



## 藍地黃虎旗？ 旗幟，真實性與認同

### Blue Flag with Yellow Tiger? Flags, Authenticity and Identity

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編者按部：本文原投稿並將刊登於 Journal of the Institute of Conservation, 2013 Vol 36 no. 1，經該刊同意預先轉載於《臺灣博物季刊》，版權所屬 Institute of Conservation (Icon)，並且其最終修定版將可於 <http://www.tandfonline.com/toc/rcon20/current> 線上閱讀。

This is a preprint of an article whose final and definitive form has been published in the Journal of the Institute of Conservation, 2013 Vol 36 no. 1, copyright Institute of Conservation (Icon); Journal of the Institute of Conservation is available online at <http://www.tandfonline.com/toc/rcon20/current>

#### 摘要

國立臺灣博物館典藏的「臺灣民主國藍地黃虎旗」是家喻戶曉國寶級的藏品，該藏品是1895年臺灣民主國成立時臺灣民主國旗原旗之摹本。根據當時報紙，這幅在1909年日本製作的摹本與原件一模一樣。此幅彩繪旗幟是個相當引人入勝的謎題，透過儀器分析，並且進一步研究旗幟本體以及留存的歷史照片與文獻紀錄，修護團隊試圖釐清發現部分看起來像是後來的新增與修補，實際上卻是摹製時原始的結構部份。來自臺灣，英國，美國和德國的修護師與科學家組成的國際團隊，進行調查和修護處理。雖然染料分析暫時未有確切結論，以致目前為止仍無法肯定黃虎旗原本的顏色，然而此次調查重新認定右上角的區塊以及部分的縫補痕跡有可能是原有的結構，因此修護過程中將這大部分保留，但少數縫線因必要而移除。揭去背紙後顯現出雙面的彩繪，接續織品部份以抽氣桌清潔，彩繪層則以棉花棒清潔，並以Lascaux 丙烯酸樹脂托襯完成。

#### 緒言

國旗通常作為國家認同與尊嚴的象徵，並為國家精神的實體標識。「臺灣民主國旗」，或臺灣一般大眾所熟知的「黃虎旗」，是國立臺灣博物館三大重要藏品的其中之一。據歷史研究推測，臺灣民主國1895年成立當時應該至少有四面黃虎旗原旗，而館藏的黃虎旗其實是於1909年所製作的摹本。甲午戰爭後，清廷與日本簽訂馬關條約，將臺灣割讓給日本，臺灣士紳奔走成立臺灣民主國，

#### 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 painted 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. Although dye analysis was inconclusive and it has not yet been possible to ascertain the original colour, it was felt that an addition in the upper right corner and some of the repairs could well be part of the original construction and these were left in situ though other repairs were removed. The paper lining was removed, revealing that the flag was painted on both sides. The fabric was cleaned using a vacuum suction table, while the paint surface was cleaned with swabs. The flag was supported using an adhesive treatment with Lascaux acrylic resin.

#### Introduction

Flags often function as tangible markers of nationhood, serving as important symbols of national identity and pride. 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 that reinforce national identity. The flag is actually a 1909 duplicate of a flag made in

升起藍地黃虎旗，可惜時間相當短暫。不久，日軍登陸臺灣，經過炮轟的黃虎旗被送到日本。至1909年臺灣總督府博物館獲得日本宮內省允許，委請畫家高橋雲亭依原樣製作摹本一幅。依照當時新聞描述，1909年於日本製的摹本是為了當時在臺北新成立博物館的展示之需，摹本「與本品分毫無異。見者不辨其真偽。」<sup>1</sup>據研究原旗應該仍在日本，但其確切下落確仍不明。

黃虎旗由單層褐色平織的棉布製成，雙面繪有鏡像的相對形象。三幅棉布以機器車縫形成兩道橫向的接縫，並且使用另一塊棉布於旗左端車縫製成穿旗桿的旗甬。黃虎旗右下方有一大塊的遺缺，而右上方連結一角則很明顯的是以其他材料製成並且為藍色的背景。據說黃虎旗應該曾經是藍色背景。黃虎旗的尺寸相當大，大約縱2.6公尺，橫3.2公尺。垂直長度本來應更長些，但是約莫於1970年代，推測是為了使外觀方整，在紙張托裱後，從上至下連同織品與背紙將邊緣裁去部分。據歷史文獻描述<sup>2</sup>，黃虎旗上繪有一隻老虎「在空中搖揮著又長又富於攻擊性的尾巴」。選用藍地黃虎的意涵是相對於清廷的黃底青龍，從清代旗幟傳統來說，龍代表最高級的統帥，虎則代表二級的漢軍將領，而龍、虎旗皆裝飾代表吉祥如意的雲紋與光明的火紋。旗幟顏色代表八旗軍，有清以來皆以黃旗軍（正黃、鑲黃）最強、人數最多。順治中期以後，八旗軍的強弱順序是：黃、白、紅、藍，正藍旗與鑲藍旗就一直殿後。臺灣民主國採用漢軍將領的標誌「黃虎」與最弱勢的藍地旗，確實避免僭越；採傳統、較方正的軍旗形式，有別一般國旗，也呈現附屬地位。身為臺灣民主國的重要相關文物，此旗在臺灣幾乎是國寶級的文化遺產；學童們不但都會在教科書讀到，黃虎的形象更是常見於生活週遭的郵票、縫線商標或各種紀念品。黃虎旗本身的歷史對臺灣民眾而言意義重大，使它成為意義格外深遠的物件；此次的維護工作在真實性與修復方法上引起了一些耐人尋味的問題。

到了21世紀的今天，黃虎旗的劣化狀況嚴重導致無法繼續展示，甚至收存與持拿時也容易造成更多的損傷。2009年，為了對黃虎旗有更多的了解並進一步修護以達安全展示之目標，臺博館開始籌備跨國的修護計劃。修護團隊成員包含博物館研究人員、紙質文物修護師、織品文物修護師與彩繪油畫修護師等，進行對黃虎旗的分析與修護。此計劃的目標在於調查黃虎旗原本的顏色，並評

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 1895. In response a group of Taiwanese gentry established the independent Formosa Republic, and the original Tiger Flag was flown. However, the republic was short-lived. After only five months the Japanese occupied Taiwan and the original flag was sent to Japan. In 1908, the Japanese 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.<sup>1</sup> It is believed that the original flag is still in Japan although its current location is unknown.

