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## **The Transfer of Cima's 'The Incredulity of S. Thomas'**

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### **The physical history of the painting up to its acquisition by the National Gallery in 1870**

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'The Incredulity of S. Thomas' by Cima da Conegliano (No. 816) (Fig.1 and Plate 9, p. 46) was acquired by the National Gallery in 1870. This account of its documented physical history up to that date serves as an introduction to the main part of this article on the transfer of the altarpiece in that it offers some possible reasons for the fragile and damaged condition of the work which made transfer necessary.

Its troubled history can be said to have begun on 28 May 1497 when the 'Gastalderia' or governing committee of the Scuola di S. Tommaso dei Battuti decided to commission an altarpiece for their altar in the church of S. Francesco in Portogruaro. It was to be a painted altarpiece rather than one sculpted in relief, and it was to be done as cheaply as possible (note 1).

It is not known when the commission to paint the altarpiece was actually given to Cima. The first reference to Cima in the account book of the Scuola dates from 1502 when he is described as being 'the master who is making the altarpiece in Venice' (note 2). However the earlier pages of the account book were already missing by 1870 when it was transcribed for the National Gallery, so it is possible that Cima may have received payments in the preceding years. Included in these missing pages may also have been a separate payment to a joiner and woodcarver for the making of the panel, like that recorded for Cima's 'Baptism of Christ' on the high altar of the Church of S. Giovanni in Bragora in Venice (note 3).

In 1504, the date inscribed on both 'cartellini' (Figs. 2 and 3), Cima completed work on the altarpiece, but not before he had to threaten to refuse to finish it in order to be paid a further instalment of his fee (note 4). In the account book the expenses involved in transporting the painting from Venice to Portogruaro are listed in detail, and include the making of what may be a packing case which was taken to Cima's workshop for collection of the painting (note 5). These are followed by the costs incurred in putting up the altarpiece and the general fitting out of the altar. Even the curtain rings for the white linen curtains to cover the painting are included (note 6). Unfortunately for the confraternity, the outlay for their altarpiece did not stop there, because Cima then began a lawsuit to extract further payments for his work. This dragged on until 1509, by which time Cima had received sums totalling some 132 ducats, not including any possible payments before 1502. This is his highest recorded fee (note 7). As the contract between Cima and the confraternity has not survived, it is not known whether this was the original stipulated fee or whether Cima exceeded the expectations of his patrons, producing a grander and more lavish work than they required. Certainly it was not executed 'with the least expense

possible' (note 8).

The next secure date in the physical history of the painting is 1745, when, according to a crudely painted inscription on a floor-tile in the bottom right corner (Fig.4), a restoration was carried out under 'D. ANG[el?]o ZoT[i?] GASTALDO' (that is, officer of the confraternity). This inscription, which was only uncovered in 1981 during further cleaning after the transfer had been completed, has been painted using a paint which, in its coarse texture and almost total resistance to cleaning solvents, is very like that found over some of the largest losses in the painting, including those on the robes of S. Thomas and S. Peter, the chest of the disciple on the far right, and, in particular, the very discoloured, black retouchings scattered across the back wall of the room. This suggests that the painting had suffered extensively from flaking, perhaps caused by neglect and poor environmental conditions, but also possibly because of a technical fault in the preparation of the panel, for example either too much or too little size brushed onto the panel before the application of the gesso layers (note 9).

The altarpiece appears to have continued to blister and flake, and in 1818 its deteriorating condition was drawn to the attention of the appropriate representatives of the Imperial government, who ordered that it should be sent to the Accademia di Belle Arti in Venice for treatment (note 10). A document dated 14 April 1820, consigning the work to Professor Giuseppe Baldassini for restoration, describes it in some detail (note 11). The dimensions given correspond to its present size and it is described as having an arched top, confirming that the top of the panel had already been altered to the irregular shape now visible. The top inch or so of wood from the panel was found to be a later addition (Fig.19), so it seems most likely that originally it had a rectangular top, with the top edge coinciding with the upper edges of the sixth row of coffering. Another possibility is that the work had a simple, semi-circular arch like that of so many contemporary Venetian altarpieces.

The same document of 1820 further describes the work as being 'executed on a panel made up of six planks of poplar, perfectly joined, which on its reverse is reinforced laterally at the bottom and in the middle with three cross-bars of wood and frequent ribs, which guarantee its preservation against whatever events to which any work executed on panel may be subjected, as long as it is not destroyed by fire or time' (note 12).

This 'guarantee' was soon put to the test. Some time between 1822 and 1830, during prolonged and complicated negotiations over the payment of Professor Baldassini's bill for the restoration, the painting was stored in a ground floor room at the Accademia. A sudden flood tide is supposed to have inundated the room, knocking over the easel upon which the panel was placed, and submerging the picture for several hours in the salt water (note 13).

In 1830 when the painting was returned to Portogruaro after this accident, it apparently needed further treatment which was carried out by a Signor Lorenzo (note 14). In 1833 it was transferred to the newly built church of S. Andrea, the church of S. Francesco having been demolished in 1828 (note 15). However blisters soon started to reappear, so in 1852 it was sent back to the Accademia in Venice.

