

# ANDREA KIRKHAM CONSERVATION LTD

Conservator of Wall Paintings and Polychrome Decoration

## **St Margaret's Church, Hardwick Norfolk**



### **Condition Survey of the St Christopher Wall Painting on the North Wall of the Nave**

*October 2019*

# St Margaret's Church, Hardwick, Norfolk

Condition Survey of St Christopher on the North Wall of the Nave

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## 1: INTRODUCTION AND SCOPE OF THE INVESTIGATION

This report is carried out as part of the 'Bats in Churches Project'. It contains:

- 1) A condition survey of the St Christopher wall painting on the north wall of the nave, including the results of paint samples taken for analysis. The Parish are considering conservation work of the wall paintings. This survey has identified flaking paint that requires stabilisation. In addition, the presentation of the painting is poor, in part, because of bat excreta and could be greatly improved through cleaning.
- 2) The use of curtains as so-called 'protection' for wall paintings from bat excreta is discussed.

The last bat survey was in 2013, prior to roof works in 2014/15. Since the roof work, the bat population has declined significantly. There are now about 6 common pipistrelles internally, compared to 30 in 2013. One serotine bat was observed during the current survey. Bat boxes were installed in the western bays of the roof, both north and south sides in 2013 (plates 2, 5, 6). The current surveys show that the bats are not using the boxes but are roosting internally above the principal rafters. All the wall surfaces (as well as all horizontal surfaces) are coated with bat urine and defecation. The worst effected areas on the north side of the nave which includes the wall painting.

The Project Plan describes the aims:

The PCC would like to engage a more diverse local audience to enjoy and learn about the historic church whilst protecting the St Christopher wall painting and other important church heritage and working towards exclusion of bats from the church.<sup>1</sup>

The inspection carried out 13<sup>th</sup>, 15<sup>th</sup>, 16<sup>th</sup> August and 8<sup>th</sup> October 2019 by Dr Andrea Kirkham ACR. We are extremely grateful to Mr Alan Bell for providing a tower scaffold for the survey.

During Tuesday 13<sup>th</sup>, Mr Ian Miller (building administrator), Mrs Liam Pilgrim (PCC Secretary) and the Team Rector, Michael Kingston attended the church. Rachel Arnold (BiC Heritage Advisor, CCT) and Diana Spencer (Engagement Officer, East Region) visited to discuss the project. Philip Parker (Ecologist) visited to discuss the bat population/issues.

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<sup>1</sup> The Church Project Plan (HG-16-02183 BiC CAP, part 3, Church Project Plan – Norfolk, Hardwick St Margaret), p. 8

## 2: LATE C20TH AND C21ST HISTORY OF THE PAINTING

There seems to be some confusion over the work carried out to the wall painting in the C20th/C21st. The Church Project Plan (HG-16-02183 BiC CAP, part 3, Church Project Plan – Norfolk, Hardwick St Margaret), point 4.2, page 7 suggests the painting was conserved about 20 years ago, that is, 1996/7. It is later suggested that I conserved the wall painting in 1996/7 (p. 18). This is not the case and the narrative seems to be confused with a report written by Pauline Plummer (commissioned by the then Architect, Andrew Anderson) on the painted rood screen, 1996/7.<sup>2</sup>

It is also stated that

‘The main concern is damage to the large St Christopher wall painting. This was restored about 20 years ago, and needs restoration again, but the issue of urine running down the wall needs to be resolved first. Funding is an issue – surveys and conservation last time cost about £7,000.’<sup>3</sup>

It was recommended in 2013 that localised areas of painted plaster should be stabilised and that the decorative border round the top of the painting (seen in Winter's watercolour of 1851) could be uncovered, if funds were available. None of these recommendations were carried out. The Parish last raised funds for the conservation of the wall painting in the late 1980s. Since then, numerous bat droppings disfigure the painting and urine is inevitably spattered across the scheme.

To summarise, the wall painting at St Margaret's Church, Hardwick was conserved in 1988 by Christoph Oldenbourg with myself as an assistant. A dark, discoloured wax coating obscured the painting and plaster was detaching badly (plates 7-13).

I provided a short condition report on the wall paintings in 2013<sup>4</sup> as part of the development phase prior to roof work carried out the following year. I have incorporated part of that report into this one, as it covers much of the background to the painting.

The recent investigation has identified a localised problem with flaking paint which needs stabilisation. The appearance of the painting could be improved with cleaning – including the removal of bat droppings which are visually disruptive and can be damaging. The Parish are unwilling to carry out any costly work to the wall paintings while the bats remain in the church.

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<sup>2</sup> When Mrs Pilgrim checked the records only Pauline Plummer was mentioned. The QIR's for 1995 and 2000 only reference the conservation work carried out in 1988

<sup>3</sup> Project plan, 4.3 Community Impacts, p. 7

<sup>4</sup> The inspection was carried out by myself on 30<sup>th</sup> April 2013 as part of an English Heritage Development Grant. Scaffold was provided for the survey

## 3: DESCRIPTION AND SIGNIFICANCE OF THE ST CHRISTOPHER PAINTING

Located on the north wall of the nave, east of the north door, the wall painting of St Christopher was discovered in the mid C19th. Cornelius Jansson Walter Winter produced a watercolour of the wall painting in 1851, which can be accessed through Norfolk Museums Service Collections website.



**Figure 1**  
'Hardwick Church North Wall Mural Painting' by Cornelius Jansson Walter Winter (1821-1891), watercolour on paper, 1851; 29.3 cm x 20 cm; inscription 'Mural Painting / as discovered on N. Wall of Church at Hardwick Norfolk'; inscription signed bottom right dated / monogram 'CJWW / 1851' (<http://norfolkmu.seumscollections.org/#!/collections/search?q=hardwick>).

The Winter drawing shows St Christopher with an angler fishing in the bottom left corner, apparently an early depiction of an angler.<sup>5</sup> In the Statement of Significance it is said that:

A watercolour by Cornelius Jansson Walter Winter dated 1851 shows details that are no longer visible (despite Andrea Kirkham's conservation work 1996/7). This includes the angler to the bottom left that the 2005 guidebook claims may be the earliest known depiction of a medieval angler.<sup>6</sup>

I did not carry out any work in 1996/7. The angler has been partially destroyed because of a cementitious repair carried out at an earlier, unknown date. The date of the damage is not known but the hard repair was removed in 1988 and replaced with the current lime/sand plaster (plates 59, 60).

Winter also indicates a 'line' just above the head of the Christ Child. Although he has not interpreted it this way, the painting above is later medieval and cannot pre-date the raising of the walls and the new roof. Winter also depicts a decorative border in black and white following the line of the roof wall arches, no longer visible. The decorative border follows the line of the new roof.

All Antiquarian accounts and more recent notes describe one St Christopher, not two. The date for the C14th scheme varies. While Ellie Pridgeon suggests a date in the second quarter of the C14th,<sup>7</sup> others suggest late C14th for the earlier scheme. Tristram (1955) suggested a date of c. 1390<sup>8</sup> and David Park (1999) described the painting as 'Fine late C14 ...'<sup>9</sup> Tristram, writing in 1955, described the painting thus:

North wall, opposite the south door, St. Christopher, against a ground diapered with ermine, clad in a red gipon patterned with delicate scroll-work in white, and a voluminous red cloak lined with green, bordered at the neck with yellow and fastened by a brooch; he holds the staff, with traces of branches at the top, in the right hand and on the left arm supports the Holy Child, who has a cusped nimbus in yellow and green, raises the right hand in blessing and holds in the left arm an Orb of the Universe surmounted by a cross. On each side is a conventionalized tree, with birds in the foliage, including an owl; and on the left the figure of an angler, in soft cap with rolled brim, shoulder-cape, short hip-length gipon, belted low, and long hose. The painting, all the features of which were clearly decipherable when it was recorded by Dawson Turner, is now much defaced, only the general mass of the

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<sup>5</sup> See F Buller, The Earliest English Illustration of an Angler, *The American Fly Fisher*, Summer 1993, Vol. 19, No. 3, pp. 2-9

<sup>6</sup> The Church Project Plan (HG-16-02183 BiC CAP, part 3, Church Project Plan – Norfolk, Hardwick St Margaret), p. 18

<sup>7</sup> E Pridgeon, *St Christopher Wall Paintings in English and Welsh Churches, c.1250-c.1500*, Unpub. PhD dissertation, University of Leicester, 2008, p. 324

<sup>8</sup> E W Tristram, *English Wall Painting of the Fourteenth Century* (London, 1955), p. 178.

<sup>9</sup> D Park in N Pevsner and B Wilson, *The Buildings of England, Norfolk 2: North-West and South* (London, 1999), p. 382.

chief figures, with traces of the trees, the owl, and the ermine diaper, now being visible. c.1390.<sup>10</sup>

In his treatment report of 1988, Christoph Oldenbourg noted that the upper part of the painting is on a different plaster but did not suggest the possibility of two schemes. There are the remains of two St Christophers. The most extensive and the predominant one is the late C14th version (roughly below the line indicated on appendix 2a). It is not unusual to find more than one St Christopher superimposed (see also Irstead Church, Norfolk). He was one of the most popular and common subjects found in English medieval church schemes. It is typical of the C19th to uncover to the earliest layer of painting. This explains why most of the St Christopher is C14th (below the line indicated on appendix 2a) because this is the earliest scheme, on earlier plaster. The earlier C14th head was probably destroyed (though some fragments may remain under the later plaster?) when the nave walls were raised for the roof, necessitating new plaster and, at about the same time, a new St Christopher. Thus, the painting above the line marked in appendix 2a is probably C15th and associated with the new roof. The black and white arched design seen in the watercolour of 1851 fits with the 4-centred braces. Only a fragment of this decoration is visible now but lacunae in the C20th overpaints suggest more survives. If funds are available it will be worth considering removing the overpaints to reveal the design, however fragmentary, which may survive on the plaster in this area. Fragments of what appear to be the later St Christopher survive as islands elsewhere.