The Tiger flag is made of one layer of brown, plain-weave cotton fabric, with the same design painted on both sides in mirror-image. Three fabric widths are machine-stitched together creating two horizontal seams, and a pole-sleeve made from a different cotton fabric is machine-stitched to the left edge. A large section of the flag is missing from the lower right corner, while the upper right corner is clearly made of different materials and has a blue background fabric. It is believed that the whole flag was once blue. The flag is large, measuring approximately 2.6m x 3.2m. It would originally have been taller 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



黃虎旗修護前正面，可見1979年裱貼的各色命紙與背紙。可見右上角顏色明顯差異。

Tiger flag, front, before treatment, showing toned paper lining applied in 1979. The flag measures 2.6m x 3.2m. The different coloured fabric in the upper right corner is clearly visible.



估右上角添加區塊以及諸多修補痕跡的定位與意義。並且，期藉由這些調查結果可作為適當修護與展示方案，以及增進社會大眾對黃虎旗的詮釋與了解。本文將對這些調查之結果與執行之修護細節作報告與述明。恰巧的是，此修護計畫起始的時間正是2010年的虎年。

## 調查

博物館的研究人員以及修護團隊都相當想研究調查黃虎旗原本的結構與材料，以增進對黃虎旗原有模樣的瞭解，以及其與1895年原旗的相互關係。並以其作為修護參考並向博物館參觀民眾解釋黃虎旗的重要意義。首先的問題是：背面覆蓋厚重背紙的黃虎旗，彩繪影像是否雙面皆有？它雖然現在看起來是褪色的咖啡色，但它原來的顏色為何？如果如歷史記載的應該是藍地的？有沒有辦法讓它再看起來是藍色的？黃虎旗上有許多修補的痕跡，但有可能部份的旗子，例如說右上角部份會不會有可能是黃虎旗原有的結構呢？也許它是1895年原旗的真實摹本，如果果真如此，有沒有可能辨別哪些是「原本的仿作修補痕跡」？哪些是「後來在博物館收藏期間陸續破損修補的部份」？期望這些問題的部份答案能讓我們得知臺博館藏的黃虎旗在當初摹製時是什麼模樣？並藉以推知1895年當時的黃虎旗再被摹製時的樣貌，以及此幅1909年摹本的身世。目前尚無確切歷史文獻得以知道1895年原旗的下落，但據推測應該在被日軍擄獲時損傷了。黃虎旗實在是個耐人尋味的謎題，根據1909年11月27日的日文版《日日新報》記載<sup>3</sup>：

**摹品，包括布料的仿舊、開裂處、顏料色彩等皆與原件無異。唯一可辨別真偽的差別在於氣味的不同……**

本修護計畫的目標之一在於使國立臺南藝術大學古物維護研究所的師生們能交流織品與西方繪畫之修護技術。國立臺灣博物館委託南藝大在校進行委託修護計畫，由於古物所中有東方繪畫與紙質修護組，學生們實地參與許多修護階段的執行尤其包括密集的揭除背紙部份。三位傑出的剛畢業校友擔任專案助理，負責繁複的檢視登錄、充份詳盡的攝影記錄、許多分析與主要的修護執行。三位專案助理專長分別為：紙質文物修護、木質與彩繪文物修護、文物保護與管理。另一位剛從英國南漢普敦大學織品修護中心畢業的織品修護師亦參與協助部份修護工作。整個修護計畫由本文的四位作者共同指導與管理。

## 原本顏色

一般人對「臺灣民主國旗」的印象是藍色的。歷史文獻記載著1895年時，黃虎旗的背景是藍色的。日軍的戰地記者James W. Davidson報導說：

在新民主國舉行成立典禮的那一天，天下微雨…但在撫署中則擁擠著熱衷的人士。廣場上掛著許多燦爛的旗子…在這些旗子上面飄揚著新國旗：藍色的背景，中央畫著一隻看似飢餓的黃色老虎，其尾巴比真老虎的長很多。<sup>4</sup>

黃虎旗主要的部份現在看起來是咖啡色的，但在之前是否真的是藍色的呢？從靠近仔細觀察，可以清楚發現織品基底材在彩繪老虎與其他部分之前是沒有染色的，反而是沿著圖像邊緣將背景圖繪上棉布基底。相對於浸染布料，而使用在亞洲地區另一種的常見彩繪技術是將動物膠與顏料混合，調製成像是水彩的顏料塗刷繪製織品。一開始Piening博士使用非破壞性的「紫外線及可見光分光光譜儀」(Reflectance Ultraviolet-visible spectroscopy 簡稱UV-Vis)檢測，初步認為棉質基底材上有使用墨水樹(logwood)的萃取物。他認為是先塗上像是兒茶萃取物 (extract of Areca Catechu) 或是紅茶之類的含有丹寧的萃取物 (tannin-containing extract) 物質，再接著塗上含有鐵的媒染劑，使得棉布顏色呈灰咖啡色。接著再塗上墨水樹的萃取物(洋蘇木Haematoxylum campechianum)，顏色就變成深藍色的了<sup>5</sup>。蘇洋木的染料並不穩定，很容易隨著酸鹼值改變顏色，也很容易因為光照而褪色。Piening博士試著使用兒茶萃取物和鐵媒染劑的模擬，試樣結果看來為咖啡色，與黃虎旗背景的褪色的咖啡色很相似。

