

**THE REEVES COLLECTION: AN INVESTIGATION
INTO CHINESE BOTANICAL DRAWINGS, THEIR
IDENTIFICATION AND CONSERVATION**

Catherine Frances Welby Bailey

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ABSTRACT

The Reeves Collection, held at the Royal Horticultural Society in London, comprises three large volumes, Chinese Drawings, and five small volumes of coloured Chinese botanical drawings entitled Chinese Drawings of Plants. They were sent back by John Reeves, an East India Company tea inspector based in nineteenth century Canton.

Virtually nothing was known about these pictures. Water damage and degradation exhibited by many watercolours in Chinese Drawings of Plants called for urgent research into their provenance, physical and aesthetic characteristics and into the materials used.

A multi-disciplinary approach was adopted. Biographical and topographical investigation uncovered the origins of these pictures while the inscriptions and historical research revealed their later history. An art historical approach was taken to describe the scientific and aesthetic aspects of the paintings. Materials were investigated using polarized light microscopy (PLM), Fourier transform infrared spectroscopy (FTIR) and chemical tests. Possible causes of pigment loss and the degradative effects of copper greens were considered. Methods of reversing darkened lead white were investigated and a hitherto unreported Chinese method tested. Consolidants were compared by reference to published and unpublished material.

Fresh Reeves correspondence emerged during this research. It was discovered that many pictures were painted in Macao between 1817 and 1831 by four named Chinese painters. The identified papers, glues, sizes and pigments have been previously noted on Chinese works of art on Chinese and western papers, but with the addition of Prussian blue. New evidence for the Chinese manufacture of this colour is presented. A Chinese method of lead white reversal proved unsatisfactory. WS-EHEC and funori were identified as the most appropriate consolidants for future testing.

The wider implications of this research include new information about Reeves, the Chinese manufacture of Prussian blue and a possible reason for difficulties encountered in reversing darkened lead pigments on Chinese objects.

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AUTHOR'S NOTE

1. Frequently used names, titles and terms are given their conventional English forms e.g. *The Mustard Seed Garden Manual of Painting* in preference to *Jieziyuan Huazhuan*.
2. There are competing systems for the romanization of Chinese characters. Prior to the introduction of Wade-Giles in 1859, there was no standardized form, so that John Reeves, for instance, adopted his own. This appears on some of the pictures on the western papers in the Collection. In the text of this thesis the romanization of Chinese terms is given in Pinyin, which was officially adopted by the Chinese in 1979. Where romanization appears as a quotation or reference, the form adopted by the original author has been used. In each case, the Pinyin version and a translation is given in the text. A complete list of these words and phrases, with translations, appears in the Glossary of Chinese Terms in Appendix II. In a few instances, where more than one form of transliteration has been referred to or quoted for the same Chinese term, *Fan Kwai* and *Fan Quai*, for example, both appear in the Glossary.
3. With reference to the Linnean Society, 'Linnean' has been spelt without an additional letter 'a', i.e. the Society's spelling has been used. In accordance with the Oxford Style Manual (2003 p. 803), the Latinized version of the Swedish botanists name has been spelt 'Linnaeus' while references to his work are given as 'Linnaean'.
4. There are frequent references in the text to western art, conventions etc., as opposed to Chinese. In these instances 'western' has been spelt with a lower case 'w', following the form given by the Oxford Style Manual (2003 p.72). However, where the word appears with a capitalized 'W' in a quotation, the text has been reproduced as originally published.
5. Chinese names are given in the Chinese manner, i.e. the family name is given first, followed by the given name. The exception to this occurs where a Chinese author has published in English, in which case the given name is followed by the surname.

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INTRODUCTION

The Reeves Collection: A Brief Description

The Royal Horticultural Society in Vincent Square, London, has among its collections in the Lindley Library eight half-bound volumes of Chinese botanical watercolours. Although the majority of the coloured drawings are on heavy cream western papers, there are over one hundred delicate botanical watercolours on fragile, adhered, Chinese papers. Three of these volumes are titled Chinese Drawings, and five volumes are titled Chinese Drawings of Plants which are hereafter together referred to as the 'Reeves Collection' or the 'Collection'. Although a little was known about the later history of the drawings, particularly their sale in 1859 and subsequent re-acquisition in the following century, virtually no information was to hand about the original collector, John Reeves (1774-1856), a tea inspector with the East India Company, the execution and collection of the pictures or the materials used.

