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Blue flag with yellow tiger? Flags, authenticity and identity

Abstract

The Flag of the Formosa Republic in the collection of the National Taiwan Museum is a national icon. It is a copy of one made in 1895 to mark the formation of a new Taiwanese republic; this replica, described in a contemporary newspaper account as an exact copy, was made in Japan in 1909. The flag was an intriguing puzzle. Instrumental analysis and a close study of the flag itself and of surviving historic photographs and records were used to try to establish whether what looked like later additions and repairs were actually part of the original construction. An international team of conservators and scientists from Taiwan, the UK, the USA and Germany carried out the investigation and the conservation treatment. The paper lining was removed, revealing that the flag was painted on both sides, and the flag was supported using an adhesive treatment with Lascaux acrylic resin.

Keywords

Taiwan, painted flag, investigation, dye analysis, adhesive support

Flags often serve as important symbols of national identity and pride, and function as tangible markers of nationhood. The Flag of the Formosa Republic, also known as the Tiger Flag, is one of three national treasures in the collection of the National Taiwan Museum which reinforce national identity. It is actually a 1909 duplicate of a flag made in 1895, one of three known flags made to mark the formation of a new Taiwanese republic. The Chinese Qing Dynasty ceded the island of Formosa, modern Taiwan, to Japan at the end of the First Sino-Japanese War under the Treaty of Shimonoseki. In response a group of Taiwanese gentry established the Formosa Republic, but it was short-lived. After only five months the Japanese occupied Taiwan and the flag was sent to Japan. In 1908, the Imperial Household Department approved the Taiwan Viceroy's request for artist Untei Takahashi to produce a facsimile of the flag. This replica, described in a contemporary newspaper account as an exact copy, was made in Japan in 1909 for the newly established National Taiwan Museum in Taipei.¹

The painted cotton flag is large, measuring approximately 2.6m high x 3.2m wide; it would originally have been larger in the vertical direction but the flag was trimmed through both paper and textile layers at the upper and lower edges, presumably to create straight edges, after it was lined with paper in the 1970s (Fig. 1). It bears a tiger 'waving a long and very aggressive tail', as a contemporary account recorded.² The design of the flag is a counterpart to the blue dragon on a yellow ground, the symbol of the ruling Chinese Qing dynasty. Traditionally, on flags of the army of the Chinese Qing dynasty, the dragon with fire and cloud was a symbol of a first rank general, while the tiger with fire and cloud symbolized the second rank. Four colours were used to represent the Qing armies - in order of strength: yellow, red, white and blue. So the blue ground of the Republican flag was an acknowledgement of the relative positions of the two nations. The cloud is a symbol of good luck or peace while the fire represents lightning. As

a tangible legacy of the short-lived republic, the flag is a cultural icon in Taiwan; children learn about it in school while the image of the tiger appears on postage stamps, sewing threads and tourist souvenirs. The history of the flag and the respect with which it is held make it an extremely significant object; its recent conservation raised intriguing questions of authenticity and approach.

The flag was in such poor condition that it could not be displayed and was vulnerable to further damage even during storage and handling. In 2009, appropriately the Year of the Tiger, an international conservation project was launched to find out more about the flag and to treat it so that it was stable enough for exhibition. The local team was led by Professor Chunmei Lin of the Graduate Institute of Conservation of Cultural Relics at the Tainan National University of the Arts and Wan-Ping Chen, paper conservator at the National Taiwan Museum. Frances Lennard, of the Centre for Textile Conservation and Technical Art History, University of Glasgow, UK, and Nancy Pollak, a freelance paintings conservator in the USA, contributed their expertise: both have a long-term interest in and experience of treating painted textiles, from the viewpoints of textile conservator and paintings conservator.

At an early stage of the project the 1970s paper lining on the reverse of the flag was removed. The strength of the paper in comparison with the very weak cotton fabric made the fabric very vulnerable to damage caused by rolling and unrolling the paper to allow access to the flag. Removing the paper revealed that the flag was double-sided with the same painted design on each side of a single layer of fabric. The paint was in much better condition on the reverse where it had been protected by the paper lining.