臺灣當地的染料專家則認為使用藍靛(indigo)將棉布染成藍色的可能性比較高，然而使用液相色層分析 (high performance liquid chromatography-photodiode array detector 簡稱HPLC-PDA)將黃虎旗織品咖啡色殘片萃取的分析結果卻沒有偵測到靛藍(indigotin)，也沒有測到鑑別墨水樹關鍵的蘇木成份產物(hematin-elimination-product)<sup>6,7</sup>。判定應該是任何留下的染料成分經過長年的摩擦或清洗遺失了，抑或是老化造成降解，導致殘留的量低於檢測範圍。很有可能不論是墨水樹或是靛藍，因為刷染的方法而比浸染更容易褪色。也有可能使用早期染料而比天然染料更容易或快速的褪色。若要考量任何可能線索的話，還有一種可能但也可惜難以做為鐵証之推

paper in the 1970s. It bears a tiger *'waving a long and very aggressive tail'*, as a contemporary account recorded.<sup>2</sup> 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. Therefore 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 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.

By the early 21<sup>st</sup> century, 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 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. A team of museum curators, paper conservator, textile conservator and paintings conservator undertook analyses and conservation of the flag. The aims of the project were to investigate the flag's original colour and to evaluate the significance of the addition in the upper right corner and of the many repairs. It was intended to use this information to inform appropriate conservation treatments and display methods, as well as to improve interpretation of the flag to the public. This article reports on the results of the investigation and details the conservation treatments carried out. The conservation treatment began, appropriately, in 2010, the Year of the Tiger.

### Investigation

The museum curators and conservation team were keen to investigate the flag's structure and materials in order to gain a better understanding of its original appearance and its relationship with the lost 1895 flag, as well as to inform the conservation treatment and to be able to explain the flag's significance to museum visitors. An initial question was whether the flag was painted on both sides - the paper lining concealed the reverse side. The flag was now a

faded brown colour, but what was the original colour? If it was originally blue, as believed, could it be made to look blue again? The flag had many repairs. However, there was the potential that some of these, such as in the upper right corner, were part of the flag's original construction, perhaps faithful copies of repairs to the 1895 flag. If this were the case, would it be possible to distinguish these 'original repairs' from repairs made during the course of the flag's subsequent life? It was hoped that answering some of these questions would give us a better idea of what the flag had looked like when it was made, telling us more about the condition of the 1895 flag at the time it was copied, and about the biography of the 1909 flag. There is no surviving historic record of what happened to the 1895 flag but it is presumed that it was damaged when it was seized by Japanese troops. The flag was an intriguing puzzle, as reported in an article in the Taiwan Daily Newspaper of November 27 1909 (Japanese language edition)

*'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...'*<sup>3</sup>

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 paintings conservation. The conservation treatment of the flag was carried out at the University where 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, much of the analysis and the majority of the conservation treatment were undertaken by a team of three specially appointed staff, recent graduates of the Institute: a paper conservator and a paintings conservator 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, UK. The analysis and treatment were overseen by the four authors of this paper.

### Original colour

In popular culture the Flag of the Formosa Republic was blue, and there is documentary evidence that the 1895 flag was blue. James W. Davidson, a war correspondent with the



# 黃虎旗再現

The Return of  
The Yellow Tiger Flag  
Conservation of the Yellow Tiger Flag  
of the FORMOSA REPUBLIC

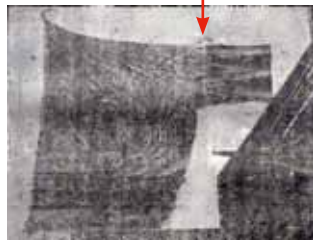
論，則為一般與靛藍織品接觸的紙張常有黃化的現象；而1970年代小托的覆背紙與織品接觸的區域相當的黃化，但在彩繪老虎與其他圖案的區域則沒有，因此背紙相關分析仍繼續進行中，但雖然許多褐色成分被萃取出，目前仍無法測得藍靛的殘留物。因此目前為止仍無法很明確判定黃虎旗主要部份的織品確切的顏色為何。

## 右上角一原有還是修補？

黃虎旗的右上角是個相當特別的部分，因為起初難以判定到底它是後來的修補，還是忠實仿做成原本黃虎旗的模樣。

經證明，黃虎旗右上方的一角是與旗身主體部分使用不同材料製作成的。雖然初步觀察織品經緯線纖維數雖然很相近，但進一步使用手持式放大倍數來檢視布料後，確認實際上是使用不同的棉布製作。黃虎旗主體與右上角比起來，其紗線比較細且織得比較鬆。紗經在右上角是垂直的，但在主體部分則是水平的。也可以很明顯觀察到，右上角織品藍色底色先染好，老虎的尾巴才畫上去的。與主要旗身區域不同的是，HPLC-PDA 檢測的結果確知右上角的織品部分含有藍靛類染料<sup>8</sup>。針對黃虎旗不同部位進行顏料分析加上 Pollak 的橫切面切片檢測分析顯示，右上角的彩繪方法與材料與咖啡色部份大不相同<sup>9,10</sup>。咖啡色部份的彩繪層是雙面的並且先繪以動物膠為底的打底層，接著再全面塗一層鋅白混合油或是油與樹脂混合的白色顏料層，接著在此之上再將各種顏色繪製圖像。彩繪層表面沒有罩漆。在檢測的樣本中所有的顏料層是同一次繪製的，因為在彩繪層之間沒有髒污，不像是間隔一段時間再加繪另一層彩繪的樣子。

在右上角的藍色部份，彩繪層裡的顏料看起來粗糙，並且不像咖啡色區域大部分的彩繪層結構，此區並沒有打底層或是白色顏料層，只有一層很厚的彩繪層。顏料層看來只有塗在正面，而背面看到的多為滲過織品部分的顏料。在兩種布料接合處的橫切面切片分析顯示，帶有黃色與白色顏料的打底層也出現於藍色區域的邊緣。如果確實如此，這表示兩部分的彩繪層應是同一時間製作的。在圖像邊緣另有加上從藍色區域向咖啡色區域延伸的黑色輪廓線。雖然顏料分析並未相當確切，但比較像是墨，也



1909年11月27日《日日新報》影印影像，文中描述黃虎旗初摹製之報導，箭頭處可見其身與右上角的接縫。  
Photocopied page from the Taiwan Day New Newspaper, November 27 1909, describing and depicting the newly made flag. The arrow points to a seam apparently joining the upper right corner.