Of the eight volumes, the three larger ones, mostly comprising coloured drawings of chrysanthemums, peonies and camellias, are considered to be in good condition. These volumes are the subject of research to the extent that the pictures have a common provenance with those in the small volumes. For the purpose of this thesis, these volumes will be referred to as the Chinese Drawings Large Volumes.

The main focus of this research project is on the set of five smaller volumes in half-bound green calfskin. Their external measurements are approximately 490mm × 380mm. The number of pages per volume varies: volume 1= 98 pages; volume 2=130 pages; volume 3= 124 pages; volume 4=148 pages, and volume 5=130 pages. The pages comprise western wove papers, with Whatman papers predominating. These volumes will hereafter be referred to as the Chinese Drawings of Plants Small Volumes.

There are two types of coloured drawing in the Chinese Drawings of Plants Small Volumes: those drawn directly onto western papers typically depicting one plant, although occasionally more than one specimen of a species is shown; and coloured drawings on smaller Chinese papers, adhered to Whatman papers, all dated 1837. A more detailed description of the pictures in the Chinese Drawings of Plants Small Volumes is given in chapters two and three.

The Research Project in Context

A modest research project on the five Chinese Drawings of Plants Small Volumes was undertaken by the author at Camberwell College of Arts as part of an MA degree in Conservation in 2007 (Bailey, 2007). One of the outcomes was the realization that the Collection merited further research, principally on its own account, but also for the information

it might yield about similar collections of Chinese botanical art and export art in the early part of the nineteenth century.

Research Aims

The aims of the research project were fourfold:

1. To provide a comprehensive account of the provenance of the Collection.
2. To identify materials used in the Chinese Drawings of Plants.
3. To investigate conservation treatments for darkened lead white and friable copper green pigments for inclusion within the conservation proposals for the Collection.
4. To expand knowledge of commissioned and collected Chinese botanical art in the early nineteenth century.

The Importance of the Collection as a Research Topic

The Collection, together with similar collections of plant, animal, fish and bird paintings, also commissioned by Reeves and now held at the British Museum (Natural History) and the Zoological Society of London, amounts to a very substantial body of work. All these collections must have been executed between 1812 (the date of Reeves' arrival in China) and 1831 (the date of his final departure), but the Royal Horticultural Society volumes can be reliably dated between 1817 and 1831. They represent a significant and well-recorded example of the materials and methods being used by Reeves' Chinese artists in Canton during the early years of the nineteenth century.

It might be expected that prior to the opening up of five treaty ports in China in 1842 with the Treaty of Nanking,¹ the pigments in use in Canton would be the traditional pigments referred to in *The Mustard Seed Garden Painting Manual* (Wang, Wang & Wang, 1977) and other Chinese texts. Some of these are referred to by Yu Feian in his *Chinese Painting Colors: Studies of their Preparation and Application in Traditional and Modern Times*, translated by Silbergeld and McNair (Yu, 1988). Although western conservation literature has tended to list the same few Chinese pigments, thereby emphasizing a limited palette of the Chinese painters, an examination of the East India Company records for Canton at the start of this project revealed that during Reeves' time in Canton (1812-1831), there was a steady trade in pigments between China, England and India. This suggested that pigments more readily known in England at the time might be found in pictures originating in Canton.

Nineteenth-century Chinese botanical pictures are held at the Royal Botanic Gardens,

¹ The Treaty of Nanking, which concluded the first Opium War, provided for the cession of Hong Kong and the opening to British trade of the five ports of Canton, Amoy, Foochow, Ningpo and Shanghai.

Kew and the British Museum (Natural History), for example, but a paucity of surrounding documentation means that little is known about them. Due partly to his methodical system of recording the pictures, his membership of learned societies, and in particular his association with Sir Joseph Banks and the East India Company, Reeves left sufficient documentary evidence, albeit scattered, to enable a reasonably comprehensive picture to be built up of the way in which the Collection was put together. This may inform similar collections.

The earlier project identified two particular conservation problems evident in the Collection. Both were noticed to be rather more acute in the Chinese Drawings of Plants Small Volumes, which had suffered water damage at the beginning of the twentieth century². Firstly, the lead white has darkened in varying degrees according to its position on the page (the lead white at the outer edges being significantly darker than the paint nearer to the centre of the pages). Secondly, the surface layers of the copper green pigments have fragmented resulting in substantial loss on some of the drawings. It was considered that this project might usefully build upon published and unpublished conservation research in both areas.