On arrival at the Accademia it was seen by the Secretary, Pietro Selvatico who reported that 'the material of the panel is in a fairly good state, the lower part of the painting with the colours very much raised and in some parts fallen off; similar damage shows in the upper part but to a much lesser extent. Furthermore the whole painting, as much in the flesh as in the drapery, shows evident signs of earlier restoration' (note 16). In 1854 it was escorted back to Portogruaro by Professor Paolo Fabris who had carried out this latest treatment, and returned to its altar in S. Andrea. In spite of this and other precautions, new losses and blisters were apparently soon visible (note 17).

In 1861 the altarpiece was moved to the Stanza del Sindaco in the Palazzo Municipale of Portogruaro, where two years later it was seen by Sir Charles Eastlake and Otto Mündler who were on one of their picture buying expeditions for the National Gallery. Although Eastlake describes only the iconography of the picture in his own notebook (note 18), he seems to have told William Boxall, who was to be his successor as Director of the National Gallery, about its condition. When 'they examined it they found many bad restorations, encrustations, areas of decay, blisters, and a large piece of the paint layer detached so that it seemed as though there was a large hole above the head of Christ in the background' (note 19). Despite this they made an offer of £1,600 for the painting.

Although this offer was refused as insufficient, it provoked a lengthy legal dispute concerning the ownership of the painting between the Municipality of Portogruaro and the Hospital which regarded itself as the successor to the Scuola of S. Tommaso. This was not resolved until 1869 when negotiations for the sale of the picture to the National Gallery were reopened (note 20). Boxall, who was by then Director of the Gallery, travelled to Portogruaro to inspect the work, and made his own notes about its condition, mentioning 'blisters caused by damp, of which many are visible and some of alarming dimensions like those on the sleeve of S. Thomas and at the bottom of his robe and several others in the sheet which covers part of Christ'. He also made an assessment of the extent of restoration on some of the figures: 'The Christ has suffered somewhat but only in parts, S. Thomas, S. John [his identification of the young disciple with the lilac drapery], S. Peter and S. Andrew [identified as the figure to the left of S. Peter] are stupendous and very well-preserved, other apostles are also in a good state, but others are horrendously restored like the two close to Christ.' (note 21) (Fig.5)

Nevertheless he was determined to acquire the work ('I would at almost any sacrifice wish Sir Charles' views carried into effect' (note 22)) and made an offer of £1,800 to the Sindaco of Portogruaro which was accepted (note 23). During the considerable delay while permission to export the altarpiece from Italy was awaited, Professor Fabris (who carried out the restoration of 1852), went to Portogruaro to repair it yet again and to have it placed in a room environmentally better suited to its conservation (note 24).

When, in April 1870, the export permit at last came through, Boxall was understandably alarmed to read that it had been granted mainly on the grounds of the painting's condition, described as 'bad' by the members of the Accademia di

Belle Arti in Venice and 'deplorable' by Giovanni Morelli on behalf of the Ministry (note 25). He wrote to Fabris begging him 'to declare frankly, on his honour, the truth about the actual state of the painting' (note 26). Fabris replied with a wonderfully obsequious letter, insisting that he would always act with 'the most loyal scrupulousness', and reassuring Boxall that the reports for the export permit had been greatly exaggerated and that he would be able 'to boast of the acquisition of this magnificent Cima which shows those little damages which you yourself have already noted [... ] I have been personally to Portogruaro and I found the panel in the same state in which I left it after my restoration, and without any threats of further decline' (note 27). At no point in the transaction does the incident of the flood at the Accademia seem to have been mentioned.

Before the painting was packed for shipment to England, Fabris again checked its condition, finding 'nothing new' (note 28), and by August 1870 it had arrived safely in London. It was decided to remove some of the thick and discoloured varnish. Boxall described the cleaning in a letter to Robert Wornum: 'As I have only had a load of varnish, opaque, patchy and disfiguring removed, it has been done by Merritt and myself simply by the hand without a drop of spirit' (note 29). This suggests the upper layers of varnish (probably dammar or mastic) were brittle enough to be powdered and thinned down by gentle abrasion. The painting was then revarnished and placed in the Gallery in November 1870, with an emphatic recommendation that 'no restoration should again be attempted' (note 30).

### **Acknowledgement**

I am very grateful to Angelina Bacon, Research Assistant at the National Gallery. Without her notes and index I would never have dared to tackle the large number of notebooks and letters associated with the directorship of Sir William Boxall.