與咖啡色區域的黑色彩繪層的顏料有所不同。

黃虎旗主要部份使用的顏料包括鋅白、與鉛紅，但亦有可能為偶氮類的合成顏料，例如繪製黃虎形象的檸檬黃。虎眼的綠色是混合檸檬黃與苯胺藍，黃虎旗主要部份的黑色是混合碳黑與一種氮顏料。此種顏料在二十世紀初的國際市場上可取得。然而，由於其組成結構隨著時間改變，因此難以取得參考材料；本結果是

依據比對相似群組成份的顏料與染料。<sup>11</sup> 右上角的顏料包括鉻黃、鋅白與一種無法判定的黑，此種黑雖無法判定，但只能區別是與黃虎旗主要部分所使用的黑色顏料是不同的。主要部分使用的展色劑是油類並且可能使用相當成分的鉛皂與(或)天然樹脂調整性質。有趣的是，其使用的材料比較接近西方，反而不是原本預期亞洲慣用的動物膠。<sup>12</sup>

雖然 右上角很明顯的是使用與黃虎旗主要部份不同材料與技法製作，但這就表示它是後人的修補嗎？縫線分析仍無法有最終定論；黃虎旗右上角是以手縫線，但咖啡色織品部分則是以機械縫製，但若是考量縫補線可能是刻意摹仿原有粗糙的縫補痕跡的話就合理許多。一份1909年《日日新報》的文章可作為右上角為黃虎旗原有一部分的佐証。雖然報紙的影像不甚清楚，但仍可看得出來黃虎旗右上角和主要旗身的拼接。同時從報紙中的影像也相當明確黃虎旗右下角一直就都空著一推測原旗可能在這個角落當時就已遺缺。

## 前人修補

前人修補的歷史也經歷不少的曲折與抽絲剝繭的過程。《日日新報》的報導中提到的裂痕，因此推測至少有部分的所謂的「破損」與修補是原有的結構，但是是否所有的修補痕都是1909年當時的呢？在20世紀期間，黃虎旗在博物館展示期間曾三度出現在早期攝影中。比較這些影像可提供一些線索得知不同階段缺損的產生情形。一張1940年的影像可見黃虎旗當初是被摺起來展示的，這在黃虎旗的正面兩邊依稀可見到兩道相對應位置的米白色塗漆痕，顯示可能當初在塗刷展櫃時不小心被塗漆沾染到。漆痕後來因為不具有重要意義，而決定在修護過程中以物理性方法移除。

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.’<sup>4</sup>

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. Rather than dyeing the fabric, a common Asian technique is to mix pigment with an animal glue binder to a consistency similar to watercolour and to use this to paint the fabric. Initial non destructive testing using Reflectance Ultraviolet–visible spectroscopy (UV-Vis) carried out by Piening suggested that an extract of logwood had been used to colour the cotton fabric. He 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.<sup>5</sup> The dye-stuff haematoxylin is not very stable; it changes colour with changing pH value and is easily bleached by light. Piening’s 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.

A local dye expert felt that indigo was more likely to have been used to colour the fabric blue. However extracts from fragments of the brown ground cotton fabric analysed using a high performance liquid chromatography–photodiode array detector (HPLC–PDA) did not detect the presence of either indigotin, nor a hematin–elimination–product, the marker for the acid extract from logwood.<sup>6,7</sup> 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 than a natural dye. In considering any available clues, it is interesting, though by no means conclusive, that yel-

lowing of paper has been observed in papers in contact with indigo–dyed textiles.<sup>8</sup> 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 were carried out but it was not possible to detect indigo degradation products as many brown components were extracted. It is still possible that GCMS may detect indigo degradation products. However, to date it has not been possible to state conclusively what colour the main ground fabric was.

### Upper right corner – original or later repair?

One very intriguing part of the flag was the upper right corner, as it was unclear whether this corner was a later repair, or a faithful copy of an area of repair on the original flag.

This corner proved to be made of different materials from the main body of the flag. Though the thread counts were similar, examination of the fabric under 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. Unlike the main part of the flag, HPLC–PDA gave conclusive results for an indigo–type dye in the blue fabric of the upper right corner.<sup>8</sup> Pigment analysis and 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.<sup>9,10</sup> On the brown fabric the painted areas on both



咖啡色區域織品的彩繪層橫切面切片(左)與咖啡色與藍色接縫處之彩繪層橫切面切片(右)A層為基底層，B層為亮白色的顏料層，為使彩繪影像其表面光滑，C層為老虎彩繪

Cross-section through an area of the brown fabric (LEFT) and cross-section through the seam between the brown and blue fabrics (RIGHT). Layer A is the preparatory ground layer; Layer B is the bright white paint layers forming a smooth surface for the painted image; Layer C is the coloured paint of the tiger.