Norfolk is a county with a high survival of wall paintings across a wide date range. Late medieval wall paintings are well represented and depictions of St Christopher are amongst the most popular subjects. The scheme at Hardwick is particularly good quality with a good range of pigments and colour use. Details, such as the trailing foliage on Christopher's under garment, are delicately drawn. An unusual feature is the repeat motifs across the background. This painting survives as an important, relatively complete example of late medieval wall painting.

Pridgeon describes the function of St Christopher as:

... that Saint Christopher was not a figure associated with dedication, liturgy or miracle-working shrines. Instead, his cult was largely image-based, and it was necessary to actually see his depiction (typically in wall paintings) to gain the rewards promised. The murals are characteristically large throughout the period to ensure the saint's visibility. His image had a number of differing roles and functions, and the traditional view that the saint was only associated with pilgrims and travellers is misguided (even though authors continue to expound this myth to this day). Primarily, Saint Christopher was a protector against unprepared death, misadventure, harm and fatigue. He was also a curer of illness, a friend, a helper and exemplar, an intercessor and mediator (both during this life and the next).<sup>11</sup>

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<sup>10</sup> Tristram, *'English Wall Painting'*, p. 178.

<sup>11</sup> Pridgeon, *St Christopher...*, p. 15. Italics are as used in Pridgeon.

The impact of St Christopher as a visitor enters the church from the south door is of a dramatic, giant figure whose visibility today reminds of his importance to the medieval congregation. As a work of art, that has withstood the upheavals of the Reformation and the vicissitudes of time, chance and taste, St Christopher draws visitors to the church.

#### 4: ORIGINAL MATERIALS AND LATER COATINGS

##### 4.1: Plaster

There are two plasters supporting two periods of wall painting (see appendix 2a). Both have a gritty aggregate rich finish seen in many late medieval wall paintings in East Anglia (see plates 44-46, 48). While no formal comprehensive survey has ever been carried out, empirical work by the author suggests that plaster technology changed +/- c.1400. By no means is there a clear cut off date from one technology to another but it can be observed that more wall paintings are carried on a gritty textured plaster from around 1400 to the Reformation in the region. By the late C15th, virtually all late medieval schemes up to the Reformation are on a gritty textured plaster. There are C14th examples but they are relatively few compared to the use of a smooth lime rich plaster skim (on a coarse under plaster) seen on many earlier paintings. The C14th St Christopher is carried on a plaster finish that is (arguably) a relatively advanced use of the typology (plates 44-46, 48).

##### 4.2: Paint

Table 1: List of Paint Samples

Sample No	Location and Description	Comment
1	Green from scroll of the text banner	C15th
2	Red from the capital letter, text band	C15th
3	Black outer border, north side	C15th
4	Dark red from St Christopher's cap	C15th ?
5	Brighter red from St Christopher's cap	C15th? Or C14th?
6	Yellowish red from Christopher's beard, flaking	C14th.
7	Red from Christopher's robe	C14th.
8	Green line on top of red	C14th
9	Green on top of red	C14th
10	Blue/green from Christopher's robe	C14th
11	Blue from tree	C14th
12	Green foliage from a tree	C14th
13	Blue from Christopher's robe	C14th
14	Red from Christopher's robe, dark 'spots'	C14th
15	Dark green from Christopher's robe	C14th
16	Red from a flaking area of Christopher's robe	C14th
17	?Black on yellow staff	C14th
18	Green spot on the Christ Child's robe	C14th
19	Mould from a later hair plaster repair	Post-Medieval hair plaster repair



19 paint samples were taken from the painting(s) to establish the nature of the original pigments and whether any are susceptible to fading. Catherine Hassall carried out the analysis and her report is attached as Appendix 1

The range of pigments is not unusual for both the C14th and C15th. These include cheaper red lead, iron oxides, charcoal black and lead white. The inclusion of a rich copper green and an organic blue, probably indigo, suggests a more expensive and sophisticated rural parish church scheme. There is evidence for the alteration and degradation of some pigments, notably the red lead is partially discoloured and some of the blue has degraded (sample 11). Indigo, used in small quantities, is the only pigment susceptible to fading. The pigments are bound in an organic medium.

Too little survives of the C15th painting to establish its colour use, though notably bright expensive red vermilion was used in this scheme. Reds predominate in the C14th scheme and contrast with green, an important medieval colour theme. Cheap pigments are used in sophisticated ways with a limited use of blue to line Christopher's cloak. There is none of the azurite blue or gold found in high status expensive schemes or ostentatious material-rich parish church schemes, familiar in late medieval East Anglia wall paintings (especially late C15th/early C16th). Rather, a skilled painter has used a relatively restrained palette to create a 'Fine late C14th St Christopher...'<sup>12</sup>

#### 4.3: Later Coatings

It is not clear when and who applied the wax coating. It was thickly applied and by the 1980s had darkened so much that the painting was obscured and difficult to read. Some of the wax remains following the conservation work in 1988 because of the gritty plaster surface.

## 5: CONDITION OF THE WALL PAINTING

### 5.1: Context

This Grade 1 listed church is constructed of flint rubble with dressed stone. Hardwick retains romanesque fabric with later medieval alterations. It is a single volume church with the remains of a round tower that had collapsed in the Great Storm of 1770. The south porch is brick and flint chequer. The C15th roof runs from east to west without a break. Major restoration was carried out in 1882. In 1986 the east end was rebuilt. Roof and drainage work were carried out 2014/15 and the church is now much drier. Under pew heating has also been installed.

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<sup>12</sup> Park, p. 382

Hardwick church contains fixtures and furnishings of high artistic value and significance which includes a polychrome rood screen, Jacobean Family pew with a tester, C17th Communion rails and tombs.<sup>13</sup>

The paintings were discovered in the mid C19th. By 1955, Tristram commented on the condition and noted that it was less visible, especially the details. The painting had been waxed and by the time it was cleaned and conserved by Oldenbourg, the wax had darkened to such an extent that the painting was difficult to read. D Park also commented on the loss of details seen in the watercolour but no longer apparent on the painting;

Fine late C14 St Christopher on N wall, though much of the detail, such as an angler, recorded in the C19 copy hanging below is now lost or hard to decipher. On either side of the saint is a tree, that on the r. with an owl which was shown being scolded by other birds.<sup>14</sup>

### *5.2: Summary of the Condition and Conservation Treatment in 1988*

The report by Christoph Oldenbourg, dated 19<sup>th</sup> June 1986, described the parlous state of the wall painting:

The wall painting, a St Christopher, is in a very poor state of preservation. It has been waxed at some point in the past and there has been a problem with damp penetration in the wall fabric. The paint surface is still fairly complete but the supporting plaster is in a serious state of decay... There are quite a few areas of several square feet completely detached. One bulge across St Christopher's thigh has broken open leaving the whole area very vulnerable. Generally the percussion test produced the typical dull sound of disintegrating crumbly plaster, due to waxing.

The painted surface is in the typical state of a wall painting uncovered at the turn of the century. The uncovering was done rather crudely with a rather large tool, leaving many islands of covering later limewash behind, and subsequently heavily waxed. This was at the time believed to be a protective measure...<sup>15</sup>

Work to conserve and clean the Christopher was carried out by Christoph Oldenbourg with myself as an assistant in June 1988 (plates 7-13). The work was grant-aided by the CBC and before conservation and treatment reports are available. This work included the readhesion of some 22 square feet of plaster with a grout of hydraulic lime, HTI-dust, acrylic emulsion AC33 (2%) (plates 12, 13). The grouted areas are shown on the diagram supplied by Oldenbourg with the treatment report in 1988 (an annotated version is provided here, appendix 2b).

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<sup>13</sup> These are discussed in more detail in the Statement of Significance by Richard Halsey. Bats in St Margaret, Hardwick Project Plan, pp. 15-21

<sup>14</sup> Park in *Buildings of England*, p. 178.

<sup>15</sup> C Oldenbourg, 'Fritton and Hardwick Churches, Report on the Condition of the Wallpaintings plus Conservation Proposals' (Unpub. report, 19<sup>th</sup> June 1986), p. 1

As much wax was removed as possible with solvents which included xylene, toluene, methylene chloride and white spirit. The removal/thinning of the wax certainly improved the appearance and the porosity of the plaster carrying the painting (plates 10, 11).

### 5.3: Condition of the Wall Painting in 2013

The comments below were made in my report of 2013 and are repeated here for ease of reference.

'Percussion' tests were carried out by myself during the recent investigation, show that most of the areas grouted in 1988 remain well adhered. The tests indicated hollow sounding areas of plaster. There is some movement in localised areas, notably the small patch above the Christ Child's orb and the worst area is at low level in the bottom right corner of the drawing (see Appendix 2b). Cementitious repairs to left (west edge) of the painting and in the bay immediately west are repairs associated with a stove.

The paint layer is sound with no sign of flaking. The worst problem, potentially, is the bat faeces which are scattered across the surface of the painting. These clearly have to date from 1988 onwards. It has been shown that bat faeces can damage wall paintings.<sup>16</sup> The interaction between deterioration of wall paintings and bat excreta is complex but in certain circumstances, faeces are shown to be damaging. Although, it is often said that faeces can easily be removed in certain cases they can cause contraction, 'ripping' the paint from the surface. Furthermore, damaging chemical processes can occur within the contact area between the bat dropping and wall surface.<sup>17</sup> Faeces visually disrupt the image. Large numbers of bat droppings are not only unsightly but can, in the worst cases, make the painting difficult to read.<sup>18</sup>

### 5.4: Condition Survey 2019

#### 5.4.1: Plaster

The condition of the plaster is the same as in 2013 (see notes above) and the diagram supplied as part of that investigation is attached as Appendix 2b.