### **Notes and references**

1. The documents relating to 'The Incredulity of S. Thomas' were first published by Botteon, V. and Aliprandi, A., 'Ricerche Intorno alia Vita e alie Opere di Giambattista Cima' (Conegliano 1893), pp. 216–24. Recently they have been republished in Humfrey, P., 'Cima da Conegliano', Cambridge University Press (Cambridge 1983), pp. 202–204. The original documents were destroyed in 1944 but accurate copies were made for the National Gallery in 1870.
2. Humfrey, P., 'op. ext.', p. 203.
3. Humfrey, P., 'op. ext.', p. 199. See also p. 201 for a separate payment for the panel for the 'Constantine and S. Helena' in the same church.
4. Humfrey, P., 'op. cit.', p. 203.
5. Humfrey, P., 'op. cit.', p. 203. In the accounts this is described as 'la cassa per condurre la palla'. The word 'cassa' can be translated as either 'case' or 'frame' and seems to have been used in the latter sense further on in the accounts when listing a payment for 'azurite to paint the frame'. Therefore it is not clear whether there was a separate travelling frame or packing case, or whether the altarpiece frame was used to protect the painting on its journey.
6. Humfrey, P., 'op. cit.', p. 203. See also p. 200 for payments for curtains to cover the 'Baptism of Christ' in S. Giovanni in Bragora.
7. Humfrey, P., 'op. cit.', p. 110 and pp. 203–204.
8. Humfrey, P., 'op. cit.', p. 202.

9. It has not been possible to identify a definite cause for the poor adhesion of the gesso.
10. Bertolini, D., ' "L'Incredulità di San Tommaso" Pala d'altare in Portogruaro ora al British Museum', 'Arte e Storia', **XIII**, 18 (1894), p. 138. This article by a Director of the Museo Concordiese in Portogruaro was published posthumously. It is the main source of information about the adventures of the painting in the first half of the nineteenth century and was used by Botteon and Aliprandi in their account of its history. See Botteon, V. and Aliprandi, A., 'op. cit.', pp. 98–100.
11. The original document has been destroyed (see Note 1) but a copy made in 1870 has been preserved in the National Gallery History File for 'The Incredulity of S. Thomas' (No. 816). The History File also contains a label cut from the back of the panel with the same date of 14 April 1820 together with seals of the Comune of Portogruaro.
12. In fact the panel was made up of seven planks. See p. 49 of this article.
13. Bertolini, D., 'op. cit.', p. 138. This story, which is repeated in Botteon, V. and Aliprandi, A., 'op. cit.', p. 99, seems rather improbable, but Bertolini describes the accident in very plausible detail and clearly had access to a documentary source for the information about the negotiations over the bill for restoration.
14. This 'restoration' (the word seems to have been used rather loosely in many of the nineteenth century sources consulted for this article and often probably refers to minor repairs and blister treatment) is not mentioned in Bertolini, D., 'op. cit.' The first reference to it occurs in a notebook kept by William Boxall, Director of the National Gallery from 1865 to 1874. 'Boxall Notebook 8, Journey Undertaken by Mr Boxall in Autumn 1869 on Account of the National Gallery' (National Gallery Archive), entry for 12 October 1869. It is also recorded in the National Gallery History File for 'The Incredulity of S. Thomas' (No. 816).
15. Bertolini, D., 'op. cit.', p. 138–9. In 1840 it was listed among the most prized paintings in S. Andrea by the Portogruaro annalist and antiquarian, Antonio Zambaldi. Zambaldi, A., 'Monumenti Storici di Concordia Serie dei Vescovi Concordiesi ed Annali della Città di Portogruaro' (first published Portogruaro 1840, reprinted by the Società di Storia, Portogruaro 1981), p. 265.
16. Bertolini, D., 'op. cit.', p. 139.
17. Bertolini, D., 'op. cit.', p. 139.
18. Eastlake Notebook, Vol. II, 1863 (National Gallery Archive), f. 6r. and f. 6v.
19. 'Boxall Notebook 8' (see Note 15), entry for 12 October 1869. These notes are written in Italian. The translation, like those throughout this article, is by the author.
20. Bertolini, D., 'op. cit.', p. 139.
21. 'Boxall Notebook 8' (see Note 15), entry for 13 October 1869. Boxall's assessment of the condition seems, with hindsight, rather inaccurate; S. Thomas and S. Peter are among the worst damaged of the figures.
22. Undated letter (probably written in September 1869) from Boxall to Sir Henry Layard (?) (National Gallery Archive).
23. Letter (in Italian) from Boxall to the Sindaco della Città di Portogruaro, 19 October 1869 (National Gallery Archive). See also Bertolini, D., 'op. cit.', p. 139.
24. Letter (in Italian) from the Sindaco della Città di Portogruaro and Pietro di Borriero (Director of the Civil Hospital) to Whom it May Concern, 13 November 1869 (National Gallery Archive). Professor Fabris, who, as well as being a painter and restorer, was Curator of the Palazzo Ducale in Venice, seems to have been acting both as agent for the sale of paintings from Portogruaro and as an intermediary

between the National Gallery and the Sindaco.

25. Copy of a letter (in Italian) from the Reggia Prefettura della Provincia di Venezia to Il Municipio di Portogruaro, 10 April 1870 (National Gallery Archive).