Investigation

The museum curators and conservation team were keen to investigate what this flag had looked like originally, to gain a better understanding of the flag, to inform its conservation treatment and to enhance its interpretation to the public. It was now a faded brown colour - was it originally blue as records suggested? Was it possible that some components, such as the upper right corner which was apparently made of different materials, were part of the flag's original construction, perhaps a faithful copy of a repair to the 1895 flag (Fig. 1)? There were many repairs – were some of these also 'original' and if so, was it possible to distinguish these from repairs made during the course of the flag's subsequent life? The flag was an intriguing puzzle – an article in the Taiwan Daily Newspaper of November 28 1909 reported:

'As the writer was told, the replica and the original flag, the old appearance of the textile, the splits, the colour of the paint, are exactly the same. The only way to tell the difference between replica and original is to smell it...'

In the popular imagination the Flag of the Formosa Republic was blue, as shown in an imaginary view of it being paraded through the streets (Fig. 2). There is documentary evidence that the 1895 flag was blue. James W. Davidson, a war correspondent with the Japanese army, reported:

'The first day of the new republic was greeted with a drizzling rain.... At the president's yamen... the court was crowded with enthusiasts, the whole square was brilliant with new flags.... while above them all, floated the new flag of the nation; a blue background with the centre decorated by a hungry looking yellow tiger possessing a tail of greater length than is customarily allotted to a real tiger.'³

Had the main part of the flag, now a faded brown colour, once been blue? It was clear from close observation of the ground fabric that it had not been dyed before the tiger and other elements were painted onto it; rather the background colour had been painted onto the cotton fabric around the painted motifs. It is a common Asian technique to mix pigment with an animal glue binder to a consistency which can be used like watercolour to paint onto fabric instead of dyeing it. Initial non destructive testing using Reflectance Ultraviolet-visible spectroscopy (UV-Vis) suggested that an extract of logwood had been used to colour the cotton fabric. Piening suggested that the colour could have been obtained by first applying a tannin-containing extract, such as catechu (extract of *Areca Catechu*) or black tea combined with an iron mordant; this produces a brown-grey colour on cotton fabric. When subsequently applied, the extract of logwood (*Haematoxylum campechianum*) changes the colour to a deep blue-black colour. The dyestuff haematoxylin is not very stable; it changes colour with changing pH value and is easily bleached by light. Trials using catechu and iron mordant on cotton fabric resulted in a brown colour very similar to the faded brown colour of the flag's background.⁴

Local opinion was that indigo was more likely to have been used to colour the fabric blue, but extracts from fragments of the brown ground cotton fabric analysed using high performance liquid chromatography-photodiode array detector (HPLC-PDA) did not detect the presence of either indigotin, or a hematin-elimination-product, the marker for the acid extract from logwood.⁵ It was believed that any remaining dye was below the detection limit having been removed by rubbing or by water over the years, or degraded by ageing. It is likely that a painted application of indigo or logwood would fade more readily than the same pigment applied by a dyeing technique. It is also possible that an early synthetic dye was used, which could be more susceptible to fading. In considering any available clues, it is interesting, though by no means conclusive, that yellowing of paper has been observed in papers in contact with indigo-dyed textiles.⁶ The 1970s paper lining was very yellowed where it was in contact with the background fabric, but not beneath the painted tiger and other motifs; tests on the paper are to be carried out. However HPLC-PDA gave conclusive results for an indigo-type dye in the blue fabric of the upper right corner.⁷

This corner proved to be made of different materials from the main body of the flag. Though the thread counts were similar, magnification using a linen tester confirmed that a different cotton fabric had been used: the fabric in the main body of the flag contained thinner yarns in a more open weave than the fabric in the upper right corner. The warp yarns ran vertically in the upper right corner fabric, but horizontally in the main fabric. It was also apparent that the blue fabric had first been painted blue then the tiger's tail had been painted on top of the background colour. Pigment analysis and Pollak's cross-section analysis of different areas of the flag also showed that the materials and painting methods used on the fabric in this corner were very

different from the materials and painting methods used on the main brown fabric.⁸ On the brown fabric the painted areas on both sides were first prepared with a glue-based gesso layer, then a zinc white oil or oil/resin paint layer was applied overall, then the other colours of the design painted on top of that. There did not appear to be any coating applied above the paint layer. In the samples examined, all paint layers appeared to be applied at the same time; there was no evidence of grime between any layers which would have indicated that some layers were applied at a later date.