The Reeves Collection in Context

The Reeves Collection may be contextualized in a number of ways. The association of Reeves with Sir Joseph Banks and his employment in Canton by the East India Company would immediately suggest that the pictures could be viewed as examples of economic botany. It was Banks who first appointed Reeves as a collector of ‘curious and desirable’³ material in 1812, one of his prime interests being in the transfer of tea production to the British colonies. The directors of the East India Company similarly requested its representatives to send back pictures of plants, animals, manufacturing processes and curiosities which were kept at its museum in East India House in Leadenhall Street. The Horticultural Society, for which Reeves started the Collection in 1817, was seemingly motivated by a mixture of scientific enquiry and horticultural exploration, but had among its membership professional nurserymen with financial interests in securing specimens of new plant introductions.

Reeves’ work could be read in the light of Orientalism. Noting elements in the eighteenth century which paved the way for modern Orientalism, Edward Said says that ‘Orientalism organized itself systematically as the acquisition of Oriental material and its regulated dissemination as a form of specialized knowledge’ (Said, 2003 p.165). According to Sacy, this material included ‘a vast depot of objects of all kinds, of drawings, of original books, maps, accounts of voyages, all offered to those who wish to give themselves to the study of [the

² Dr. Brent Elliott, The Royal Horticultural Society historian. Pers. Comm. 10th November 2010.

³ Banks, J (1803) Letter to William Kerr dated 18th April. Dawson Turner Collection, 1790-1827, 14, pp.61-68. British Museum (Natural History).

Orient]’ (Sacy quoted in Said, 2003 p.165). Reeves collected all these during his time in China, together with information on various aspects of Chinese life and manufacturing processes sent back in correspondence.

As an example of botanical illustration which, it is argued, embodies features from both the western and Chinese botanical painting traditions, the Collection is substantial and diverse. It provides ample scope for identifying singularly Chinese methods of representing plant material. These are juxtaposed with the more familiar western techniques of botanical illustration. This east-west collaboration is equally apparent in the materiality of the Collection, which demonstrates an interesting mix of pigments, binders, adhesives, papers, fixatives and sizes.

The Collection could equally be understood as an example of export art, although it is argued that there are features which distinguish it from the thousands of pictures, fans, rolls of wallpaper, lacquer ware and porcelain which found their way back to Europe and America on merchant ships. However, Reeves’ painters were probably export artists (Clunas, 1984 p.11). Joseph Sabine, the then Secretary of the Horticultural Society of London, noted that Reeves had engaged the best flower painter in Canton. Due to restrictions placed upon the movements of foreigners (Archer, 1972 p.253), Reeves would have found his painters in the Factory area (Fan, 2004 facing p.90) where local artists were engaged in the production of mass-produced art for the *fan quai* (foreign devils).

Each of the activities listed above can be viewed as part of a larger phenomenon, that of consumerism. Arguing that consumerism is highly significant in world history, Adshead (1977) traces its rise in Europe and China between 1400 and 1800 through the histories of six fields of exchange. The first three relate to food (e.g. tea), dress (e.g. silk), and shelter; the fourth comprises utilities (heat, light etc.); the fifth he terms ‘communications’ by which he means ‘intellectual diffusion’ (Adshead, 1977 p.2). Included here is scientific knowledge, which he defines as ‘the unrestricted desire to know’ (Adshead, 1977 p.177). The sixth field is symbolism, that is, messages conveyed by consumer commodities. He maintains during the four hundred years which elapsed between the selected dates, this European-Chinese trade was responsible for a consumer revolution resulting in globalisation, the effects of which were not fully felt until the nineteenth and twentieth centuries.

Finally, the Reeves Collection might simply be viewed as a collection of paper objects requiring conservation treatment.

Research Parameters

Thus Reeves' contribution may be variously interpreted. The concepts of economic botany, Orientalism and consumerism have not been pursued further. For reasons which are explained in chapter three, plants portrayed in early Chinese herbals and books on agriculture, and botanical subjects as decorative motifs, were also not within the scope of this research.

The focus of this research project was on the drawings *qua* pictures; their provenance and history, their defining characteristics particularly in relation to export art, traditional Chinese flower painting and western botanical illustration, material composition and conservation. These research areas dictated the formulation of the Research Questions.