#### 5.4.2: Paint layer

There are a number of issues arising. The most immediate being i) the flaking paint on Christopher's beard; ii) the impact of bats on the wall painting; iii) the general appearance of the painting and iv) concern that the painting is fading.

- i): Flaking paint. Most of the paint layer is sound and adheres well to the support. However, there are white lacunae suggesting relatively recent paint loss, certainly post 1988 restoration. There is not an obvious problem with the paint technology and most of these white lacunae are unchanged since first observed in 2013 (plates 52-54).

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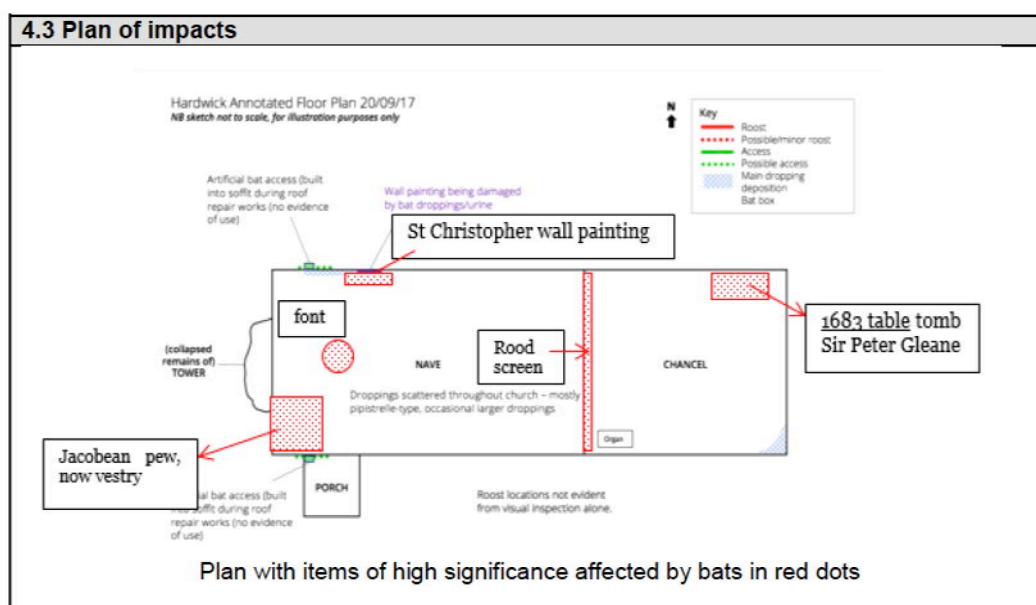
<sup>16</sup> S Paine, 'The Effects of Bat Excreta on Wall Paintings' in, *The Conservator*, ed. C Villiers, No. 17 (1993), pp. 3-10.

<sup>17</sup> Paine, 'Bat Excreta...', p. 6.

<sup>18</sup> A Kirkham, *St Margaret's Church, Hardwick, Inspection of the Wall Painting*, Report, May 2013

There is one significant exception. White lacunae were visible on Christopher's beard in 2013 but at that time there was no evidence of active flaking. This has changed and the beard is flaking badly (plates 49-51). Paint analysis does not indicate an obvious problem with the original technique, but there are residues from the 1988 work. Even so, it is odd that the worst area of flaking (Christopher's beard) is so localised when other areas also retain wax residues. While environment change following the roof works has probably exacerbated the flaking, it still does not explain the localised nature of the problem.

- ii): Impact of bats (plates 14-42). There is no doubt that the bats in this church impact on the wall painting and all the other irreplaceable high significance furnishings, fixtures, painted or unpainted. Bats are defecating and urinating on the wall painting particularly in the 'upper zone' (that is, the upper third of the wall surface, plates 17, 18). On non-porous surfaces bat urine (both older and newer) is clearly evident (plates 22, 23). While urine is less immediately obvious on the painting because of the porous plaster surface, the visual evidence is clear on the adjacent white surfaces, west and east of the painting (for example, plates 21, 37). There is a badly stained area west of the painting, by the bat access (see figure 2, below), and runs are visible on the surface of the painting (plates 16-18). Microbiological growth (MBG) is seen on the white hair plaster repair through Christopher's head (plates 39, 40, sample 19). A sample taken from a dark 'spot' on Christopher's robe appears to be staining from bat excreta (plates 55, 56, sample 14).



**Figure 2:** Plan of Impacts (4.3), Church Project Plan, p. 8

Numerous bat droppings can be seen, especially in the 'upper zone' which must post-date 1988 when the painting was last conserved and cleaned. Many of the droppings are old and dry. Comparison with photographs taken in 2013 shows many of the same droppings on the painting (for example, plates 29, 30). Fortunately, not all droppings are adhering to the paint surface, some 'hang' off a fine 'network' of cobwebs and dust. In the worst cases, though, the droppings are stuck to the painted surface and will be

difficult to remove. New droppings were observed during the wall painting survey and on the last visit, October 8<sup>th</sup> there were numerous droppings and new urine splashes on horizontal surfaces.

- iii) Appearance of the painting. There are other issues with the appearance of the wall painting besides the bat excreta. The wax coating was not fully removed in 1988. It is not always possible to remove all traces of wax and, to some extent the problem here is related to the original plaster technique. A number of the samples taken for analysis show the remains of the discoloured wax coating on the surface (samples 17, 18), effecting the appearance. It is likely that with modern cleaning methods the wax could be further removed and the painting will appear 'brighter'. There is no point in carrying out this expensive work if the bats are still using the internal spaces of the church.

The surface is covered with dust, debris and cobwebs. Accumulated dust sits on the upper surfaces of the undulating plaster (notably by Christopher's hand, holding the Christ Child). Almost the same dust and debris is on the surface as 2013 (see plates 57, 58).

- Iv) Fading. In the Statement of Significance:

It is the St Christopher wall painting that is most threatened, as it has already lost colour since the late twentieth-century cleaning and it must be getting many urine hits as well as droppings.<sup>19</sup>

The pigment identified in the paint analysis likely to fade is the indigo blue and its use is limited. The 'missing' angler partially survives but the upper part was destroyed by a large cementitious repair (?early C20th), removed in 1988 and replaced with a lime/sand plaster (plate 60). No damage was done to the surrounding painting in 1988 as a result of the repair work. Thus, part of the angler and a tree were lost as a result of physical damage long before the 1980s. I suspect the impression that the painting has 'lost colour' is more because it is now covered with dirt, dust and bat excreta that obscure the scheme rather than because it is fading.

## 6: CONSERVATION PROPOSALS

### 6.1: Essential

- Essential work includes fixing flaking paint. As the painting has been waxed in the past, an acrylic dispersion such as Lascaux 4176 diluted in water can be used to re-adhere the flaking paint. Tests on site will establish the appropriate dilution.
- The worst areas of detaching plaster (that is, the small patch above Christ's Orb and at low level in the bottom right corner) should be secured. A lime-base grout would be

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<sup>19</sup> Halsey, Statement of Significance, p. 20

injected behind the detaching plaster which would be gently pressed into place. Any small repairs can be filled with a mortar of lime putty and washed sieved sand (1:3).

- Removal of the bat droppings from St Christopher by mechanical means, if possible. If any droppings are pulling the surface then any flakes of paint will need to be re-adhered, probably using diluted Lascaux 4176.
- Remove all surface dust and cobwebs with soft brushes.

#### 6.2: *Desirable*

- Although not essential, it is worth considering the removal of overpaint between the head of St Christopher and the braces, if funds are available. Even if the surviving medieval design is fragmentary, removal of the overpaints will improve the appearance of the scheme and place the C15th Christopher into its architectural context. The overpaints will be removed with small handtools. Any plaster losses will be filled with a mortar of lime putty and washed sieved sand (1:3). New repairs can be toned with a pigmented limewash, if necessary.
- It is worth considering further removal/thinning of the remaining wax coating where possible, using wax solvents such as toluene, xylene, white spirit perhaps mixed with acetone or isopropyl alcohol. The proportions and mixtures will be established during tests. This will be time-consuming work and the appearance will not be so dramatic as in 1988 but it should even out the background and clarify dull, difficult to see areas.

#### 7: BLINDS/CURTAINS AS MITIGATION FROM BAT EXCRETA

Statement of Significance, Halsey, p. 21:

The worst affected highly significant item is the St Christopher wall painting. Much of it could be protected now with a blind or curtain fixed to the ends of the roof arch braces directly above. This could be drawn back to allow viewing during the day and dropped to provide protection when the bats are most active at night. As the droppings are randomly spread, a deflector would have only a limited effect.

Neither the rood screen nor the Jacobean family pew show obvious signs of bat impact, though their historic paint finishes must be getting their share of urine splashes. Any impact can only be prevented by restricting entry of bats to the church. A blind or curtain for the St Christopher and cloth covers for the two tombs would be a straightforward means of preventing further impact from flying bats, regardless of the results of any further monitoring.<sup>20</sup>

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<sup>20</sup> Halsey, Statement of Significance, p. 21.