On the blue fabric in the upper right corner, the pigments in the paint appeared to be coarser, and there was a thick layer of paint applied with no gesso layer or layer of bright white paint like those found on the brown fabric. The paint appeared to be only applied to the front of the fabric, and the image visible on the reverse was due mostly to paint soaking through the fabric. Cross-section analysis at the seam between the two fabrics appeared to indicate an area where the ground with white and yellow paint layers was also present at the edge of the blue fabric.⁹ If this is correct, it may indicate that the painting of the two fabrics was done at the same time. The black paint used for an added outline of the tiger's tail continued from the blue fabric onto the brown fabric. Although pigment analysis was not conclusive, its appearance was more ink-like and it contained different pigments from the black paint used for the outlines on the main brown fabric.

Pigments used on the main part of the flag included zinc white and lead red, but also early synthetic pigments based on azo-colours, such as Tartrazin yellow used for the yellow tiger. The green in the tiger's eyes were made up of a mixture of Tartrazin yellow and Aniline blue. The black on the main ground fabric was made of a mixture of carbon black and an azo pigment. These pigments were on the international market from the beginning of the twentieth-century. It should be noted, however, that as the composition changed over the years, it is difficult to get reference material; these results are based on similarities with pigments and dyes of the same group of compounds.¹⁰ Pigments in the upper right corner included chrome yellow, zinc white and an unidentified black which differed from the blacks used on the main part of the flag. The binding medium of the paint on the main part of the flag was oil with a significant proportion of lead soap and a natural resin, interestingly a medium more associated with western than Asian painting where an animal glue binder would be expected.¹¹

Analysis of the seams was not conclusive; the upper right corner was attached with hand stitching whereas the seams in the brown fabric were machine stitched, but this was no surprise if the methods were replicating crude repairs. The best evidence that the upper right corner was an original part of the flag came from the photograph of the flag in the 1909 newspaper article. Although the available photocopy was of poor quality (Fig. 3) there certainly appeared to be a join between the upper right corner and the main part of the flag. It was also clear from the newspaper photograph that the lower right corner of the flag had never been present – presumably the original had suffered a loss in this area. The flag had been photographed on three occasions while on display in the museum during the twentieth-century. Comparison of these images gave some information about the stages at which further losses had occurred. An image from 1940 showed (Fig. 4) that the flag had been displayed folded – a line of cream

coloured paint on the obverse of the flag corresponded to the fold line, showing that it had been deposited accidentally, probably when the display case was painted. This paint was mechanically removed during treatment as it was of no significance.

The history of the repairs was also not straightforward to unravel. As the newspaper article referred to splits, it was assumed that at least some of the 'damage' and repairs were part of the flag's original construction, but did all the repairs date from 1909? No difference could be discerned between the S-plyed, 3-ply, blue-black, cotton yarns used for attaching and seaming the blue fabric in the upper right corner and those used for repairs to the flag; all these threads appeared to have been dip-dyed as the core of the thread was much paler than its exterior. This dyeing method appeared unusual as it has not been noticed on other Asian sewing threads. As it was felt that the upper right corner was likely to be original, it was therefore also believed that the repairs in the blue-black thread could well date from 1909. Close observation of the flag (Fig. 5) gave greater credence to this hypothesis. A patch of linen fabric had been used on the reverse of the flag to reinforce a slit through the tiger's left front paw. Under magnification the slit appeared very clean-cut, as though made with a blade. The long seam passing beneath the tiger's extended right leg and across its left leg also appeared to have smoothly cut edges (Fig. 6), and close observation of a poor-quality reproduction of a photograph of the flag taken in 1953 indicated that the repair was already present at that time. Although other repairs did not provide such clear evidence of deliberate damage, the blue-black repairs were all retained as the conservators could not be sure they were not original. In fact the only repairs to be removed were made in two different thicknesses of beige-coloured cotton thread. These repairs used different stitching techniques from those in blue-black threads – they created crude seams by overlapping sections of fabric to cover areas of damage and they were causing major distortion to the flag. The fabric beneath the stitching appeared worn as though it had been damaged over time; the damage did not appear to have been created deliberately. Three of the repairs in thinner beige thread were close together and were started with large knots – these were considered to have been made at the same time. Paint inside the fold of one of these seams also suggested that the repair had been made after the painting of the exhibition case referred to above.