The Research Questions

The Research Questions were as follows:

1. Accepting that the Collection is relatively well-documented, what can be learned about its conception, formation, subsequent history and use?
2. What are the defining characteristics of the drawings and how do these relate to their Chinese and western origins?
3. Which materials (pigments, binders, papers and sizes) were used, or were likely to have been available for use, by the Chinese artists?
4. What conservation treatment (if any) should be recommended, particularly in respect of the darkened lead white and flaking copper green pigment?
5. How might the information gained from an understanding of this Collection be of more general application?

An Outline of Current Scholarship

Self-evidently, all collections start with the collector. Although John Reeves seems to have been a fairly prominent natural historian of his day, his death, for instance, meriting an entry in the *Gardeners' Chronicle and Agricultural Gazette* of March 1856⁴ and the *Linnean Society of London Proceedings* 1855-61,⁵ to date, there has been little academic interest in Reeves or his collections of drawings. Limited biographical material was included in his obituaries and he merits a modest entry in each of the *Oxford Dictionary of National Biography* (2004, Vol. 46 p.352) and the *Dictionary of British Botanists and Horticulturalists* (Desmond, 1977 p.515). His plant introductions were listed by Bretschneider (1898), and by Cox (1945) in *Plant Hunting in*

⁴ *The Gardeners' Chronicle and Agricultural Gazette*, 1856, 29th March. London.

⁵ *The Linnean Society of London Journal of Proceedings*, 1855-61, p.xliii. The Linnean Society of London.

China. There are only two published works which deal exclusively with his drawings; Whitehead's *The Reeves Collection of Fish Drawings* (1969) and a limited edition work *Chinese Natural History Drawings Selected from the Reeves Collection in the British Museum (Natural History)* (Whitehead and Edwards, 1974).

More recently, Prof. Fan in *British Naturalists in Qing China Science, Empire, and Cultural Encounter* (Fan, 2004) has identified a lacuna in knowledge about the practical and cultural interaction between British naturalists and the indigenous Chinese from the middle of the eighteenth century until the early years of the twentieth century. Recognizing that European naturalists were heavily reliant upon the knowledge and skills of Chinese plant-collectors and artists, which was never formally acknowledged, Fan traces the work of both parties to these endeavours.

In identifying suitable Chinese plants for transportation and as the subject-matter for drawings, Reeves was following a distinguished line of amateur and professional gardeners, botanists and natural historians, including Clarke Abel, William Kerr and John Bradby Blake. Cox (1945) provides short biographical sketches and outlines the work carried out by these men in China, while Bretschneider (1898) concentrates on listing the plant introductions attributable to each. Kilpatrick (2003) has written a well-researched update on plant introductions from China which includes material on the work of John Reeves, and his elder son, John Russell Reeves.

There is a vast amount of literature on Chinese painting, both Chinese and western. This is perhaps unsurprising given its lengthy history, variety and importance to collectors and connoisseurs. It has not been the aim in this thesis to set out the history of flower painting in China, but rather to consider aspects of the genre which may elucidate the Reeves pictures. The historical connection between painting and early alchemy, the idea of *yin* and *yang* and of the five elements (water, fire, wood, metal and earth) on which the five colours (black, white, red, green and yellow) were based are all discussed by Sze (1957).

It is said that, partly due to the influence of the *literati*, the Chinese were more concerned with the intellectual aspects of painting than with the practicalities, (Yu, 1988 p.ix). This is borne out by the texts translated by Acker (1954, 1974) and Bush and Shih (1985) in which the canons and philosophy behind the art predominate. Rowley (1959) attempts to elucidate the dualism inherent in many of the principles of Chinese painting; these were based on Taoism and Confucianism. However, in *Chinese Painting Style: Media, Methods, and Principles of Form* Silbergeld criticizes Rowley's work as being 'dated and in some ways problematical' (Silbergeld, 1982 p.3). The Chinese tendency to philosophize their art is succinctly contrasted by Hulton and Smith '... each of the three main areas described...are dominated by one mode of

floral art. In Europe it has been scientific and analytic; in Western Asia and India it has been decorative and hedonistic; and in East Asia, aesthetic and even philosophical' (Hulton and Smith, 1979 p.x).