Natural England's Technical Information Note, TIN043 (first published 2008; 2<sup>nd</sup> edn, 2011), *Bats in Churches: a management guide*, suggests possible mitigation to deflect droppings in the form of 'vertical hanging screens' (suggested for the protection of wall paintings)<sup>21</sup>

Vertically-hanging screens could be also be used to protect wall paintings or other items on walls. This technique has been little tested as there are concerns about its aesthetic impact. Any protection such as this would require the authority of a faculty. Possible materials could include fine netting (as used to keep birds off buildings) or clear plastic. If screens can be mounted so they hang some distance from the objects they are designed to protect, they could prevent bats flying close to the objects thus provide protection from excreta. Netting screens would be almost invisible if hung carefully. (TIN043, 2011, p. 5)

The Parish quite rightly raised objections to covering the wall painting.<sup>22</sup> Wall paintings are large-scale fixed works of art that are a significant and irreplaceable part of our visual culture. They are meant to be seen. Wall paintings survive as a testament to past congregations, their aesthetic choices, beliefs and ideologies, who raised money and commissioned the paintings. To cover wall paintings negates the whole experience of seeing and reading them. Visitors to churches come to see our rich legacy of paintings, furniture, glass, etc and they contribute by putting money in the box. They do not come to see an interior that is aesthetically marred by an ocean of curtains and plastic sheeting because of bat excreta.

Covering paintings create micro-climates. Opening and closing curtains can damage wall paintings by abrading against the surface, especially if paint is flaking or powdering. The suggestion in the statement of significance that a parishioner should open and shut curtains everyday is impractical and yet another burden. Fixing curtains to a historically significant medieval roof (suggested at Hardwick) is also unacceptable. Curtains, etc will become dirty, covered with bat excreta. If hung high up (as suggested at Hardwick) they will be difficult to remove for cleaning.

It is entirely unacceptable to mitigate the effects of bat excreta on wall paintings by hanging curtains/blinds/etc in front of them. Other methods must be found to protect our irreplaceable cultural heritage from the impact of bats. At Hardwick, the Parish have requested that the bats are excluded from the church.

Dr Andrea Kirkham ACR  
October 2019

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<sup>21</sup> Also cited in Hales, 2017, p. 407

<sup>22</sup> NB. During the consultation process the PCC raised a number of observations and reservations regarding installation of a curtain, and as a result, this option has been removed from the plan for Hardwick Church. Note added to the statement of significance



**Plate 1**

*Top left:* exterior view, south side

**Plate 2**

*Above:* detail, south side, bat access, west end

**Plate 3**

*Left:* exterior view, north side from east to west







**Plate 4**

*Top far left:* north side, from west to east



**Plate 5**

*Bottom far left:* detail of the bat boxes

**Plate 6**

*Left:* north side, west end, location of the bat boxes and the wall painting

Location of the wall painting in red

Bat access in blue





**Plate 7**

*Left:* view of St Christopher before conservation in 1988. A discoloured wax coating has obscured the fine details of the painting

**Plate 8**

*Above:* detail, before conservation in 1988



**Plate 9**

*Above:* view of the upper half of the painting before conservation in 1988

**Plate 10**

*Top right:* detail of the Christ Child, during wax removal in 1988. The contrast is dramatic



**Plate 11**

*Bottom right:* detail, right edge of Christopher's cloak during cleaning, 1988





**Plate 12**

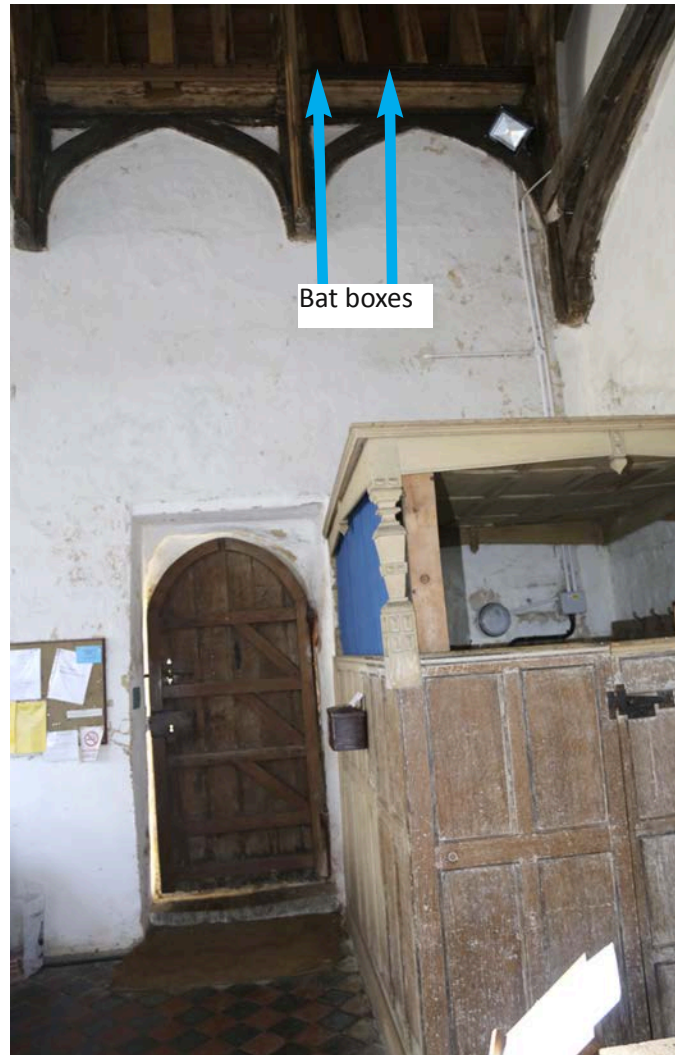
*Left:* detail of Christopher, with the painted plaster faced during plaster stabilisation, 1988

**Plate 13**

*Above:* detail of St Christopher, detaching plaster showing the fragility of the wall painting before the 1988 work



**Plate 14**  
*Above:* view of the nave looking west



**Plate 15**  
*Middle:* view of the west end of the south wall, showing the location of bat boxes and the Jacobean family pew



**Plate 16**  
*Right:* view of the west end of the north wall showing the staining associated with bat excreta



**Plate 17**

*Left:* north side, view of the staining below the bat access, extending onto the wall painting

**Plate 18**

*Above:* east of the wall painting, north wall of the nave, showing the worst area of bat defecation in the upper third of the wall (henceforth referred to as the 'upper zone')



**Plate 19**

*Top left:* detail of the north west windowsill with bat droppings and urine, west of St Christopher

**Plate 20**

*Left:* Bookshelves and information below the north west window (west of St Christopher)

**Plate 21**

*Above:* detail of the north wall, east of St Christopher and the window, showing bat excreta. The worst vertical surface is the area in upper third of the wall



**Plate 22**

Above: aisle tiles showing urine spatter



**Plate 23**

Above: ledger slab with urine spatter



**Plate 24**

*Above:* south wall of the nave, west end, showing the location of bat boxes with the upper third of the wall affected by bat defecation/urine. Note the location of the painted Jacobean pew high heritage value below the bat access. The black and white paint scheme is a rare survival

**Plate 25**

*Top right:* opposite north side showing the location of the bat boxes

**Plate 26**

*Right:* opposite north side of the church. The problems are even worse on the north side of the nave, which has the medieval wall painting



**Plate 27**

*Above:* detail of the top part of St Christopher between the arches, 2013  
Large numbers of bat droppings are evident here. The upper third of the wall (both north and south sides) are very badly spattered with bat excreta. The following sequence of photographs show bat droppings in detail

**Plate 28**

*Above:* the same area in 2019. The area is spattered with bat droppings. For the most part, these appear to be old with a smaller number of new droppings. The urine cannot be quantified because it soaks into the porous surface of the medieval painted plaster.



**Plate 29**

*Above:* top of the painting, detail of the text banner in 2013. Numerous droppings on the painted area are less obviously visible than on the surrounding white.



**Plate 30**

*Above:* the text banner in 2019 with bat droppings



**Plate 31**

*Left:* detail, showing bat droppings on the painted surface, C15th scheme in 2019

**Plate 32**

*Above:* detail of bat droppings, top right side, between the painting and the brace, 2019



**Plate 33**

*Far left:* detail to the left of St Christopher before conservation in 1988. Note that the sprouting staff is only partially visible



**Plate 34**

*Left:* detail during conservation in 1988. Clean painted surface when first uncovered



**Plate 35**

*Left:* detail showing the sprouting staff in 2019. Bat droppings are scattered across the surface. Urine is not immediately visible but it is in the 'upper zone' which is the worst area of bat excreta



**Plates 36**

*Far left:* north wall, detail of the staining west of the wall painting

**Plate 37**

*Left:* detail of plate 36. The drips, dust and defecation are post 1988 conservation



**Plate 38**

*Above:* detail of St Christopher's head in 1988

**Plate 39**

*Top right:* detail of St Christopher's head in 2013

**Plate 40**

*Right:* detail of St Christopher's head, 2019





**Plate 41**

*Above:* detail, top left showing bat droppings. The painted border in the Winters water-colour may survive under the overlying paint layers

**Plate 42**

*Above:* detail of the Christ Child's halo with bat droppings





**Plate 43**

*Top left:* detail of the right side of Christopher's robes

**Plate 44**

*Left:* detail of the plaster surface indicating the gritty-textured finish, a typical late medieval East Anglian surface

**Plate 45**

*Above:* detail of the gritty textured plaster with brushstrokes showing in the paint layers