26. Letter (in Italian) from Boxall to Fabris, 27 April 1870 (National Gallery Archive).

27. Letter (in Italian) from Fabris to Boxall, 30 April 1870 (National Gallery Archive).

28. Letter (in Italian) from Fabris to Boxall, 24 May 1870 (National Gallery Archive).

In a letter dated 1 August 1870, Fabris asked for news of the painting which by then had arrived in England. He had every confidence that it would be in good condition because it had made 'the long journey [...] hermetically sealed in its case'.

29. Letter from Boxall to Wornum, 12 August 1870 (National Gallery Archive).

30. National Gallery 'Manuscript Catalogue'. Entry for 'The Incredulity of S. Thomas'.

## **Early treatment at the National Gallery**

### **Martin Wyld**

The first part of this article has described what is known of the physical history of Cima's altarpiece before its acquisition by the National Gallery in 1870. Although on acquisition a note was made to the effect that no restoration should again be attempted, blister-laying was necessary in 1877–9, 1882, 1890 and again in 1920, 1929, 1931 and 1936–8. No cleaning was done before any of the blister-laying, and given the large amount of old varnish and repaint on the picture (Fig.1 and Plate 9, p. 46) very little success could have been possible. During the early 1940s, some minor panel repair and more blister-laying were done at Bangor, North Wales, near the quarry in which the National Gallery pictures were stored during hostilities.

Manod quarry is a remote mountain site with two hundred feet of rock above the storage areas constructed for the pictures during the Second World War, and access was by a tunnel several hundred feet long. The natural atmospheric condition of the caves allowed a stable relative humidity and temperature to be achieved by heating alone, with no humidification or refrigeration being necessary (note 1). The conditions in the quarry were far superior to those in the National Gallery, and the problems of warping panels and blistering paint were greatly reduced. When the Collection was returned to London at the end of 1945, the Gallery was in the process of being repaired and reconstructed with air-conditioning installed in a few of the rooms. The conditions in the greater part of the Gallery without conditioning had a severe effect on many sensitive panels. A crisis occurred during the very cold winter of 1947 when the central heating necessary to maintain a tolerable temperature for visitors led to very low levels of relative humidity. Several panels split, both in the exhibition and storage rooms, and Cima's altarpiece developed larger areas of flaking paint than almost any other picture in the Collection.

Two craftsmen in the newly formed Conservation Department spent most of their time from 1947 until 1951 blister-laying the Cima, but the effect was mostly temporary. Work was then suspended and other urgent problems, most notably the re-transfer of Sebastiano's 'The Raising of Lazarus' (No. 1, 3. 810 m x 2. 896 m) prevented any progress on the consolidation of the Cima, which was covered with facing paper attached with wax/mastic in turpentine, and stored face upwards.

### **Reassessment**

In 1969 Arthur Lucas, the Gallery's first Chief Restorer, examined the Cima with the intention of making it fit again for public exhibition. He found that the blistering was so severe that, if the facing paper were removed, paint would spring off even when the picture was lying flat. Lucas proposed that the facing paper should be removed a few square inches at a time, the old varnish and retouchings cleaned off the surface and out of the cracks, and blister-laying attempted again. It was not surprising, in view of the picture's long history of flaking, that even after cleaning the blister-laying was ineffective. In some areas, due to woodworm and dry-rot having eaten away the poplar panel, there was nothing underneath the paint and ground layers to which they could be secured. In other areas where the wood was relatively intact the loose paint could be partially re-attached, but not soundly enough to give any confidence that the treatment was permanent. A variety of adhesives were used, including gelatin, sturgeon's glue, wax and PVA, but none was effective, nor was any markedly superior to the others.

When parts of the paint were free of old varnish and retouchings, an important observation could be made. This was that the paint layer was on the whole well attached to the gesso, and that there was no cleavage between the paint and gesso or between the gesso layers. Investigations of some of the old losses, by digging out the fillings, showed that almost without exception, it was the gesso which had flaked away from the panel, taking the paint with it.

The photographs taken at this time (Figs. 6 and 7, Plate 10, p. 47) show the condition of the paint surface as regards loss, wearing, holes made during early attempts at blister-laying by injection, and the many different coloured and textured fillings used, but not its extreme fragility. It was by now clear that blister-laying alone would never consolidate the surface sufficiently to allow the picture to be exhibited. Because the paint and gesso formed one mainly continuous layer, Lucas decided that they could be transferred to a new support, and this proposal was accepted. As Lucas has pointed out (note 2), had there been serious cleavage between paint and gesso, a successful transfer might not have been feasible. To transfer a picture from its original support is an extreme and irreversible form of treatment, and should be avoided whenever possible. The process itself is not without risk, a transferred picture is inevitably changed; the texture and appearance of the paint may be altered, the curvature of the original wooden panel will be lost, and in the case of a large altarpiece, an unnatural flatness in the new support may be disturbing. Before a decision to transfer is made, there must be some certainty that every conceivable alternative treatment has been tried, and that developments in the techniques and materials of conservation will not, within the foreseeable future, lead to some new method of coping with the problems whilst avoiding transfer. This last point is not an easy one. It can of course be used as an excuse to delay tackling a particularly difficult picture. Since 1969, when the decision to transfer the Cima was taken, new methods of reinforcing and supporting transferred paint have been used, but no new technique which would have made the transfer unnecessary has been introduced.