Some western scholars have sought to describe Chinese art by reference to terminology. Benjamin March, for instance, set out *Some Technical Terms of Chinese Painting* (March, 1935) as a dictionary giving the Chinese character followed by the romanized spelling, translation and a short written description. Van Gulik adopted a similar approach in his 'Note on painting styles and type of index' in *Chinese Pictorial Art as Viewed by the Connoisseur* (Van Gulik, 1981, p.63). Both are commonly cited in conservation literature. Others have concentrated on painting style; Silbergeld, for instance, deals relatively briefly with materials and places and places rather more emphasis on the defining characteristics of Chinese painting, such as compositional design and perspective (Silbergeld, 1982). The lack of linear perspective and foreshortening are recurring themes in western writings on traditional Chinese art and export art. Sullivan (1973) contrasts this with the Chinese notion of continuous perspective, dictated by the scroll format, and identifies other peculiarly Chinese painting characteristics such as lack of shadow and reflections.

The Mustard Seed Garden Painting Manual (Wang, Wang & Wang, 1977) is predominantly a practical treatise on painting, which pre-dates the introduction of western pigments (apart from carmine) and is frequently mentioned in conservation literature. For Sullivan, manuals such as this are evidence that 'the forms of traditional painting had become completely conventionalized' by the end of the Manchu dynasty (Sullivan, 1959, p.36). *Chinese Painting Colors: Studies of their Preparation and Application in Traditional and Modern Times* (Yu, 1988), also often cited, is intended as a more scholarly work which includes translations from earlier texts, including *The Mustard Seed Garden Painting Manual*, but nevertheless provides information on the sources, preparation and practical application of colours. This work usefully links the traditional use of pigments with modern i.e. mid- twentieth century practice.

The term 'export art' embodies all forms of artistic endeavour intended for a foreign consumer, and would include furniture, jade carvings, fans, wallpaper, porcelain and ivories etc. For the purposes of this project, research has focussed on Chinese export watercolours, the most prolific modern writer in the field being Clunas (1984, 1987, 1997, and 2004). Other writers dealing with this art include Ting (1985), Crossman (1991) and Crosby Forbes (1979) whose exhibition catalogue *Shopping in China: The Artisan Community at Canton, 1825-1830* comprises an informative series of pictures of shop-fronts.

Wilson and Liu (2003) edited an unusual compilation of essays, written in Chinese and English, entitled *Souvenir from Canton-Chinese Export Paintings from the Victoria and Albert Museum*. According to Wilson in his discussion of botanical paintings intended for export, 'The production date of a painting is estimated to be 2-12 years later than the watermark date' (Wilson and Liu, 2003 p.12). The dates of papers in the Collection and estimated dates of drawing have been compared as part of this research.

For information about Chinese painters' studios of the period, and western appreciation (and criticism) of the art, the published accounts of Toogood Downing (1838), John Barrow (1806) and Paul-Émile Daurand Forgues ('Old Nick', 1845) make compelling reading. Tillotson particularly draws upon contemporary writings in his consideration of China trade painting (Tillotson, 1987) and emphasises the links between this art form and trade.

While many histories of the East India Company are available, the five-volume running commentary by Morse (1926-29) remains an authoritative work on trade and English- Chinese relations at this time. The information provided can be cross-checked with the original Company records held at the British Library, which are considerably more detailed. For example, Morse lists the more valuable items of import and export and labels the remaining goods as 'sundries'. The original manuscript records, however, itemize these goods by name and the quantities are sometimes also given.

Drawings had been commissioned by the Company from China and elsewhere prior to Reeves' arrival in Canton. These included botanical and zoological subjects, but drawings of trades, people and manufacturing processes were also collected. Work on this collection of nearly five thousand drawings from India and south-east Asia was carried out by Mildred Archer of the India Office Library and are the subject of two works by her, *Natural History Drawings in the India Office Library* (Archer, 1962) and *Company Drawings in the India Office Library* (Archer, 1972). Most of the botanical paintings were transferred to the Royal Botanical Gardens, Kew; Archer's work remains seminal.

During Reeves' time in Canton, the Company sought to accommodate the shipment of live plants and other perishable goods destined for Sir Joseph Banks and the Horticultural Society, and, indeed, the Society awarded medals to several of the ships' captains in recognition of their services to horticulture. The most recent history of the Royal Horticultural Society and its predecessor is Dr. Brent Elliott's *The Royal Horticultural Society: A History* (Elliott, 2004). Much of the material for this work was obtained from the Horticultural Society's manuscript Minutes and the published *Transactions of the Horticultural Society* and its successor.