# 黃虎旗再現

The Return of  
The Yellow Tiger Flag  
Conservation of the Yellow Tiger Flag  
of the FORMOSA REPUBLIC

從黃虎旗右上角或旗身之間的藍黑色的縫補線看來，不論看起來是連結用或是修補用的部分，同樣具有幾樣特色：都是3股S撚藍黑色的棉紗，並且都看起來都是以浸染的方式製成，因為在線的中心都比外圍顏色淡很多。這樣的染線法並不尋常，因為筆者未曾見過亞洲的縫線中有此情形。由於右上角被判定很有可能為原作部分，因此推測藍黑色線也很有可能是1909年所為。仔細觀察黃虎旗更加進一步支持了這樣的假設。此外，在黃虎旗的背面靠近黃虎左前掌處，還有一塊用來補強裂縫的亞麻質補丁。顯微放大觀察似乎邊緣相當整齊，彷彿是用刀子切割。另一道從黃虎伸出的右腳延伸到左腳的長縫補線，其邊緣看起來也像是乾淨的切痕，而仔細從一張1953年的老舊影像裡依稀可觀察到這道縫補痕在當時就有了。因此似乎很有可能這些所稱的「修補」痕跡在當時就已存在是刻意模仿原旗裂痕的樣貌。雖然其他的縫補痕相較明顯無刻意破壞作舊的跡象，大部分的藍黑色縫補線予以保留，而少部分的縫補線，基於視覺考量與平整度考量因此討論後決定予以移除並裝於夾鏈袋中保存供日後研究。移除部份主要是兩種不同粗細的米白色棉質縫補線，這些米白色的縫補線與藍黑色的線縫法不同，其將織品破損區域重疊遮蓋粗糙縫起，使得旗身部份變形。此部分縫補線下方的織品看來破損是經過時間累積造成的磨損，破損看來不像是刻意製成的。較細的米白色縫線其中三處較接近，並且起始有打明顯的結，看來這幾處是同一個時期所補的。在接縫折



廣田弘毅1940年日本貴賓參訪博物館情形。其背後可見黃虎旗，由於左邊未見棉布織品顯示旗幟當時被局部摺疊展示。

Hirota Kouki, a Japanese visitor to the museum in 1940. The flag can be seen in a display case behind him – no cotton fabric is visible to the left of the painted tiger showing that the flag has been folded.



從黃虎左腳(左)延伸過右腳(右，放大198倍)之裂痕影像，顯示其被刻意裁切。

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

起處之間的塗漆痕也顯示此處的縫補必然是在前述塗刷展櫃沾染之後才補的。

## 調查結果摘要

雖然黃虎旗的染料分析未如預期的提供明確結果，黃虎旗其他部分的調查與分析並配合紀錄希望能提供更多關於黃虎旗結構之資訊。幾乎無庸置疑，黃虎旗右上角的部份應為原本摹製時的一部份，並應予以保留；右下角部分很明顯的一直都是空缺的。有相當高的程度可支持保留部分的修補，有鑒於其可能為原摹製結構。但由於我們認為其餘部分有可能是在黃虎旗生命史中較後來時期所進行的修補。加上造成相當程度的變形，或是有些情形會特別在視覺上造成干擾，因而經過仔細記錄後接續移除。

## 修護處理

首先，先以物理性方法移除前述之米白色漆痕，因為經判斷認定其無重大意義。接下來的步驟則終於解答計畫最初的疑問之一：黃虎旗是否是雙面的。1970年代左右，黃虎旗被以漿糊與背紙裱托起。當時並未留下任何紀錄，但是修補痕跡可見織品並未妥善整理經緯，且嚴重變形與折疊。背紙上的皺摺對應產生織品上的磨損痕，並且紙張的撕裂痕也連帶撕裂織品。事實上在修護計畫前有先從背紙處將裂痕使用嵌折加固以避免捲收與攤開時造成裂痕更加深。由於背紙持續造成黃虎旗織品的損傷，因此決定將其移除並重新托襯支撐。

黃虎旗正面的彩繪層全面性皆略有裂痕，並且局部有剝落現象。但整體看來還算牢固地附著在織品上。觀察損傷似乎都是由捲收黃虎旗時的動作所造成，反而不是材料本身不穩定的狀況。經過沾有去離子水的棉花棒做清潔測試，得知彩繪層對水份較為敏感，因為打底層含有溶於水的碳酸鈣，但只要乾燥後便回復穩定狀況。背紙移除時由於只有短時間在局部使用少量的水分，因此未有造成損傷。首先，先使用吸塵器進行乾式清潔，在接著使用

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 applied to the front of the fabric only, 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. 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 probably 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.<sup>11</sup> Pigments in the upper right corner included chrome yellow, zinc white and an unidentified black that 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 appeared to be primarily oil, possibly modified with lead soap and/or resin. Interestingly such a medium is more commonly associated with western than Asian painting where an animal glue binder would be expected.<sup>12</sup>

It was clear that the upper right corner was made using

different materials and techniques from the main part of the flag. Did this mean that it was a later addition? 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 repairs. However 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 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.

### Repairs

The history of the repairs was also not straightforward to unravel. As the Taiwan Daily 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? 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 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.

No difference could be discerned between the S-plied, 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 the authors had not noticed it 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 gave greater credence to this hypothesis. A patch of linen fabric had been



修護師於特製工作橋上檢視黃虎旗。  
Conservators examining the flag from a specially constructed bridge.