The construction of the panel has been described earlier in this article. Briefly, seven poplar planks each between 40 and 80 cm across and just under 2 m long were glued together horizontally with simple butt-joints. By the time the picture arrived at the National Gallery, various battens and cleats had been used to reinforce it (Fig.8)

and the top may have been reshaped to the present irregular arch.

### **The removal of the wood**

Preparation for the transfer proceeded as follows:

1. The paint surface was faced with two layers of Eltoline tissue, butt-jointed, attached with mastic in turpentine containing 5% by volume stand oil. This traditional facing mixture had been successfully used a few years earlier in the transfer of Signorelli's 'Circumcision' altar-piece (No. 1128, 2. 584 m x 1. 803 m) and had adhered well over a long period. The facing had been sufficiently flexible to withstand any stress to which the picture was subjected both during the removal of the wood and during its attachment to a new support.
2. A third layer of Eltoline tissue was attached with a thin flour/rabbit-skin glue/water adhesive.
3. Cheesecloth (a loosely woven fine jute fabric) was pasted over the third facing layer, using the same aqueous adhesive.
4. Paraffin wax was brushed on, then scraped off, leaving a thin even layer. The three Eltoline tissue layers and the cheesecloth all extended 15 cm beyond the edge of the picture.
5. A temporary support was made of Sundeala (oil-bound paper fibre board) 1 cm thick with 5 cm paper honeycomb and 8 mm hardboard behind it, glued with epoxy. This board was cushioned with two layers of Eltoline tissue laid onto it, and Melinex was stretched over the tissue.
6. The panel was placed face-down on the temporary support and the facing layers were trimmed and taped to the Melinex so that no debris could accidentally penetrate between the picture and the support.
7. The battens and cleats were unscrewed from the back of the panel, and a thin strip of wood which had been nailed round the edges was also removed.

The removal of the wood then commenced. The techniques used were entirely manual. Though mechanical routers and planes are often used with success in transfer, there is a danger of a power tool, however carefully handled, snagging on knots in the wood or on the bent nails which are mysteriously but commonly found in old panels, and ripping up far more wood than is intended. Semi-circular 15 mm gouges were pushed along the grain, cutting channels 6–7 mm deep, and the ridges left between the channels were then cut down. Each plank was reduced by a similar amount, and the process repeated until the panel had been reduced from c. 5 cm to 1 cm in thickness. Many nails were found embedded in the panel, and several knots were also cut out.

Fig.9 shows a detail of the back of the panel at this stage. The middle of a knot had been cut out from the front and replaced with a square plug by the panel maker; the disturbance in the grain of the wood near the knot can be seen. Fig.10 shows the bottom right corner of the back of the panel. The horizontal line just below the top of the illustration is the lowest of the six joins between the planks. The worm damage revealed by the reduction in the thickness of the panel is typical of that found everywhere. The worm channels vary in diameter from less than 1 mm to nearly 4 mm. More worm damage was found along some of the joins, particularly the top two; the protein in the glue (casein) used to join the planks is considered a delicacy by



woodworm beetles. As layers of wood were removed from the back of the panel, more worm damage was found near the painted side than there had been near the unpainted back. The worm damage visible in Figs. 9 and 10 was not unusually severe and had not seriously affected the strength of the wood. There were very few exit holes in the front of the panel; it was later found that there were many semi-circular depressions in the back of the gesso which had been made by the insects. The battens which had been fixed to the back of the panel before its purchase by the National Gallery (Fig.8) were necessary because the joints had been loosened by the warping of the individual planks, and possibly by the picture's submersion, and not because each individual plank had been undermined by woodworm. Many poplar panels of the fourteenth- to sixteenth-centuries in the National Gallery Collection have been far more severely attacked by woodworm and dry-rot than Cima's altarpiece, and yet still provide an adequate support for the gesso and paint layers.

The removal of the first layers of wood is usually the easiest part of a transfer. The removal of the final layer of wood was complicated by several factors. Many different blister-laying adhesives had been used on the Cima, often in very large quantities. Fig.6 shows a detail of the Apostles' heads on the right; the lines of white dots are holes made with a syringe in order to inject animal glue under the gesso. Much of this glue, which must have been considerably diluted with water in order to be used in a syringe, had run into the worm channels and soaked into the wood, making the panel surface more brittle. Thick animal glue, too thick to be used in a syringe, had also been soaked into the panel and had filled the larger diameter worm channels to a depth of several millimetres. Many old fillings had penetrated into worm channels, and in the two joints at the top of the picture some original wood had collapsed and several wide strips of paint and gesso had been compressed into the panel by fillings. Areas where wax had been used for blister-laying presented less difficulty.