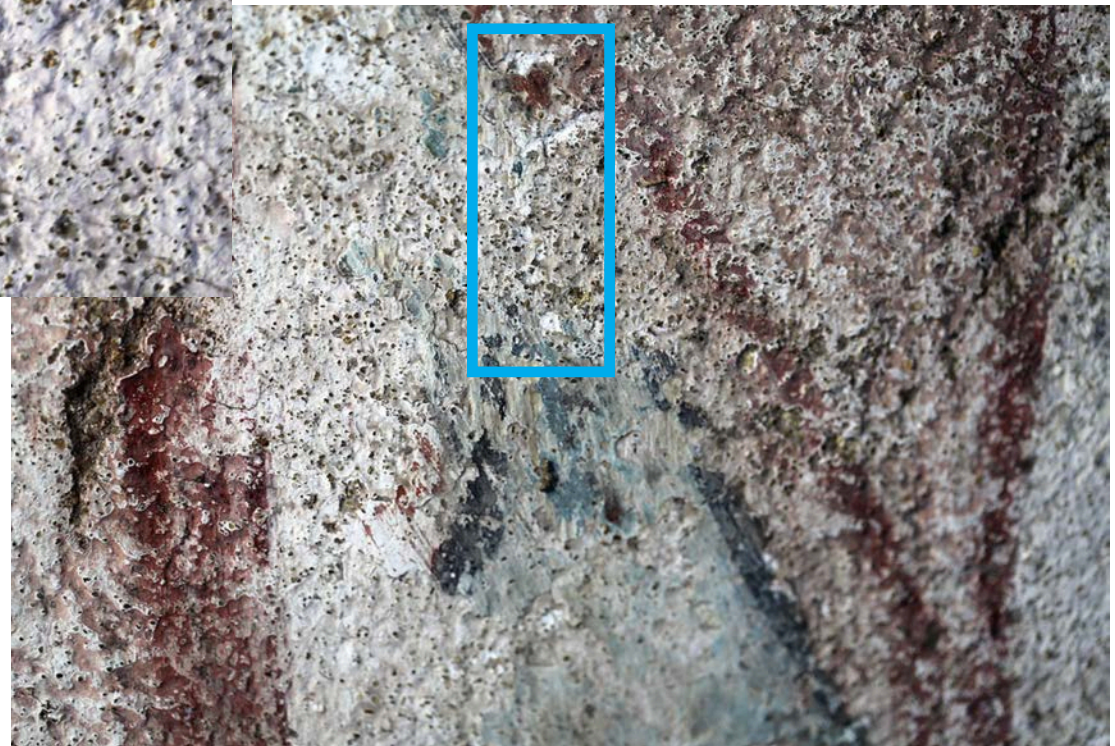
**Plate 46**

*Above:* detail of the plaster texture showing the distinctive gritty surface typical of this typology. Note also the dark sand grains 'grinning' through the paint



**Plate 47**

*Top right:* location of plate 46



**Plate 48**

*Right:* detail of Christopher's drapery with white lacunae, indicating paint loss



**Plate 49**

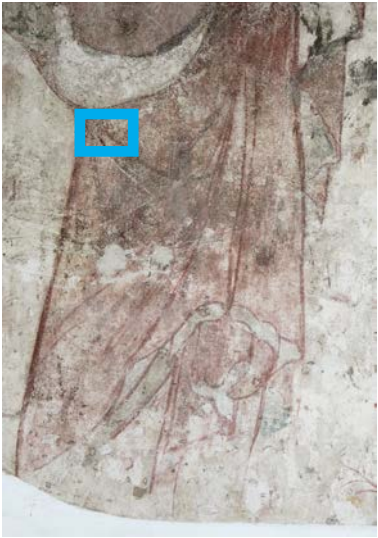
*Top left:* detail of St Christopher showing the location of plates 50-51

**Plate 50**

*Left:* detail of Christopher's beard showing flaking paint and paint loss, evidenced by white areas

**Plate 51**

*Above:* detail of plate 50 showing the flaking paint



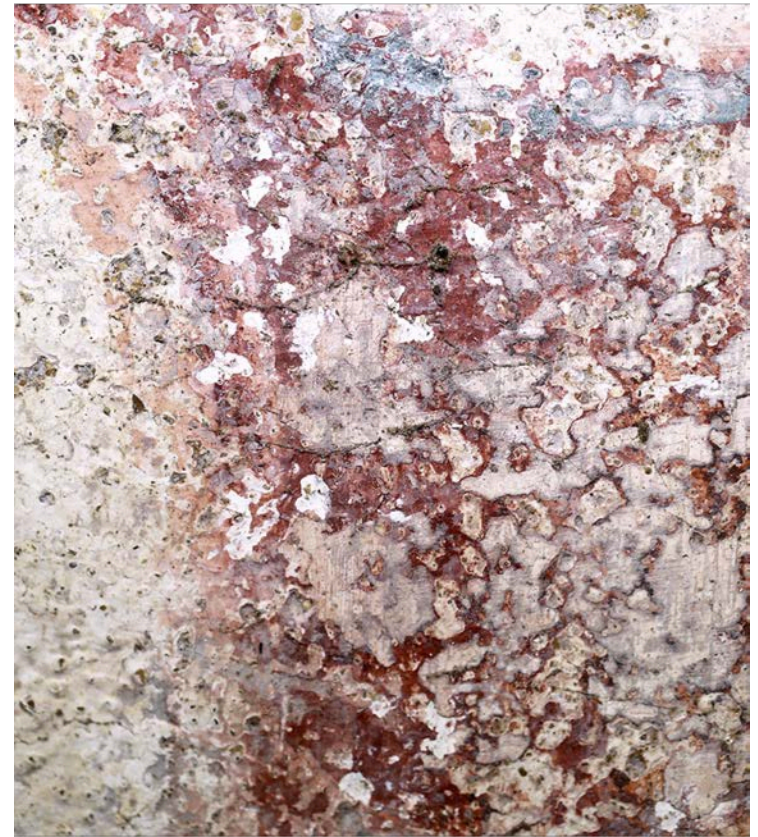
**Plate 52**

*Above:* location of plates 53-54



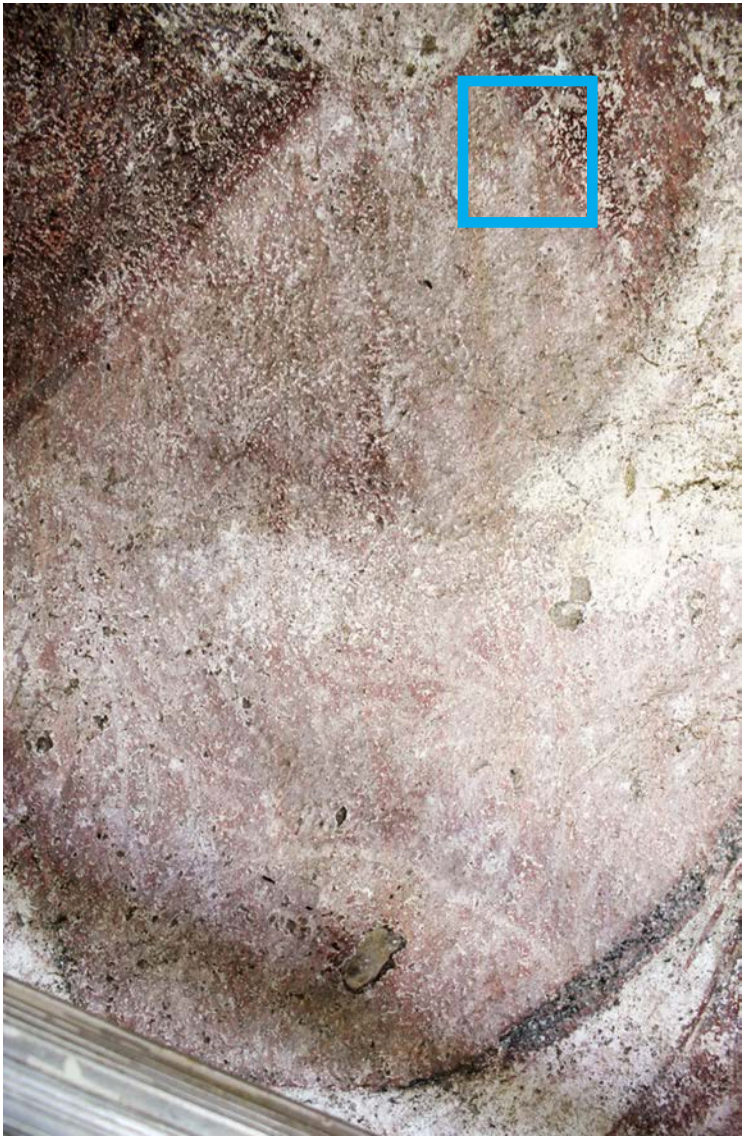
**Plate 53**

*Above:* detail of Christopher's robes showing areas of paint loss (evidenced by the white lacunae) in 2013



**Plate 54**

*Above:* the same area in 2019. The areas of loss are the same as 2013



**Plate 55**

*Left:* detail of St Christopher's under garment, of pinkish red with delicate trailing foliage

**Plate 56**

*Above:* detail showing dark 'spots' (see sample 14)



**Plate 57**

*Left:* detail of Christopher holding the Christ Child showing accumulated dust and cobwebs in 2013. The plaster undulates and the dust and cobwebs settle on the upper surfaces of the undulations

**Plate 58**

*Below:* detail showing accumulated dust and cobwebs in 2019





**Plate 59**

*Far left:* detail of Winter's watercolour showing the angler

**Plate 60**

*Left:* detail of the angler in 2019, partially destroyed by a large repair. Part of a tree is also destroyed