Many works on western botanical illustration have adopted an historical approach, notably Blunt's *The Art of Botanical Illustration* (Blunt, 1950) which has been reprinted as Blunt and Stearn's work of the same title (Blunt and Stearn, 1993), King's *Botanical Illustration* (King, 1978) and Kaden's *The Illustration of Plants and Gardens 1500-1850* (Kaden, 1982). An alternative approach is that adopted by Nissen (1951) who analyses the hybrid position of the western botanical illustrator as part artist and part investigator, and usefully categorizes botanical art work as 'habitat pictures', 'vegetation pictures' etc. More recently, Kemp notes that:

... [there has] been little incentive to analyse illustrations critically with respect to questions as to how they work in relation to the text; what the nature is of the framework of visual communication within which they make articulate sense; how different media and illustrative conventions translate the information for the spectators; and how they relate to the complex compound of conditions under which the illustrations were produced... (Kemp, 1996 p.197).

This interaction between illustration and text, and the theory-loading of scientific illustration is the subject of Knight's paper (1985). Bridson (1989) similarly looked at natural history illustration as a means of visual communication.

Conservation research can be broadly separated into materials research and investigation into methods of treatment. For materials research, reliance has been placed on *The Mustard Seed Garden Painting Manual* (Wang, Wang & Wang, 1977), *Chinese Painting Colors: Studies of their Preparation and Application in Traditional and Modern Times* (Yu, 1988) and Dr. John Winter's *East Asia Painting* (Winter, 2008). Joseph Needham's *Science and Civilisation in China* (Needham, 1954-1988), which now runs to twenty-four volumes, has been extensively referred to as an authority on early Chinese botanical works and herbals, early alchemy and paper-making.

For methods of treatment, research of the conservation literature, particularly the more recent articles and un-published research, has been carried out with particular reference to darkened lead white, and the consolidation of friable copper green pigments. These are discussed in detail in chapter five.

A more comprehensive review of the literature pertinent to each part of the research is given within each chapter.

Design of the Research Project

The first part of the project involved the identification of the key literature and primary source material. The second stage was initiated by the dis-binding of Chinese Drawings of Plants Small Volume II of the Collection which provided an opportunity to collect pigment samples from the gutters of volume. This volume was selected as being one of the two in the least stable condition. Two pages were retained in the studio at Camberwell College of Arts for testing and preliminary conservation treatment (cleaning). The two most acute problems besetting the Collection were identified as a focus for discussion: the reversal of lead white and the consolidation of malachite.

Methodology

During the course of the project, the adopted research methods proceeded from biographical, historical and topographical research to comparative art historical research and from thence to materials and conservation research.

Biographical Research

A limited amount of biographical research on John Reeves has been undertaken through the National Archives at Kew, Christ's Hospital School records and the Worshipful Company of Cordwainers. This served two purposes; to ensure that there was no confusion between family members with the same or similar names and to make sense of some of the references to family members in Reeves' correspondence. Primary sources used for the biography of Reeves include his original letters found at the British Library, RBG Kew, the Wellcome Institute, the Lindley Library, The Linnean Society of London and in the family archive held by his great-great-great grandson, Jonathan Goodman.

Historical and Topographical Research

Historical and topographical research yielded information on export art, botanical illustration, the East India Company and east-west trade (including traded pigments and papers), Canton life and plant-collecting. Many of the contemporary descriptions of Canton, including visits to the studios of Chinese painters, are contained in rare books. These, coupled with pictures of Chinese painters' studios, were used to provide an insight into the way Reeves' painters may have worked.

The British Library holds the original records of the Canton Factory. These proved to be valuable for information about the trade in paint and pigments, which hitherto seems to have gone un-noticed, or at least un-noted, by the conservation community.

The Royal Horticultural Society's Lindley Library is home to the nineteenth century volumes of *Minutes of Council* of its predecessor, including the Minutes of the newly-established Chinese Committee which was responsible for sending Robert Fortune on his first trip to China in 1843. Reeves was a member of that committee. This library also holds the original diaries of two of its gardeners, John Potts and John Damper Parkes, who were sent to China by the Society in 1821 and 1823 respectively, both of whom were assisted by Reeves.

Two of Reeves' notebooks are held at the British Museum (Natural History). While these are principally concerned with the painting of fish, there are a few references to plant paintings. At the British Library, in the Africa and Asia Reading Room, there is a small selection of Reeves' drawings, in his own hand, which depict the skylines of Canton and Macao. Maps and scenes of Macao and Canton have all aided in piecing together the details of the way in which Reeves lived, worked and collected during his time in China. They have also shed light on the way in which his Chinese artists may have worked.