Although the dye analysis of the flag did not prove as conclusive as had been hoped, the investigation and analysis of other components of the flag in combination with the documentary evidence helped to provide information about the flag's construction. There was no question but that the upper right corner should be retained as a likely part of the original construction, and it was clear that the lower right corner had never been present. There was deemed to be a high enough level of certainty to warrant retaining many of the repairs as likely to be part of the original construction, but it was felt that others had probably been carried out at a later stage of the flag's history. As they were causing considerable distortion, or in a few cases were particularly visually obtrusive, the latter were removed following thorough documentation.

Conservation treatment

As already mentioned, one of the initial questions, whether the flag was double-sided, was answered during an early stage of conservation treatment. The flag had been lined with paper during the 1970s, using starch paste as an adhesive. No documentation survived from this period but the treatment had been inexpertly carried out; the fabric had not been aligned and was distorted and folded. Creases in the paper had caused accompanying lines of abrasion in the textile, and previous tears in the paper had also torn through the textile; in fact an initial step was to mend tears in the paper lining to prevent the tears in the textile from getting longer as the flag was rolled and unrolled. As the paper lining was now actively causing damage, it was decided that it should be removed and the flag re-supported.

The paint on the front of the flag was cracked overall, with some areas of flaking, but on the whole it appeared firmly attached to the textile. The damage appeared to have been caused by the mechanical movement of rolling the flag, rather than through any inherent instability. Tests showed that the paint structure was sensitive to moisture as the ground layer containing calcium carbonate was water-soluble, but the ground became stronger again as it dried. No damage was anticipated during the paper removal process which would only cause minimal wetting during a short period in each area of the flag. The flag was first cleaned using vacuum suction and then the paint layer was swabbed with deionised water. The paper was removed layer by layer by dampening it with deionised water and peeling it away - a long, slow process. There was excitement as the gradual removal of the paper revealed an identical painted design on the reverse of the flag. The paint on the reverse was found to be in much better condition where it had been protected: much brighter, presumably less light damaged, and less degraded and cracked. The brown background fabric appeared identical in colour and condition on the reverse. The starch paste had not been applied evenly; in some areas of very thick application, the cotton fabric had become very brittle and was quite fragmentary. The paper was left in these areas temporarily to aid safe handling of the flag.

One of the aims of the conservation project was to expose staff and students of the Graduate Institute of Conservation of Cultural Relics at the Tainan National University of the Arts to the specialist areas of textile conservation and western easel paintings conservation. The conservation treatment of the flag was carried out at the University. The Institute runs programmes in the specialisms of Asian paintings and paper conservation. Students from the two programmes were involved in several stages of the treatment including the extensive paper lining removal. The documentation, including detailed photo-documentation, and the majority of the conservation treatment were undertaken by a team of three specially appointed staff, recent graduates of the Institute: a paper conservation and a paintings conservation specialist and a conservation administrator. They were joined for some stages of the treatment by a recent graduate of the former Textile Conservation Centre at the University of Southampton. The treatment was overseen by the four authors of this paper.

After removing the paper the condition of the flag was re-evaluated and treatment options re-considered. Where necessary the paint was consolidated, mainly on the obverse, but also in some areas of the reverse, with a 4% solution of isinglass. The cotton fabric was still very soiled and had considerable water staining. Deposits of starch paste made the fabric rather brittle and prevented the easing of the distortions. Cleaning was carried out section by section (Fig. 7);