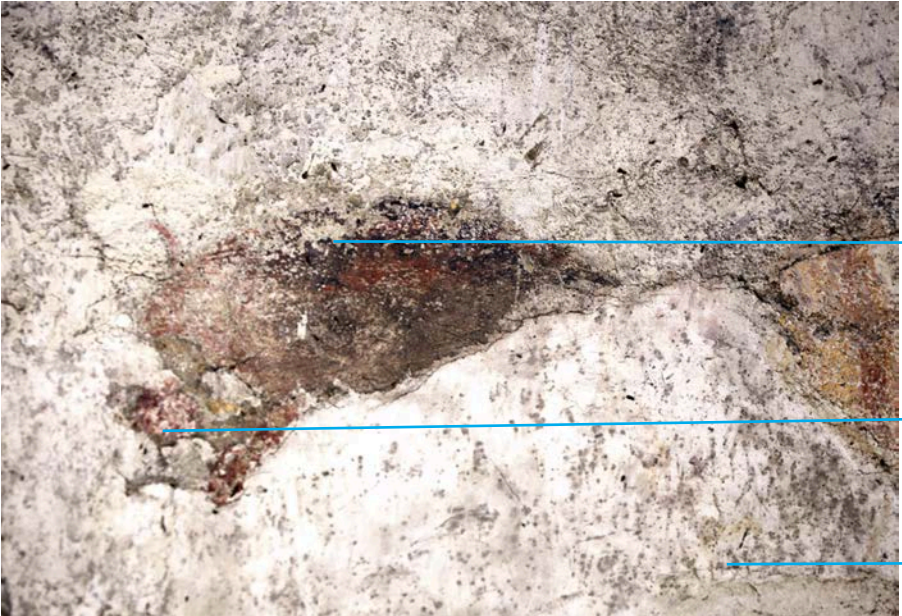




1

2

3



4

5

19



6



7



18

8



9

10



11



12



13



14



16



15



17

## ST MARGARET'S CHURCH, HARDWICK

Norfolk

Paint samples were taken by Andrea Kirkham from the following areas:

- 1 green from scroll of the banner – C15th
- 2 red from capital letter – text band – C15th
- 3 black outer border, north side – C15th
- 4 dark red from Christopher's cap – C15th?
- 5 brighter red from Christopher's cap – C15th? or C14th?
- 6 yellowish red from Christopher's beard, flaking – C14th
- 7 Red from Christopher's robe – C14th
- 8 green line on top of red – C14th
- 9 green on top of red – C14th
- 10 blue/green from Christopher's robe – C14th
- 11 blue from tree – C14th
- 12 green foliage from tree – C14th
- 13 blue from Christopher's robe – C14th
- 14 red from Christopher's robe, with dark 'spots'
- 15 dark green from Christopher's robe – C14th
- 16 red from an area of paint loss Christopher's robe – C14th
- 17 ?black on yellow staff – C14th
- 18 green spot on Christ Child's robe
- 19 mould from a later hair plaster repair

### Examination procedure

The samples were examined under low magnification and then some of the pieces were mounted in cold-setting polyester resin to be cut and polished as cross-sections.

Material from the coloured layers was dispersed on glass slides and the pigments identified using a polarising light microscope.

### C15th Painting

Samples 1-3 were too small to mount as cross-sections, so they were prepared as paint dispersions

- Sample 1      No green particles were seen in the dispersion, only a few particles of red lead.
- Sample 2      Vermilion
- Sample 3      This consisted of a blackened pigment. A few particles of vermilion were also present so it may originally have been a red.
- Sample 4      The cross-section shows a layer of red lead on the plaster surface, overlaid by a few particles of vermilion.

Sample 5, from Christopher's red cap is more likely to be from the C14th scheme because the red is a red iron oxide, and that pigment was used widely for his costume in the C14th.

### C14th Painting

Red            Pure **red iron oxide** was found used on its own in Samples 5, 8, 14 and 16. In Sample 9 the same red was laid over a thin undercoat of red lead.

**Red lead** was used for the undercoat of Christopher's beard [Sample 6]. The fragments in the sample had crumbled, and the dark brown second layer was missing. In the dispersion particles of chalk were present as well as red lead.

A thin line of red lead particles was also found as a first layer on the plaster in Samples 7 and 9. In both of these the red pigment had partly blackened.

Red lead was also found under the red iron oxide of Christopher's robe in the area where green was applied as a top coat [Sample 9]

**Vermilion** was identified on Sample 2, the C15th scheme.

Green        In Sample 12, a dark **green copper glaze** based on a dissolved copper salt such as verdigris, was used over a black undercoat based on charcoal black.

The same copper pigment was also used mixed with **lead white** and **charcoal black** for the dark green in Sample 15.

In Sample 18, from the Child's robe, a thin layer of lead white is overlaid by an equally thin layer of the green mixed with lead white. On top of the green are blackened pigment particles

In Sample 12, a lump of pale blue copper/chalk/lead salts can be seen on top of the green.

**Blue**            An **organic blue**, probably indigo, was used mixed with lead white and some charcoal black in Samples 10 and probably 13. The cross-section made from Sample 10, clearly shows particles of lead white and the dispersion shows an organic blue, but in Sample 13 the paint is in very poor condition, and the identity of the pigments is not so certain.

Sample 13 was taken from an area of blue, but no blue pigment was found. The cross-section shows a thin layer of lead white mixed with a few particles of red iron oxide, overlaid by calcium-containing salts.

**Yellow**        The cross-section made from Sample 16 shows a thin layer of lead white overlaid by a mixture of **iron oxides** and lead white that has largely discoloured to black. The blackened material tests positive for lead.

### **Later organic coating[s]**

There is a layer of organic material over the paint in many of the fragments. Most of this is probably wax which was partly removed in 1980s because it has a cloudy appearance in UV, but it appears to be less opaque than the wax normally found used. The layer can be clearly seen in Samples 17 and 18.

### **Mould in Sample 19**

An organic coating, perhaps the wax, can be seen over the later white plaster. Within the layer are fibres similar to those associated with mould growth.

### **Staining on Sample 14**

The dark patch over the red paint of Christopher's robe in Sample 14 is an amorphous, opaque brown material that does not resemble deposits left by mould growth. It may be staining as a result of bat urine or bat droppings.

### **Paint flaking**

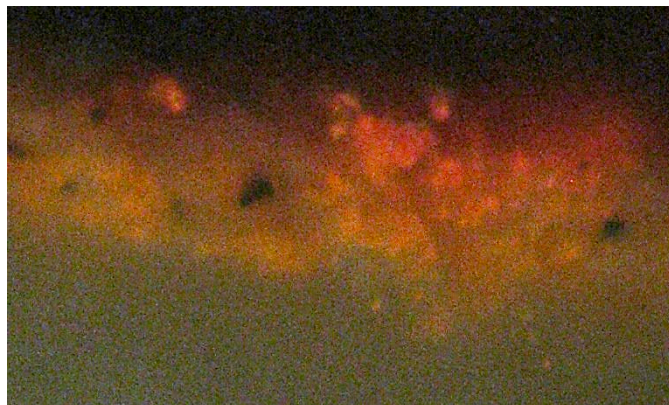
Sample 16 was taken from an area that has flaked. There appears to be no obvious reason why the paint should be detaching. The only difference from the other samples is that the red of the garment consists of a single thin layer of red iron oxide, in other samples there is a build-up of layers, often with a lead-based paint as a first coat.



**SAMPLE 4**

Dark red from Christopher's cap

Vermilion particles over red lead.

**SAMPLE 5**

Brighter red from Christopher's cap

Red iron oxide resting directly on the plaster

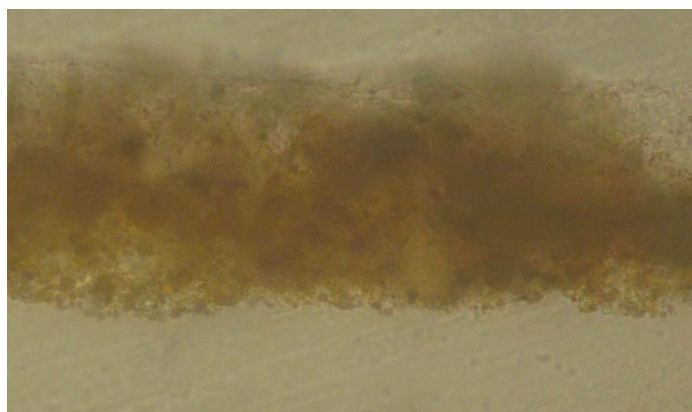
**SAMPLE 6**

Yellowish-red from Christopher's beard –  
C14th

Red lead particles



Section lit from behind to show the  
organic coating [wax?] on the surface



**SAMPLE 8**

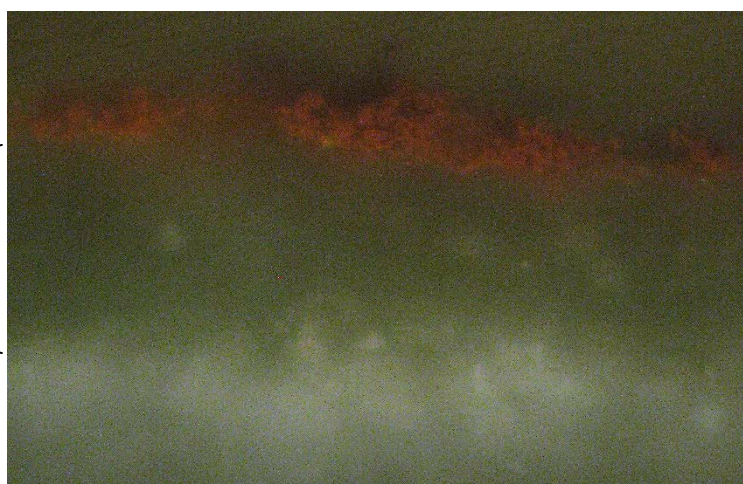
Green line on top of red

Red lead particles, largely blackened

**SAMPLE 9**

Green on top of red

The green must have flaked off -  
the red iron oxide is the only pigment  
final skim coat of  
plaster, or limewash