Experience during earlier transfers had shown that the safest method of removing the last layer of wood was to cut a very shallow slope at a slight angle to the direction of the grain and to shave away the tapered edge of the wood with a small fish-tail chisel. This method proved to be impractical on the Cima. The parts of the panel affected by thick animal glue (of the consistency of carpenter's glue) or putty filling the worm channels, by knots and by original or later inserts of wood obviously needed individual treatment. However the remainder of the wood was so insecurely attached to the gesso that it was impossible to cut a shallow slope because strips broke away along the grain no matter how carefully the chisel was used. Strips of wood 10–12 cm long and 3–4 cm wide would become completely detached, but usually with a few small fragments of paint and gesso stuck to them. These fragments were laboriously cut off the wood and replaced. No facing adhesive could match the strength of the thick animal glue which had been successful in sticking a very small proportion of the gesso to the wood. These fragments represented the only tangible benefit of centuries of blister-laying. It was found that the safest method of removing the last layer of wood in the very loose areas was to cut it away at an angle of approximately 30° to the gesso, instead of at the very shallow angle normally used, and to cut across rather than along the grain. Fig.11 shows an original wooden insert of parallelogram shape at the bottom of the picture, where the adhesion between wood and gesso was good enough for a shallow sloping edge to be cut.

As the back of the gesso was uncovered the evidence of the blister-laying could be more clearly seen. Large quantities of animal glue had penetrated the cracks, damages and injection holes and had spread out between the wood and the gesso. The effect had been the exact reverse of that intended; where the gesso was most stained by blister-laying it was least well attached to the wood. The wood was also stained, and scrapings from the surface were analysed by gas-chromatography in case a resinous or other inappropriate layer had been applied to the panel before the gesso but the large amount of animal glue present prevented any other substance (if it were there) from being identified. The severe flaking from which the picture suffered long pre-dated its submersion in the Grand Canal, is not uncommon in Cima's work, and may be the result of faulty techniques by the panel maker. There were no abnormalities in the gesso, which was found to be weak and powdery but not badly decomposed. Removing the lumps of thick animal glue in the worm channels and cavities was the most difficult part of the preparation for transfer; it was almost too hard to be cut or shaved away and no moisture or solvent could be used safely. The last splinters of wood and many of the old fillings which were thicker than the original gesso were removed with a scalpel.

Figs. 12–14 show the back of the gesso after the removal of all the wood. Fig.12, taken in raking light from the side of the panel, shows the reverse impression of the poplar grain; the panel was clearly rough enough to provide a good 'tooth' for the gesso. The two lines converging towards the top of the illustration are ridges in the gesso which mark the edges of planks; the gesso 'remembers' that each plank had a convex warp (as seen from in front) across its grain. Though it is difficult in raking light to distinguish between shadows and stains in the gesso, many of the dark patches are glue staining.

Fig.13, also taken in raking light, shows the arched top of the picture, where the removal of the final layer of wood had started. The panel and gesso had been carefully covered with Melinex and heavy rubber mats all through the transfer, but the gesso had absorbed some moisture from the atmosphere and swollen slightly. An air-conditioning malfunction, which produced RH of 100% for several hours one night, led to the pronounced swelling and buckling of the gesso which can still be seen in this photograph taken months later. The facing was able to withstand the expansion of the gesso and remained securely stuck to the paint. Fig.14, taken in ordinary light, is of one plank's width at the top of the picture; it shows some staining of the back of the gesso and also the incised lines which indicate the positions of the roof beams; the floor tiles and the arched windows in the grey wall were the only other part of the design to have been incised.

### **The attachment of the paint layer to a new support**

A variety of materials have been used to reinforce transferred paint layers and to provide new supports for them. Traditional methods have usually treated paint layers removed from wooden supports in the same way as canvas pictures in need of lining. Aqueous lining adhesives, of animal glue, flour and water have been used to stick ordinary linen canvas to the back of the paint or ground. This method is not too damaging if used skilfully with moderate quantities of glue, but can easily result in wrinkles and depressions in the paint layer and, eventually, in severe buckling of the

canvas. An extreme example is Sebastiano's Raising of Lazarus (No. 1) which was transferred from panel to canvas in France c. 1780, and which, by the time of its re-transfer in the National Gallery in the 1960s, had five canvases altogether, each of which had been put on to correct surface deformation and prevent flaking but had failed to do so. The Sebastiano had been stuck first to brown paper, and then to canvas, and the glue had deteriorated sufficiently for all the backing layers to be removed when it was re-transferred. In many cases the glue and canvas can never be removed without damaging the paint. The alternative traditional adhesive, white- or red-lead paint, is completely irreversible, but at least avoids the great sensitivity to changes in relative humidity of lining glues, and the violent shrinking which can occur when a new gesso ground is applied over the back of the original.

The most satisfactory supports now available for transferred panel paintings are aluminium honeycomb and fibreglass-faced constructions, which are light, rigid and dimensionally stable. Some kind of interleaf is essential in order to maintain the principle of reversibility. The simplest way of describing the very long process of consolidating Cima's altarpiece is to list each stage in turn, giving some account of why particular options were chosen and others discarded.