deionised water was sprayed onto the area of fabric being treated, after masking off the painted areas. This treatment was carried out over a vacuum suction table to prevent the water from spreading from one area of the flag to another by capillary action; although this ensured that each area of the flag dried quickly, there was time to carry out some realignment of the warp and weft yarns. The cleaning left the flag in a much cleaner and more flexible condition. The paint surface on the reverse of the flag was cleaned by rolling cotton swabs moistened with saliva over the surface, followed by poulticing the cleaned area with blotters dampened with distilled water and left in place until dry. This served to wick grime from fabric exposed by cracks in the paint, while limiting rolling stress on the water-sensitive ground layer. It was not possible to remove all the starch from the paint, but this in itself acted as a consolidant, and also as an isolation layer between the paint and the new adhesive support. There was extensive discussion about the most appropriate way to re-support the flag so that it was stable enough to be rolled, stored and displayed safely, and so that its appearance was enhanced for display. Even after cleaning, the cotton fabric was still too brittle for a stitched support treatment to be viable, and the painted areas could not be stitched in any case. This meant that an adhesive treatment was necessary.

The conservation team brought together experience of two different approaches in carrying out adhesive support treatments. By far the most common approach in Asia is to line a painted textile with paper using starch paste, in the same way as a work of art on paper. By contrast, in the UK and the USA it is common to stabilize a painted textile using a synthetic adhesive to attach a new textile support. Had the flag proved to be single-sided, the most appropriate support technique would perhaps have been to support the flag onto a new, suitably dyed opaque textile with starch paste, using a culturally accepted technique and a material known to be stable in the hot and humid Taiwanese climate. However the double-sided nature of the flag meant that it was desirable to use a semi-transparent support fabric such as silk crepe-line, which would allow the painting on the reverse still to be visible. Tests were carried out to ascertain whether starch paste could be used on silk crepe-line, but although they appeared promising, experts in lining large textiles doubted whether this would form a strong enough substrate for such a large and heavy textile. It was also felt that re-wetting the paint for a second starch paste treatment would not be desirable. A final decision was taken to use an acrylic resin, a mixture of Lascaux 360 HV and 498 HV. The climate controlled conditions in the museum meant that the display environment would not be affected by the climatic extremes outside the museum.

Silk crepe-line fabric was dyed an appropriate colour and was coated with a 14% solution of 2:1 w/w Lascaux 498 HV: Lascaux 360 HV. Once dry, the adhesive coated fabric was heat-sealed to the reverse of the flag using a heated spatula set at 65°C. The adhesive film on the background fabric was also solvent activated with Industrial Methylated Spirit (IMS) to ensure a strong adhesive bond, though solvent was not used in areas of the painted design. The adhesive treatment successfully supported the weak cotton fabric and stabilized the loose fragments now finally released from their paper backing. The full adhesive support extended across both painted and unpainted areas of the flag – there were many areas of damage to the fabric beneath the painted areas and it was felt that an incomplete support would compromise the flag's overall stability. The binding medium of the paint was found to be unaffected by

acetone, the solvent which could in theory be used to reverse the Lascaux adhesive, and the short time of heat-sealing did not affect the paint. It was considered that the support would be strong enough to allow the flag to be hung for short periods on display, allowing museum visitors access to both sides. To facilitate decision making about the conservation treatment, digitally printed models of the flag were used to illustrate different options – these could be sent by post from the conservators at the university to the curators in the museum in Taipei.

Display and interpretation

It is planned that the flag will go on temporary exhibition in the museum from late 2012. At the time of writing the final method of display was not decided, but the flag will not be permanently mounted in any way. In theory it could have been stitched onto a fabric-covered inert mounting board for safe vertical display, but this would have prevented access to the reverse of the flag, and its large size would mean that it would have to be mounted and dismantled in the exhibition area as the board would be too large to move around the museum. A more flexible display method would be to rest the flag on a slanting fabric-covered board for the duration of its exhibition. It is likely that areas of loss in the fabric will be visually infilled by covering the board beneath the flag with suitably dyed fabric so that they are less distracting to the viewer. If it is possible to gauge the full extent of the original flag from the 1909 newspaper picture, the flag's original size could be recreated by extending the underlying colour-matched fabric. It was decided however that areas of missing paint should not be inpainted as they are quite extensive. One of the initial questions posed was whether the background fabric of the flag could be made to look blue again. While the inconclusive dye analysis had not provided enough evidence of the flag's original colour to make this appropriate, it was also decided that it would be difficult to achieve this effect technically, though perhaps covering the cotton fabric with dyed blue silk crepe or another semi-transparent fabric could have been an option.