**SAMPLE 10**

Blue/green from Christopher's robe

Organic blue + lead white + black

over red iron oxide

over a few particles of  
red lead

**SAMPLE 11**

Blue foliage

The paint is very degraded and some  
of the colour may be from copper salts

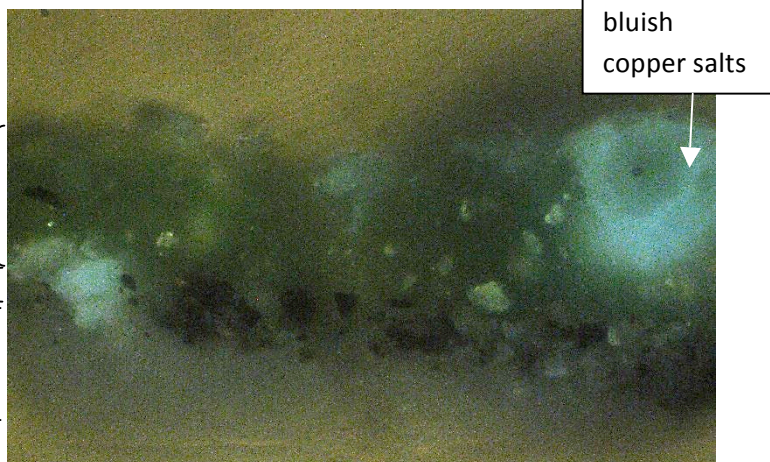


organic  
layer ?wax

**SAMPLE 12**

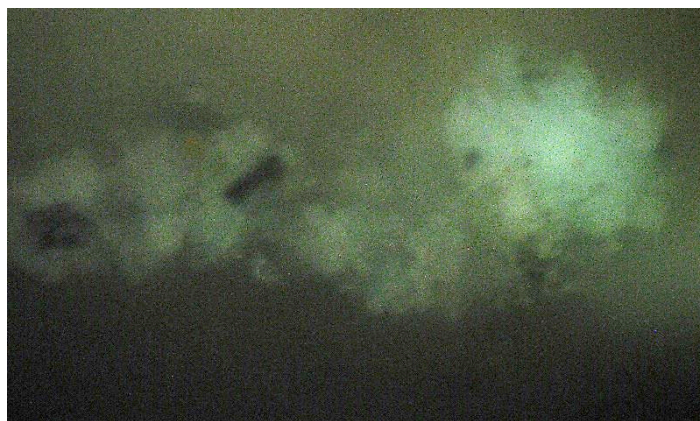
Green foliage from tree

copper green glaze  
charcoal black undercoat  
plaster

**SAMPLE 13**

Blue from Christopher's robe

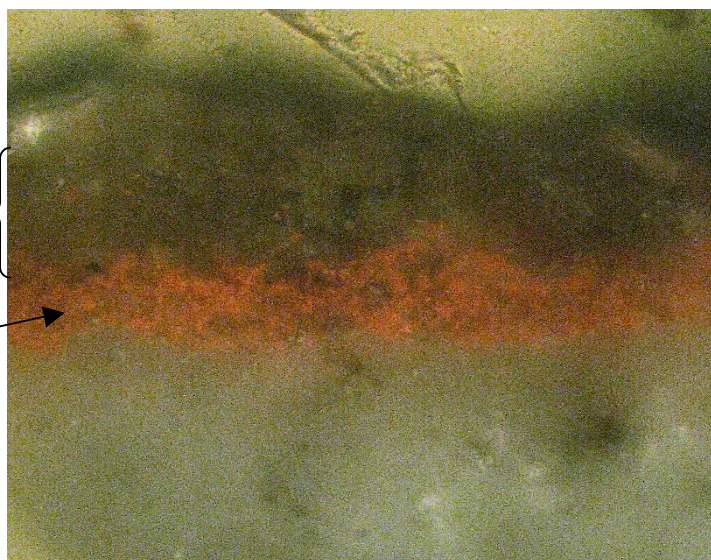
Degraded paint tests positive for lead

**SAMPLE 14**

Red from Christopher's robe, with dark 'spots'

brown organic layer possibly  
from bat dropping or urine

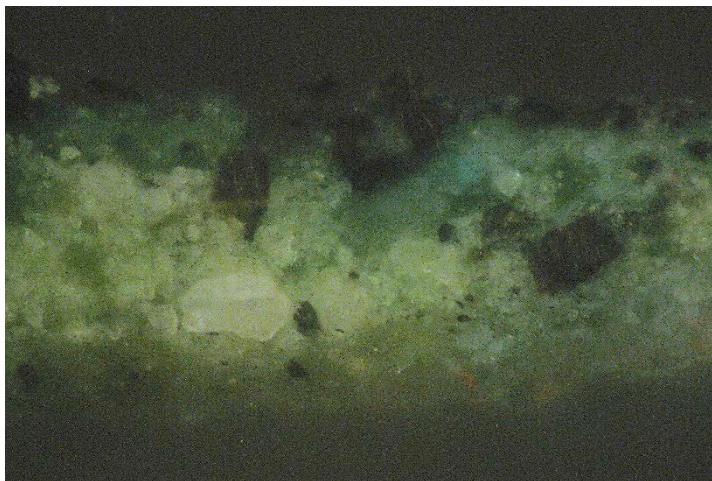
red iron oxide of robe



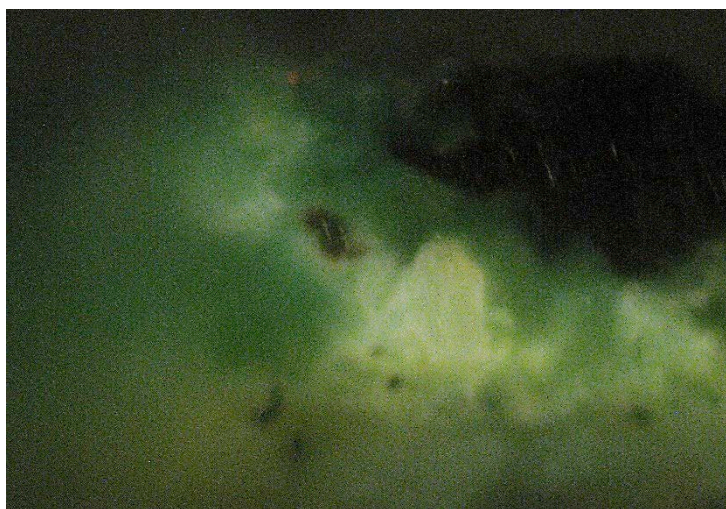
**SAMPLE 15**

Dark green from Christopher's robe

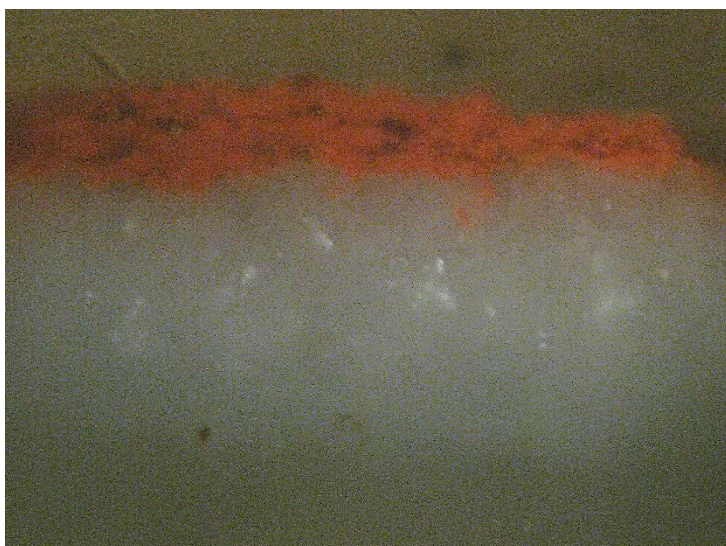
copper green, charcoal black and  
lead white



Another fragment, showing  
globules of copper green glaze

**SAMPLE 16**

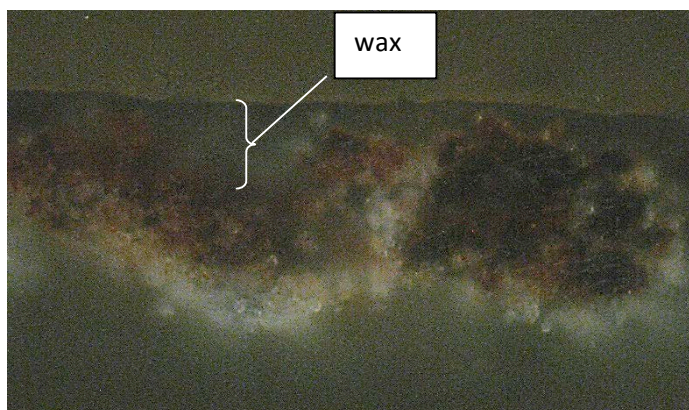
Red from flaking area of  
Christopher's robe



**SAMPLE 17**

?Black on yellow staff

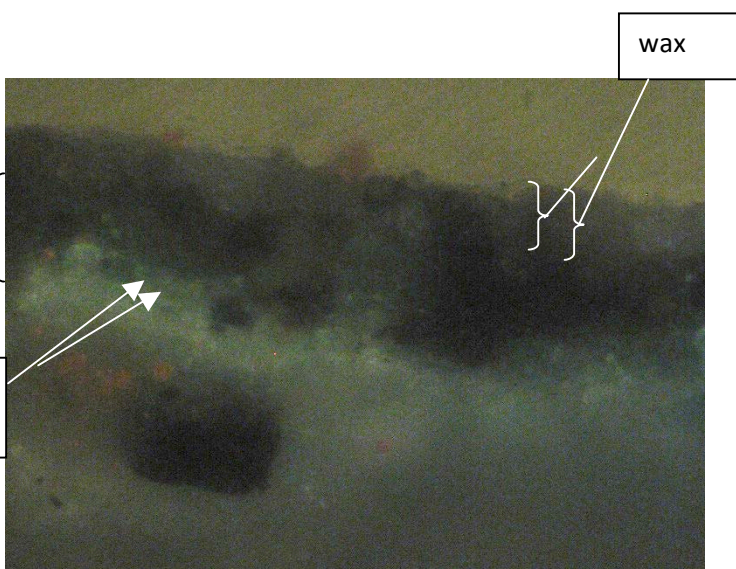
Blackened lead pigment mixed  
with a little iron oxide yellow,  
over lead white undercoat