Comparative Art Historical Research

Research into the pictorial representation of flowers, both in China and the west, was a pre-requisite to understanding the differences between traditional Chinese flower painting, flower paintings destined for the western market, and western botanical illustration. Comparisons were made with similar collections held at Kew, in private galleries, the V&A and the British Museum (Natural History).

All the East India Company picture collection has been retained at the British Library, including two albums containing sets of pictures depicting the manufacture of lead white and vermilion. These are referred to in the discussion on materials.

Materials and Conservation Research

Materials research was initially conducted through translated Chinese writings on painting, notably *The Mustard Seed Garden Painting Manual* (Wang, Wang & Wang, 1977) and *Chinese Painting Colors: Studies of their Preparation and Application in Traditional and Modern Times* (Yu, 1988). These were supplemented by the East India Company records for the Canton Factory and by contemporary accounts of traded goods. Modern bibliographic sources have been used for the most current information on pigments, papers, sizes and binders. Microscopic and chemical methods were used to ascertain the materials on selected parts of the Collection.

Conservation research focussed on the two key areas of concern with this Collection: darkened lead white and flaking copper green pigments. Published bibliographic sources, particularly the

more recent articles in the conservation press, were used to gain an understanding of the chemical processes believed to be involved and possible treatment options.

Outline of the Chapter Content

The first chapter provides biographical details of Reeves with particular reference to his years in China. It traces the way in which Reeves became a Banksian correspondent and describes those aspects of his life in Canton and Macao which assisted him to become a valuable corresponding member of the Horticultural Society. This can be read in conjunction with the time line in Appendix I.

The following chapter develops the theme by examining the way in which the Collection was formed in China and its subsequent history in England. Relying largely on the Society's *Minutes of Council* and *Minutes of the Drawings Committee*, the provenance of the pictures is traced from the date of receipt of the first batch, to their sale as part of the Horticultural Society's library in 1859 and their re-acquisition in two instalments in 1936 (Chinese Drawings of Plants Small Volumes) and 1953 (Chinese Drawings Large Volumes). The time line in Appendix I also relates.

In chapter three the pictures are discussed by reference to the artistic and technical conventions which characterize traditional, naturalistic Chinese flower painting, export art and the western 'scientific' method of botanical illustration. This chapter effectively acts as a bridge between the descriptive part of the research and the more practical enquiry into materials and conservation issues.

Chapter four deals with the physical components of the pictures and particularizes the materials found, or likely to be found, in the Collection: the pigments, papers, sizes and binders. Also included here are the results of a small experiment carried out by the author at Camberwell College of Arts using a Chinese method for reversing darkened lead white.

Chapter five discusses the key conservation issues for the Collection. The reversal of darkened lead white and the consolidation of flaking copper greens, which have been identified as the two most challenging and pressing problems on some of the pictures in the Chinese Drawings of Plants Small Volumes, are discussed with here.

In the conclusion, the original aims of the research and the research questions are re-visited with a view to assessing whether those aims have been met and whether the questions have been answered. The main findings from this research are drawn together and areas identified for further research.

CHAPTER 1

BIOGRAPHY OF JOHN REEVES WITH PARTICULAR REFERENCE TO THE CHINESE YEARS

1.1 Introduction

The Reeves Collection at the Royal Horticultural Society, while forming a discrete body of work, can be contextualized by reference to John Reeves as a dedicated amateur natural historian and assiduous collector. Although brief biographical details have been published, no previous researcher appears to have given close scrutiny to Reeves' living and working conditions in China and to have considered their impact upon his life as a naturalist. Furthermore, his continued contribution to scholarship in retirement, most notably his practical support for Fortune's first expedition to China, seems to have gone largely unrecognized. In this chapter, a biography of John Reeves is given with particular emphasis on the Chinese years.

The topology of nineteenth century Canton and Macao is dealt with only in so far as it may have a bearing on Reeves' living and working conditions, assists in explaining some of his handwritten notes contained in correspondence, or to understanding relevant paintings held in the Goodman Family Archive. Since Reeves' collecting activities were closely bound up with the East India Company's trade, the 'Canton System', is explained. His activities as a natural historian can be deduced partly from the pictures and plants he sent back, from his two surviving notebooks at the British Museum (Natural History), from letters and notes written to Sir Joseph Banks and to correspondence with Dr John Lindley, Robert Brown (librarian to Sir Joseph Banks and later the first Keeper of the Botanical Department at the British Museum) and to John Goodhall, a friend and colleague at East India House. Insight into Reeves as a family man is evident from four surviving letters to his sisters.

