant but the small quantities and their presence in this particular cupboard suggest Hepworth might have kept them to try out in the context of her artistic practice.14

Conclusion

The contents of cupboard L reinforce the idea that the Plaster studio was a flexible and experimental space in line with the experimental lithographs we know she made there and the samples of unusual materials found there, such as the nuggets of coloured glass and coloured stone samples. The presence of small amounts of chemicals used for patination strongly suggest that Hepworth herself patinated her
small sheet metal works on site and that she experimented with patination
techniques; they also confirm her interest in how the colour effects she specified for
her bronzes were achieved. The chemicals found in the Palais may point to a desire
on Hepworth’s part to maintain the brown patinas on her works displayed outside,
rather than letting them weather but further evidence of this is needed to inform our
future treatment of these sculptures.

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1 Tate’s Hepworth Studios Conservation Project was funded through the Esmée Fairbairn Collections
Fund with additional support from the Friends of Heritage Preservation
2 The Palais contents were inventoried during the project
3 Some works in progress were brought over from the Palais and some materials and tools were re-
arranged by one of Hepworth’s assistants, George Wilkinson, working to Alan Bowness’s instructions
- see Bowness, S. The Sculptor in the Studio 2017
4 Salts are chemical compounds defined by several specific properties and formed by the reaction of
a metal oxide or carbonate with an acid e.g. common salt (sodium chloride) can be made by the
reaction of sodium hydroxide (metal oxide) with hydrochloric acid. They are usually obtained in
crystalline or powder form and dissolved in water for use in patinating and other applications
5 One of three known formulae for patinas used by Hepworth and her founders (Bowness. S. Plasters:
The Gift to Wakefield 2011 p. 59)
6 The name ‘copperas’ dates from times when copper(II) sulfate (blue crystals) was known as blue
copperas, and iron(II) and zinc sulfate were by association known respectively as green and white
copperas because of their colour in crystal form.
7 Bowness, S. Plasters 2011 p. 59
8 Unidentified materials from the Palais have not yet been analysed
9 Bowness, S. The Sculptor in the Studio 2017 p. 66
10 The inventory carried out during the Hepworth Studios Conservation Project recorded only items
that were judged to have been present prior to 1976, this was subjective, based on the look of items,
going on packaging and similarity to items in the Studios.
11 Bowness, S. The Sculptor in the Studio 2017
12 Bowness, S. Plasters 2011 pp. 53- 56. Hepworth’s correspondence with the Morris Singer foundry
including personal communication with Eric Gibbard the foundry manager is in the Tate Archive
13 Bowness. S. Plasters 2011 p.59
14 While other cupboards in the studios do contain a mixture of practice and non-practice related
items (e.g. cat flea collars and gardening catalogues in Cupboard J in the Stone Studio), cupboard L
does appear more organized and dedicated to artistic practice.