However it would be possible to display a manipulated digital image showing what the flag originally looked like, to the best of the curators' and conservators' knowledge. A digital image of the reverse side could also be displayed alongside the flag if it is exhibited on a board. The knowledge about the flag which has been gained from the investigation will inform the interpretation of the flag to visitors. It had been hoped that dye analysis would help to explain the mechanism by which an originally blue dye had faded to brown in the background fabric, but the uncertain results unfortunately do not provide conclusive evidence. There have also been discussions about adding information about the conservation treatment to the display; the treatment of the flag acts as a showcase for the development of conservation in Taiwan. One of the museum's other most significant objects, The Map of Taiwan under the reign of Kang-Xi Emperor, which dates from around 1700, the earliest known map showing the island in detail, was conserved in Japan in 2003-05.

Conclusions

The international project was very successful with input from both East and West reflected in the final treatment decisions. The Flag of the Formosa Republic has regained its double-sided nature, and is now cleaner and much more stable (Fig. 8 shows the reverse of the flag after cleaning). It is possible to display it safely, and for short periods it would be possible to hang it

so that both sides could be seen. The flag is also much more accessible; it can be rolled safely for storage but can be unrolled to be viewed. The large and international project team communicated very successfully by email and Skype, with Lennard and Pollak making visits to Taiwan at key intervals, while the project administrator was invaluable in helping the project to run smoothly. The treatment also met its aim of involving conservation students and recent graduates, and exposing Taiwanese conservators to the methodologies of textile conservation and western paintings conservation. The western conservators also learned a great deal from the project.

The investigation hoped to unravel the intriguing history of the flag, but whereas some of the questions initially posed have been able to be answered fairly conclusively, other aspects remain obscure. It is not certain that some of the repairs were 'original', deliberately created at the time of the flag's construction to mimic damage in the 1895 flag, but it is entirely possible that the repairs carried out in blue-black thread were part of the original construction. It appears that the same thread was used for these repairs and to attach the blue fabric in the upper right corner which documentary evidence suggests was there from the beginning. It is perhaps too tenuous to suggest that the blue-black repairs could have been similar in colour to the original flag, whereas the assumed later beige-coloured repairs were more closely colour matched to the faded brown colour, but it is tempting to think this could be significant. The skill of Asian replica makers in creating authentic copies was acknowledged throughout the project, enhancing the knowledge that any of the features observed could have been 'original'.¹²

The whereabouts of the 1895 flag are not known but it is hoped that one day it will be possible to compare the two flags. It is also hoped that further analysis will be possible. Perhaps future dye analysis techniques will be capable of identifying the very small amount of dye left in the background fabric. One other avenue which has not yet been explored is to analyse the twentieth-century black and white photographs to see whether it is possible to draw from them information about the colour of the flag when they were taken. In the meantime the 1909 flag in the collection of the National Taiwan Museum acts as a surrogate for one of the three flags raised in 1895 as well as being an extremely significant object in its own right. Although created at a later date this flag is a powerful representation of the short-lived 1895 republic.

Footnotes

1. *The Story of Collection in a Century*, National Taiwan Museum (2008), 103-105.
2. Henry Morse, *The Republic of Formosa*, III-4 (1895), 49.
3. James Davidson, *The Island of Formosa Past and Present*, Macmillan (1903, reprinted in Taiwan 1992), 282.
4. Dye analysis carried out by Dr. Heinrich Piening, Bayerische Verwaltung der staatlichen Schlösser, Gärten und Seen, München, using Ultraviolet-visible spectroscopy (UV-Vis).
5. Alison N Hulme, Hamish McNab, David A Peggie, Anita Quye, Ina Vanden Berghe and Jan Wouters, 'Analytical characterization of the main component found in logwood-dyed textile

samples after extraction with hydrochloric acid' in *Proceedings of the ICOM-CC 14th Triennial Meeting, The Hague, 12-16 September 2005*, (London: James and James, 2005) 790-795.

6. Jennifer Poulin, 'Identification of Indigo and its Degradation Products on a Silk Textile Fragment Using Gas Chromatography-Mass Spectrometry' *Journal of the Canadian Association for Conservation* 32 (2007), 48-56.