1. Fig.13 shows the severe buckling of the top of the picture due to the gesso having absorbed moisture from the atmosphere. Less pronounced buckling had affected some of the lower half of the picture as well. The facing layers had moved with the gesso, and were still secure. The picture was detached from the temporary support and slid face-down onto the Melinex covered hot-table, sealed with a membrane and heated to 40°C at a pressure of 15 mbar (1.5 kPa) for an hour. The buckling slowly reduced until the picture was almost flat and relaxed, and the same low pressure, which prevented any alteration of the surface texture, was maintained while the hot-table cooled.

2. The highest ridges (Fig.12) where the gesso had a reverse impression of the roughest poplar planks, were lightly scraped down with a scalpel, and some fillings of greater thickness than the gesso were reduced. Some small areas of cleavage in the gesso were treated; some perished or broken up gesso was removed and replaced with chalk and glue filling.

3. Areas stained by wax blister-laying were degreased by blotting with acetone.

4. The most crucial stage of the transfer now began. The picture had suffered from one serious deficiency: the gesso was not stuck to the panel, and could not be reattached. However the gesso layers themselves were in remarkably good condition in spite of the unfortunate history of the picture, and were well attached to the paint. The removal of the gesso as well as the wood, which is sometimes necessary in a transfer, was never considered with the Cima. Some time was spent in deciding which material was most suitable for using as a first reinforcement for the gesso. The main qualities sought were (a) that it should stick securely and permanently (b) that it could be applied without affecting the rabbit-skin glue in the gesso by wetting it too much (c) that it should dry or set without shrinking (d) that it should not be porous (e) that it should not darken or discolour the gesso, or alter its refractive index (f) that it should be reversible (g) that it should be unaffected by

solvents in other adhesives.

Many tests were made with traditional and modern binding materials, glues and fillers, in different combinations and strengths. Practical tests were made on the remains of a ruined early Italian panel picture which had been used in an exhibition some years before as an example of a picture during transfer. Several square feet of gesso with an old facing on the painted side were available for experiments. In addition, gesso made with weak rabbit-skin glue was brushed onto cotton mesh, sanded to the same thickness as the Cima and deliberately cracked. Materials under consideration were brushed onto the gesso samples and observed as they dried, then tested for adhesion, flexibility, ease of removal and so on. Small samples of reinforced gesso were cut out and subjected to accelerated ageing. Details of the composition of modern materials were obtained from manufacturers, and the materials analysed and assessed in the Scientific Department.

Various types of acrylic preparations most nearly fulfilled the specified qualities, and a proprietary brand of acrylic primer was chosen for further tests on the picture itself. A 15 mm flat sable brush was used to apply a thin coat of primer both to the gesso and to some of the fillings. Though there was some water in the primer, which slightly swelled the gesso for a short time during drying, the acrylic primer film when dry was more satisfactory than any of the alternatives, for example acrylic paint, which has less water in it but adhered less well, polyvinyl acetate emulsion, polyvinyl alcohol (with titanium white and fillers) and others. The acrylic primer, which had been developed to be thinly brushed out and to cling to any surface, was applied to the whole of the back of the picture with the small sable brush. The water in the primer had the effect of swelling some concentrations of blister-laying glue, which could then be removed, and of revealing some areas of incipient cleavage in the gesso, which were treated individually. A second thin coat of primer was applied and the picture then left alone for a few weeks in case of any reaction. The primer proved to have stuck securely to both gesso and fillings. The primer's reversibility was checked; it could be softened with solvent and scraped off, or cut off dry with a scalpel.

5. The acrylic primer is designed to form a layer of even thickness, that is not to fill in and level off depressions and irregularities in the surface to which it is applied. The surface texture of the back of the picture was sharply revealed when it was covered with a thin white layer. Using raking light, the depressions were filled with a chalk/vinyl emulsion filler, lightly sanded until the back of the picture was smooth (Fig.15). The filling of the depressions in the back was essential in order that the texture of the front of the picture would be unaffected during later face-up treatment on the hot-table. The filling used was slightly porous in order to provide a good key for adhesives.

6. At the same time as practical and scientific tests had been made to find the most suitable material with which to reinforce the gesso, other tests had been made to help in the choice of an interleaf, and of adhesives to attach the picture to the interleaf and the interleaf to the panel. Of the fabrics considered as an interleaf, very finely woven linen (weight:  $165 \text{ gm/m}^2$ ; threads/cm: warp 23, weft 26) was chosen. Very few fabrics of fine weave (essential to avoid any possibility of weave

interference) are made in sufficient width (over 2 m) to be used in one piece. Linen may be prone to embrittlement and fragility with age but synthetic fabrics do not necessarily perform better and are unsuitable for use with some types of adhesives.

The choice of an adhesive, once traditional methods had been rejected, was limited initially to those which dry by chemical reaction or to those which are activated by heat. An adhesive which dried by evaporation could soften or attack the layers reinforcing the gesso, and could not be used safely for the second stage of attaching the picture and interleaf to the panel. All epoxies which can be used in a thin layer would be in practical terms irreversible if used in a transfer. Various experiments were made with a smaller aluminium honeycomb panel of the same type to which it was intended to attach the picture. The test panel was approximately one metre square. Samples of gesso, with different interleaves and adhesives, were stuck to the panel on the hot-table at a range of temperatures and pressures. Though it is impossible to predict the precise long-term behaviour of an adhesive, these practical tests, and additional scientific testing, led to the choice of Beva 371 (note 3).