去離子水與棉花棒清理顏料層。背紙則是以去離子水濕潤後一層接一層的慢慢去除，過程相當緩慢且漫長。隨著背紙漸漸揭開，令人興奮的顯現出背面的圖繪影像，由於兩面的圖繪為相對應之鏡像，因此彩繪層的區域在黃虎旗兩面同樣的位置。背面彩繪層由於受背紙保護而狀況相對良好，有可能是因為較少光照損害而顏色較為明亮，同時也較少劣化與裂痕。背面咖啡色織品部份顏色與狀況看來一樣，但是漿糊並未均勻塗刷，因此部份區域較厚使得棉布基底材變得相當脆且部份變成碎片。此區域的背紙暫時予以保留以便後續處理之安全。

移除背紙後，黃虎旗背面的狀況重新進行檢視與評估修護方案的選擇。彩繪層在必要處以4%w/v之鱈魚膠水溶液進行加固，其主要加固部份分布在正面部份，但在背面也有少數區域。織品部份仍舊相當髒污且佈滿水漬，殘留的漿糊也使得織品硬且脆，難以進行變形調整。清潔分區塊逐步進行，先將彩繪層區域遮罩起後，使用去離子水噴灑於待清潔區域之織品上。為避免毛細現象產生，將水份擴散到其他區域，前述清潔動作在抽氣桌上進行向下吸引水分。雖然這樣的動作可使織品乾燥加速，但仍有充分時間可以調整變形的織品經緯線。經過清潔後，使得織品清潔度與彈性皆改善許多。背面的彩繪層再接續使用棉花棒與唾液濕潤並滾動清潔表面潔髒污與殘留漿糊。接著再使用去離子水濕潤吸水紙置於清潔過的彩繪層上溼敷至乾燥為止。此舉一方面可清潔顏料裂縫中織品的髒污，另一方面可避免滾動動作影響對水份敏感之打底層。雖然無法全面將殘留的漿糊清除乾淨，但殘留的漿糊即如同加固劑般的加固料層，也同時可接續隔離新的托襯與黏著劑。

關於使用何種托襯方法有相當多的討論，如何才能提供捲收與展示時安全穩固的支撐，並且展示時的外觀可達到加分的效果。即使是經過清潔動作，黃虎旗的織品仍然因為太過脆弱而無法以縫的方法加襯固定，加上大區域的顏料層也無法縫，因此必須採用黏著劑方法。修護團隊針對兩種合適黏著支撐黃虎旗的方法進行經驗交流，在亞州較常見的方法是類似書畫的方式將彩繪織品以漿糊與紙張托裱。<sup>13,14</sup>但是相對的，在英美地區則是較習慣將彩繪織品使用合成黏著劑與另一塊新的織品貼襯。倘若黃虎旗若是單面的話，最文化合宜並且適應臺灣濕熱的氣候環境的方法將可能會是使用漿糊與染好適當顏色

的不透明的布將文物黏貼托襯。但是由於黃虎旗是雙面的，表示會想要使用像是絲質的疏薄絹(silk crepe)類的半透明材料支撐，好讓背面的影像也可觀賞。為確認評估漿糊是否適合用於疏薄絹，修護團隊使用漿糊黏著疏薄絹於彩繪旗幟的模擬樣本上，以進行相關測試。結果雖然看起來可行，但是有豐富裱褙大型書畫的專家擔心難以支撐如此大型且有相當重量的黃虎旗。同時也考量宜避免為了漿糊裱托再度加濕黃虎旗。因此，最後決定混合使用Lascaux 360 HV與498 HV兩種壓克力類黏著劑。配合博物館環境內的溫濕控制，可以較不用擔心有如戶外一般劇烈的變化。

疏薄絹選定適當的顏色後染色，並塗佈上濃度14%w/v的壓克力黏著劑水溶液(黏著劑以重量2:1的Lascaux 498 HV和 Lascaux 360 HV調製而成)。待乾燥後，黏著劑塗佈的疏薄絹接著以65°C的熨斗從黃虎旗的背面適度加熱黏著，接著避開顏料層的部份，在織品部份再使用Industrial Methylated Spirit (IMS) 溶劑作用，以加強黏著牢固度。小托選擇從背面著手是考慮到正面影像較重要，不應該被模糊，並且背面顏料層的表面也較為平滑。使用黏著劑加襯的方法替代原有的背紙，很成功的加強支撐了破損嚴重的棉質基底材並且穩定了鬆落的殘片。全面性的以黏著劑加固織品與顏料層區域主要是考量到除了織品部份的破損零碎，有顏料彩繪的區域也有不少部份的破損是深及織品的，為了顧全黃虎旗全面性的穩定度，因此不採用局部加固而是全面托襯。顏料層的展色劑因為不會與丙酮作用，因此理論上未來若需要移除疏薄絹及黏著劑時可拆除回復，而用來啟動黏性的熨斗加熱也控制在短時間接觸亦對顏料層不具影響。疏薄絹全面加固後理論上可配合展示短時間懸掛，使觀眾可以同時觀賞到雙面。方案決定前，臺南藝術大學團隊善用數位輸出樣本，模擬不同加固的方案，郵寄到臺北的博物館，以供研究員討論。

## 展示與詮釋

黃虎旗修護後預計在2012年底在博物館舉行短期特展。截至著筆為止，最終展示的方法仍未決定，但確定不會將黃虎旗長期固定在襯板上。其中的一個方案是將黃虎旗以針線安全的固定在包覆織品的中性板材上垂直展示，但此方案會使得背面無法觀賞，並且其碩大的尺寸會使得必須要在展場進行固定與拆卸的動作，否則展板無

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, 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. Therefore it seemed likely that these 'repairs' had been made deliberately to imitate splits in the original flag. Although other repairs did not provide such clear evidence of deliberate damage, the blue-black repairs were mainly retained as the conservators could not be sure they were not original, although a small number were removed and kept away for later study for their appearance was particularly disfiguring. The main group of repairs to be removed were those using two different thicknesses of beige-coloured cotton thread. These repairs used different stitching techniques from those with blue-black threads. They created crude seams by overlapping sections of fabric to cover areas of damage and 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.