**SAMPLE 18**

Green spot on Christ Child's robe

blackened pigment

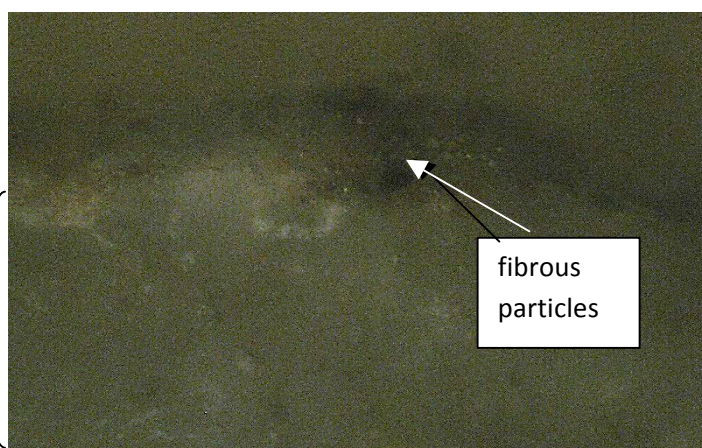
patch of green over  
white layer

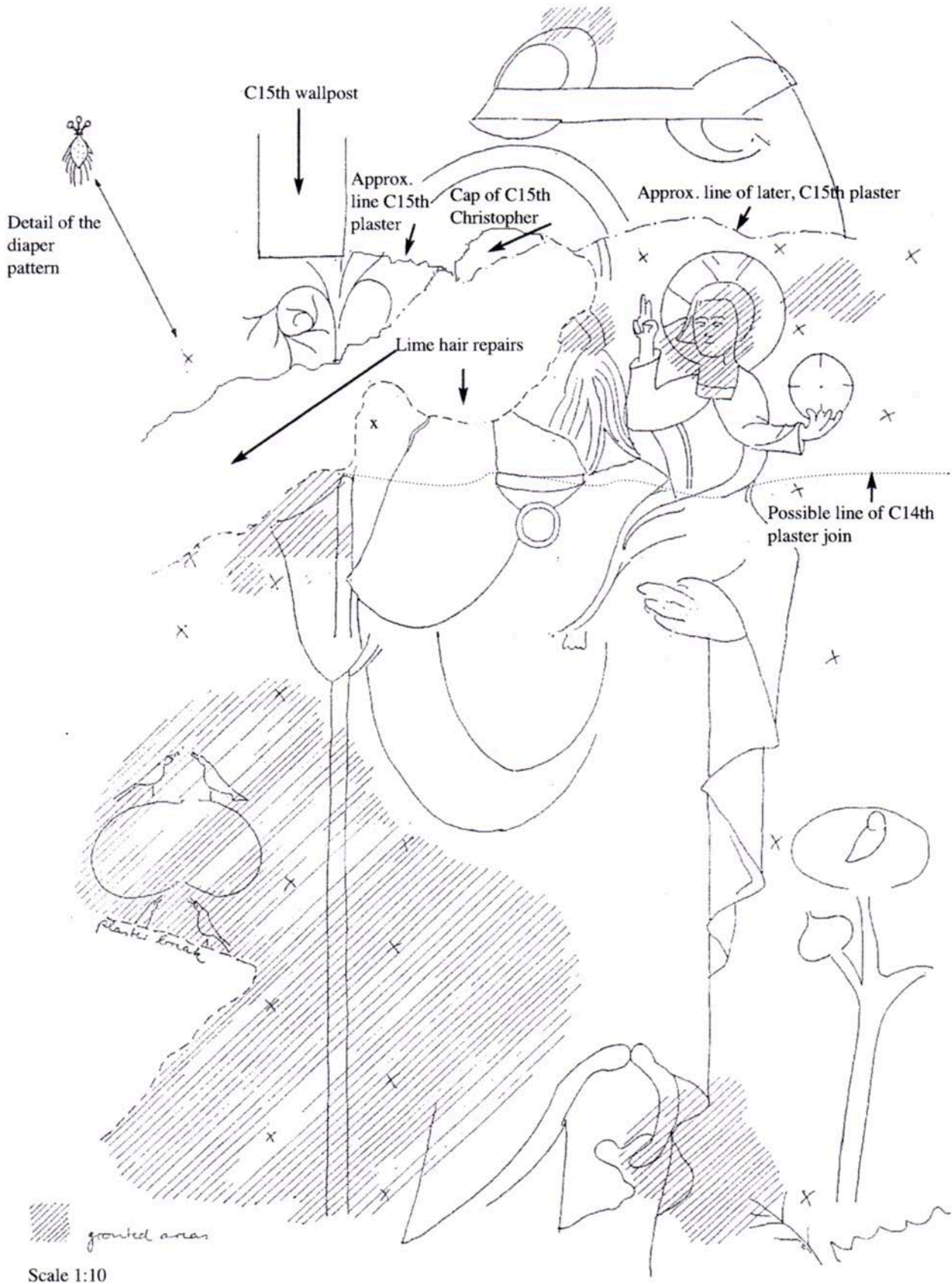
**SAMPLE 19**

Mould on a later hair plaster repair

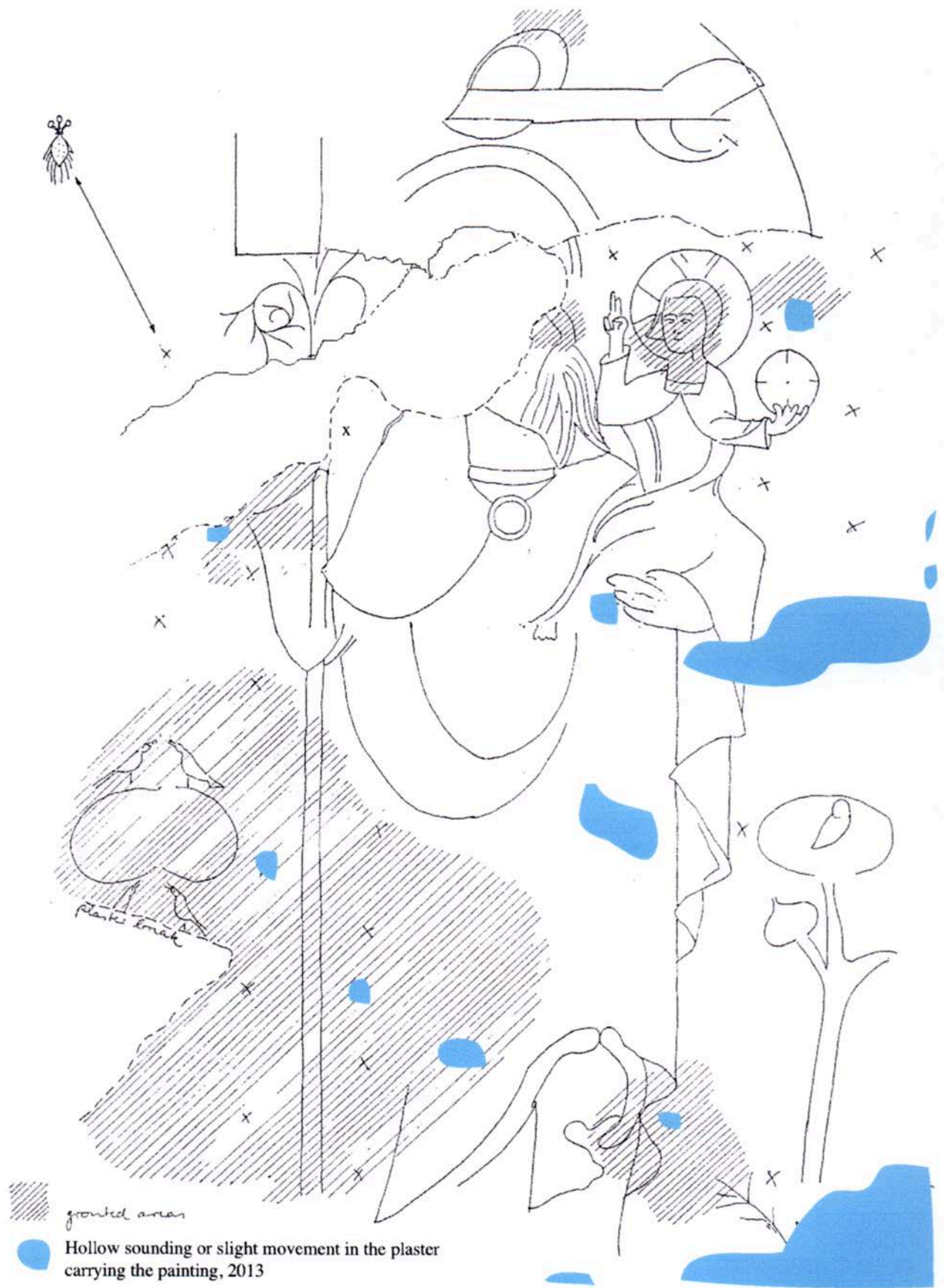
plaster

fibrous  
particles





Appendix 2A: Drawing, C Oldenbourg, adapted by A Kirkham 2013



Appendix 2B: Drawing, C Oldenbourg, adapted by A Kirkham 2013