The linen was stretched on a loom, and three coats of Beva 371, diluted with 50% by volume white spirit, were brushed onto one side of it. The picture, which had been face-down until then, was turned over and positioned face-up on the linen (Fig.16). The cheesecloth and two of the three Eltoline tissue facing layers were peeled off (without wetting them) and the paint surface examined through the remaining facing layer. The picture was attached to the linen using the same procedure as for a vacuum hot-table 'nap-bond' Beva lining. The table was set to 73°C to activate the adhesive and 20 mbar (2 kPa) pressure (Fig.17).

After the table had cooled, the final layer of facing was peeled off (again without wetting) and the picture was found to be securely attached to the linen, with the texture of the front unaltered. Small areas of old fillings were cut away from the front to make sure that the adhesion of all the layers behind the gesso was satisfactory. No cleavage was found in the new supporting layers, and the bond between the linen and the filled acrylic primer was sound.

7. The aluminium honeycomb and fibreglass panel (Fig.15) was supplied by Fine Art Stretchers and Services Inc. (note 4). The core was of 34 mm aluminium honeycomb, with one vertical and three horizontal box-section aluminium bars to ensure rigidity, faced with resin-impregnated fibreglass attached with epoxy. The fibreglass was butt-jointed over the aluminium bars. To eliminate any possibility of the construction of the panel or the pattern of the honeycomb core showing on the face of the picture, a sheet of 'Fibr Plate' (note 5) was glued with epoxy to each side of the panel, and fine fibreglass fabric over the front. The fibreglass fabric was filled with a chalk/vinyl emulsion filler and sanded. Three coats of Beva 371, diluted with 50% by volume white spirit, were brushed onto the front of the panel. The linen/picture layer was removed from the loom and positioned over the panel. The hot-table was used to attach the linen to the panel; the table was set at 78°C to compensate for the thickness of the panel, with the pressure again at 20 mbar (2 kPa). After the table had cooled, the panel was removed and the linen (which had been cut c. 30–40 cm larger than the picture) was tacked to the sides and back of the panel with one coat of Beva 371.

Attaching pictures to honeycomb panels in this way is a well-tried procedure. It is sometimes found that because the wood which is set into the edge of the panel (c. 25 mm wide) does not conduct the heat as well as the honeycomb, the bond at the edges is insecure. This did not seem to have happened with the Cima, and would anyway have been relatively unimportant because the linen was stuck to the sides and back of the panel.

The surface texture of the paint was not affected at all by the two face-up sessions on the hot-table. The preparation of the back of the gesso layer is the key to the preservation of the texture of the front. The wood-grain pattern in the paint was as visible after the transfer as it had been before, and the joins in the panel remained equally clear. Some of the planks had a very slight convex warp across their grain (Fig.13 shows the impression of this left in the gesso after the removal of the wood) but it would have been very difficult to preserve the warping in its original form during the transfer. The warping could have been imitated by building up the back of the gesso before attaching it to the linen, or by making very shallow horizontal corrugations on the honeycomb panel, but to achieve an authentic effect on such a large picture might have been impossible. In all other respects the texture of the picture has been preserved, and there is no interference at all from the linen, honeycomb, reinforcing bars or the wooden edges of the panel. The final construction is shown in Fig.18, and the picture after cleaning and transfer in Fig.19.

Though it is perhaps unrealistic to consider the question of reversibility when a picture's original support has been removed, the Cima could be taken off the honeycomb panel in one of two ways. The linen could be detached from the panel, using heat or solvents, or alternatively the gesso/paint layer could be faced and detached from the linen. Tests made during the transfer showed that the filler and acrylic primer could be cut away from the gesso if necessary. Only time will prove whether the acrylic primer and Beva 371 are as permanent as we hope, and whether the construction of the honeycomb panel is as stable as it is designed to be. Following the transfer, filling and retouching of the many losses began. An account of restoration of the picture and a description of Cima's materials and technique will appear in a future issue of the 'Technical Bulletin'.

### **Notes and references**

1. See the 'National Gallery Report 1938–54' (London 1955), for a full account of the history of the Collection during and after the Second World War.
2. Lucas, A. W., 'The Transfer of Easel Paintings' in 'Recent Advances in Conservation', G. Thomson (ed.), Butterworths (London 1963), pp. 165–8.
3. Berger, G. A., 'Heat-Seal Lining of a Torn Painting with Beva 371', 'Studies in Conservation', **20**, 3 (1975), pp. 126–51.
4. Fine Art Stretchers and Services Inc., 5604 New Utrecht Avenue, Brooklyn, New York 11219 made the specially shaped panel to order.
5. 'Fibr Plate' is resin-impregnated fibreglass with one smooth side, 3. 56 m wide, 2. 1 mm thick.

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