### Summary of investigations

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

A first step was to mechanically remove the cream coloured paint referred to above as it was considered to be of no significance. The next stage of treatment answered one of the initial questions: whether the flag was double-sided. The flag had been lined with paper during the 1970s, using

starch paste as an adhesive. No documentation survived from this period. The fabric had not been correctly 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. An initial treatment was to mend tears in the paper lining to prevent the tears in the textile from growing 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. Cleaning tests using swabs dampened with deionised water 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 suc-



揭除背紙後黃虎旗的背面。背面的彩繪層狀況比正面好很多。  
The reverse of the flag following paper removal. The paint was in much better condition on the reverse.



法在博物館(庫房與展館)之間搬運。另一方案則考慮在斜板上加襯後,使用磁鐵固定,展示黃虎旗背面以呈現揭除背紙的成果。黃虎旗下方並襯有以穩定性質染料染成適當顏色的襯布,這樣織品的部份缺損便可以在視覺上補全完整,好讓觀眾不會被破損干擾。彩繪缺損部份由於面積廣佈,最後決定不全色。展示同時計劃以同尺寸的數位複製旗以正面呈現與原件並列展出。原本最初的問題,到底要不要將背景變回藍色的模樣?一方面目前為止,尚無科學分析可證明背景布有無藍色成份,另一方面是技術上也難以達到這樣的效果。不過當初的確考慮過將疏薄絹或其他半透明的布料染成藍色,再罩到淡咖啡色的黃虎旗棉質基底材上。

然而,亦可能盡研究人員以及修護師們的所知範圍,應用數位處理展示黃虎旗最初的樣貌。本計畫調查得知對於黃虎旗的新資訊能讓觀眾了解關於黃虎旗的詮釋。原本期望染料分析能幫助解釋為何織品本來是藍色的染料褪色成咖啡色的化學機制與原理,但很可惜未能獲得確切結果。當初亦討論將修護資訊加到展覽中,以呈現臺灣修護的發展指標。

## 結論

此次國際合作經驗,由於東西雙方的共同竭力促成的修護方案,尤其反應在最後相當成功的修護結果。臺灣民主國藍地黃虎旗回復其原有的雙面狀態,也較之前更乾淨、更穩定。日後可以安全展示,如果時間不長,甚至可以考慮懸掛呈現,以雙面皆可展示。修護後也較可持拿,典藏時安全的捲收收存,檢視時可攤開平放。藉由此次計畫同時也達到當初的設定,讓修護學生以及畢業生參與工作,使臺灣的修護師們能接觸西方織品與油畫修護的方法,西方修護師也藉此案學習許多。

本次研究調查希望揭開耐人尋味的黃虎旗歷史,雖然一些最初提出的問題有的已經能夠回答相當確鑿,但仍有一些部分仍未能確定。如部份修補痕跡仍難以確定,是否為摹製時刻意做舊,模仿1895年原旗的破損情形。藍黑色縫補線很有可能為摹本原有的,這些修補線看起來與連結右上角的線相似。而從歷史資料看來,右上角在摹製時就存在了。另一個推論可能證據薄弱,但是卻又很難不讓人不去忽視它可能的重要性:或許藍黑色縫補線與原旗顏色相近,而後來被認定為修補用的米色線與褪色的

咖啡色織品接近。整個計畫中,在亞洲地區特有為了仿製與原作接近而刻意做舊的作法一直被列入考量,也強調了「任何觀察到跡象都有可能是原有的」的觀念。

1895年黃虎旗的原旗仍下落不明,但希望有一天,會有機會能比較這兩面黃虎旗,也希望有可能進一步分析。也許未來的染料分析技術將能夠確定殘留在織品中微量的染料成分。另一個尚未探索的途徑則或許是可以嘗試分析二十世紀的黑白照片,從中描繪出拍攝時有關這旗幟著色的訊息是否有可能。在此期間,在國立臺灣博物館收藏的1909黃虎旗繼續扮演替代1895年升起三面旗中的一幅,它自己本身也是一個非常重要的文物。雖然是後人的摹本,但仍是短暫1895年臺灣民主國的重要代表。

## 附註

- <sup>1</sup> 《百年物語:臺灣博物館世紀典藏專輯》,國立臺灣博物館(2008)頁103-105。
- <sup>2</sup> Henry Morse, *The Republic of Formosa*, III-4 (1895), 49.
- <sup>3</sup> 1909年11月27日《臺灣日日新報》日文版。
- <sup>4</sup> James Davidson, *The Island of Formosa Past and Present*, Macmillan (1903, reprinted in Taiwan 1992), 282.
- <sup>5</sup> 染料分析由德國巴伐利亞邦宮殿花園湖泊修護中心主任Heinrich Piening博士進行,使用紫外線及可見光分光光譜儀。
- <sup>6</sup> 高效液相色層分析檢測由美國大都會美術館科學研究部柴山伸子小姐協助。
- <sup>7</sup> Alison N Hulme, Hamish McNab, David A Pegg, 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.
- <sup>8</sup> 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.
- <sup>9</sup> 染料與顏料分析由德國巴伐利亞邦宮殿花園湖泊修護中心主任Heinrich Piening博士使用紫外線及可見光分光光譜儀,彩繪展色劑與進階顏料分析是由(2011年)德國德瓦洛與凡斯曼藝術品與史蹟科學分析實驗室使用傅立葉轉換紅外線光譜顯微分析儀(FTIR)進行,以及(2003-04年)臺灣國立資產保存研究中心籌備處始用傅立葉轉換紅外線光譜顯微分析儀(FTIR)與能量散射X射線螢光光譜分析儀(ED-XRF),以及國立臺南藝術大學使用X射線螢光光譜分析儀。
- <sup>10</sup> 彩繪層橫切面切片檢測由Nancy Pollak執行。觀察比較彩繪層剝落樣本與包埋於TechnoviZ間之彩繪織品殘片,樣本備製:林宜儒。樣本於正常光與此外線下以50-400倍率進行檢視與攝影記錄。
- <sup>11</sup> Piening博士,同上。
- <sup>12</sup> 顏料層展色劑由德國德瓦洛與凡斯曼藝術品與史蹟科學分析實驗室使用傅立葉轉換紅外線光譜顯微分析儀(FTIR)鑑別。
- <sup>13</sup> Anne Amos, 'Japanese textile conservation', *Conservation News* 50 (March 1993): 12-14.
- <sup>14</sup> Sun-Hsin Hung, 'Materials and Techniques of Initial Lining on Silk Paintings: A Case Study of "Tsai Zhi Xian by Song Dynasty Artist"', *Journal of Cultural Property Conservation* 11 (2010): 75-88.
- <sup>15</sup> Frances Lennard and Vivian Lochhead, 'United We Stand! The Conservation of Trade Union Banners', in *Tales in the Textile. The Conservation of Flags and Other Symbolic Textiles. Preprints, North American Textile Conservation Conference 2003*, comp. Jan Vuori (Peebles Island: NATCC, 2003): 111-118.
- <sup>16</sup> 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.