7. HPLC analysis kindly carried out by Nobuko Shibayama, Department of Scientific Research, Metropolitan Museum of Art, New York.

8. Dye and pigment analysis by Dr. Heinrich Piening, Bayerische Verwaltung der staatlichen Schlösser, Gärten und Seen, München, using Ultraviolet-visible spectroscopy (UV-Vis). Binding media and additional pigment analysis were carried out by Labor Drewello & Weißmann, Germany (2011) using FTIR; at the National Centre for Research and Preservation of Cultural Properties, Taiwan (2003-04) using FTIR and Energy Dispersive X-ray Fluorescence (ED-XRF); and at the Tainan National University of the Arts (2011) using X-ray fluorescence (XRF).

9. Cross section analysis by Nancy Pollak. Visual comparison of samples of paint flakes and painted fabric mounted in TechnoviZ and prepared in cross section by I-Lu Lin. The samples were examined and photographed under normal and ultraviolet light at 50-400x magnification.

10. Piening, as above.

11. The binding medium was identified using Fourier Transform Infrared Spectroscopy (FTIR) by Labor Drewello & Weißmann, Germany.

12. Craig Clunas, 'Connoisseurs and aficionados: the real and the fake in Ming China (1368-1644)', in *Why Fakes Matter: Essays on Problems of Authenticity*, ed. Mark Jones (London: British Museum Press, 1992) 151-154.

Captions

Fig. 1 Tiger flag, front, before treatment, showing toned paper lining applied in 1979. The different coloured fabric in the upper right corner is clearly visible.

Fig. 2 Imagined depiction of one of the flags being paraded in 1895.

Fig. 3 Photocopied page from the Taiwan Daily Newspaper, November 27 1909, describing and depicting the newly made flag.

Fig. 4 Hirota Kouki, a Japanese visitor to the museum in 1940. The folded flag can be seen in a display case behind him.

Fig. 5 Conservators examining the flag from a specially constructed bridge.

Fig. 6 An image of the long slit through the tiger's left leg and beneath its right leg (at 198x magnification) indicates that it was cut deliberately.

Fig. 7 Cleaning the flag section by section over a vacuum suction table.

Fig. 8 The reverse of the flag following paper removal. [It is intended to replace this image with an after picture of the flag.]

Materials and suppliers

Lascaux 360 HV and Lascaux 498 HV.

AP Fitzpatrick. 142 Cambridge Heath Road, Bethnal Green, London, E1 5QJ.

<http://www.apfitzpatrick.co.uk>

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Biographies

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Frances Lennard gained the Postgraduate Diploma in Textile Conservation from the Textile Conservation Centre and the Courtauld Institute of Art in 1985. She worked as a textile conservator for 15 years, including 11 years in partnership with Fiona Hutton in the south-west of England. She has taught textile conservation since 2001, as the Programme Leader of the MA Textile Conservation, University of Southampton, and since 2010 as Convenor of the MPhil Textile Conservation at the University of Glasgow.

Nancy Pollak

Conservator of Paintings and Painted Textiles

Art Care Associates, Frederick, MD

Nancy Pollak is a 1991 MS Graduate of the Winterthur/ University of Delaware Program in Art Conservation where she majored in painting conservation with a special emphasis in painted textiles. In 1996 she established her private conservation practice, Art Care Associates, specializing in the treatment of painted textiles, including Tahngkas, flags and banners, and traditional paintings on panel and canvas.

Chunmei Lin

Associate Professor

Graduate Institute of Conservation of Cultural Relics and Museology

Tainan National University of the Arts, Taiwan

Chunmei Lin gained a doctorate at the Department of East Asia of the Institute for Art History, University of Heidelberg, Germany in 1988. She was involved as an art historian with the

German/Chinese Conservation Project at the Bavarian Conservation Office in Munich from 1990 to 1995. Since 1996 she has taught both art history and conservation management in Tainan.

Wan-Ping Chen

Paper Conservator,
National Taiwan Museum, Taiwan

Wan-Ping Chen graduated from the Graduate Institute of Conservation of Cultural Relics at the Tainan National University of the Arts in 2007. Since then she has worked at the National Taiwan Museum as a care-taker of the collection and a paper conservator.

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