## 致謝

本計畫黃虎旗之修護執行者包括:辜貞裕、林宜儒、呂劍君、陳宜柳、Lynn Bathke、Frances Lennard、Nancy Pollak以及國立臺南藝術大學古物維護所的學生們。計畫主持人為林春美教授,協同主持人為蔡斐文副教授。

tion 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. There was excitement as the gradual removal of the paper revealed an identical painted design on the reverse of the flag. The design was in mirror image, so that the paint layers were in the same place on both sides 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.

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% w/v solution of isinglass in water. 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; 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 the

starch 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.<sup>13, 14</sup> By contrast, in the UK and the USA it is common to stabilise 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. Trials were carried out, using starch paste to adhere silk crepe line fabric to mock-ups of the painted flag, but although they appeared promising, local conservators experienced 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. Finally a 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% w/v solution of 2:1 w/w Lascaux



於抽氣桌上局部逐區清潔黃虎旗。

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



498 HV: Lascaux 360 HV in water. 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 support was adhered to the reverse of the flag as it was considered more important not to obscure the front surface and because the paint surface was smoother on the back. 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 to see 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

The flag is to go on temporary exhibition in the museum in 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. One option would have been to stitch the flag onto a fabric-covered inert mounting board for safe vertical display, but this would have prevented access to the reverse, 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. It

was considered likely that the flag would be displayed on a padded, sloping board, attached using magnets, with the back of the flag visible to show the image after removing the backing paper. It was planned to infill areas of loss in the fabric by covering the board beneath the flag with suitably dyed fabric so that they are less distracting to the viewer. It was decided however that areas of missing paint should not be inpainted as they are quite extensive. It was planned to display a full-scale digital replica of the other side alongside the flag. 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 is possible to display a manipulated digital image showing what the flag originally looked like, to the best of the curators' and conservators' knowledge. 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 were also 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.

## 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. 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.



使用小頭熨斗將帶有黏著劑的疏薄絹黏襯於黃虎旗背面  
Using tacking iron to adhere Acrylic resin coated-crepe to the back of the flag.

The flag is also much more accessible; it can be rolled safely for storage but can be unrolled to be viewed. 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'.<sup>16</sup>

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



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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

- <sup>1</sup> National Taiwan Museum, *The Story of Collection in a Century*, (Taipei: National Taiwan Museum, 2008): 103-105.
- <sup>2</sup> Henry Morse, *The Republic of Formosa*, III-4 (1895), 49.
- <sup>3</sup> Taiwan Daily Newspaper, November 27 1909 (Japanese language edition)
- <sup>4</sup> James Davidson, *The Island of Formosa Past and Present*, Macmillan (1903, reprinted in Taiwan 1992), 282.
- <sup>5</sup> Dye analysis carried out by Dr. Heinrich Piening, Bayerische Verwaltung der staatlichen Schlösser, Gärten und Seen, München, using Ultraviolet-visible spectroscopy (UV-Vis).
- <sup>6</sup> HPLC analysis kindly carried out by Nobuko Shibayama, Department of Scientific Research, Metropolitan Museum of Art, New York.
- <sup>7</sup> Alison N Hulme, Hamish McNab, David A Pegg, 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 14<sup>th</sup> Triennial Meeting, The Hague, 12-16 September 2005*, (London: James and James, 2005): 790-795.
- <sup>8</sup> 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.
- <sup>9</sup> 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 & WeiBmann, 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).
- <sup>10</sup> 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.
- <sup>11</sup> Piening, as above.
- <sup>12</sup> The binding medium was identified using Fourier Transform Infrared Spectroscopy (FTIR) by Labor Drewello & WeiBmann, Germany.
- <sup>13</sup> Anne Amos, 'Japanese textile conservation', *Conservation News* 50 (March 1993): 12-14.
- <sup>14</sup> Sun-Hsin Hung, 'Materials and Techniques of Initial Lining on Silk Paintings: A Case Study of "Tsai Zhi Xian by Song Dynasty Artist"', *Journal of Cultural Property Conservation* 11 (2010): 75-88.
- <sup>15</sup> Frances Lennard and Vivian Lochhead, 'United We Stand! The Conservation of Trade Union Banners', in *Tales in the Textile. The Conservation of Flags and Other Symbolic Textiles. Preprints, North American Textile Conservation Conference 2003*, comp. Jan Vuori (Peebles Island: NATCC, 2003): 111-118.
- <sup>16</sup> 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.

#### Acknowledgements

The conservation treatment of the flag was carried out by Jen-Jung Ku, I-Lu Lin, Chao-Chun Lu, Yi-Lui Chen, Lynn Bathke, Frances Lennard, Nancy Pollak and students from the Graduate Institute of Conservation of Cultural Relics at the Tainan National University of the Arts. The project was co-hosted by Professor Lin and Fei-Wen Tsai, Associate Professor in the Paper Conservation Group at the Institute.