Correspondence has been traced at the British Library, The Royal Horticultural Society, the Wellcome Institute, Royal Botanic Garden Kew (henceforward referred to as 'RBG Kew'), the British Museum (Natural History) and the Goodman Family Archive. This was supplemented by records held by the National Archives, the Worshipful Company of Cordwainers and several learned societies.

A time-line indicating important events in Reeves' working life is set out in Appendix I. The chapter concludes with a short summary of Reeves' contribution as a naturalist and collector.

1.2 A Review of the Literature

No complete published biography of John Reeves has been traced. Early biographical material is scattered and published sources are few. Whitehead's *The Reeves Collection of Chinese Fish Drawings* (Whitehead, 1969), published by the British Museum (Natural History), focuses on Reeves' fish drawings and his two notebooks now held at the Museum. While this proved useful in bringing to light the existence of the notebooks, which include references to the painting of a few plants and, exceptionally, provide the names of the Chinese painters, biographical details were also obtained from an earlier work by Bretschneider (1898 pp.256-263) and the *Journal of the Proceedings of the Linnean Society* (1855-1861, p. xliii). Bretschneider also wrote a short article entitled *On Some Old Collections Of Chinese Plants* (Bretschneider, 1894) in which he identified the problems associated in distinguishing the work, particularly of plant-collecting, undertaken by John Reeves and that which was carried on by his son, John Russell Reeves, who had a similar career as a tea inspector in China.

Whitehead (1969 p.195) refers to the existence of twelve letters written by Reeves to Sir Joseph Banks, which were compiled by Dawson in 1958. During the course of the current research, nearly twenty such letters have come to light. Whitehead was similarly not clear as to the dates of Reeves' two periods of leave from China (Whitehead, 1969 p.194), and was incorrect⁶ in stating that Reeves formed the Chinese Committee at the Horticultural Society (Whitehead, 1969 p.194), although it is clear from the Minutes held at the Lindley Library that Reeves was a member of that Committee and directly assisted Robert Fortune. Whitehead and Edwards' *Chinese Natural History Drawings* (Whitehead and Edwards, 1974 p.11) attributes further biographical material to assistance given by a great-great-great grandson, the late Sir Victor Martin Reeves Goodman who had also been a trustee of the British Museum (Natural History). This work outlines some of the contribution to knowledge made by earlier plant collectors, such as James Cuninghame (d. 1709), and John and Alexander Duncan, surgeons with the East India Company in China, as well as Sir Joseph Banks and Daniel Solander. The work of William Kerr and David Lance was also mentioned and this proved useful in locating some of the pictures once held at East India House in Leadenhall Street, to which Reeves referred in his correspondence with Banks. Whitehead and Edwards' work also refers to two articles written by Reeves: one on the *material medica* employed by the Chinese and the other on the Chinese names for the stars and constellations, which later appeared as an entry in Morrison's *A Dictionary of the Chinese Language* (Morrison, 1815-1822).

⁶ The Chinese Committee was formed by the Council of the Horticultural Society and was chaired by nurseryman George Loddinge. *Journal of the Proceedings of the Horticultural Society*. 1846, Vol.I, p.208. Royal Horticultural Society. The Horticultural Society Minutes of the Chinese Committee December 28th 1842-February 23rd 1843. The Royal Horticultural Society.

The original impetus for collecting plant material and pictures appears to have come from Sir Joseph Banks, to whom Reeves was introduced before he sailed for China in 1812. Banksian collectors are considered as influential ‘agents of empire’ by Mackay (1966). Métaillé (1994) concentrates on the introduction of the tea plant *Camelia sinensis* into India, but nevertheless also considers this to be part of a more general policy on the part of Banks to strengthen the economic power of England and the empire. Reeves’ letters to Sir Joseph can be contextualized in this way.

Gifts from the Gardens of China (Kilpatrick, 2007) is concerned with plant introductions from China, and has proved a useful source of biographical material, including the name of Reeves’ great-great-great grandson, Jonathan Goodman, who provided access to the Goodman Family Archive for the purposes of this research. Fan, in his work *British Naturalists in Qing China*, notes that ‘Although natural history was the most extensive Western scientific research in China, it has been entirely neglected by historians’ (Fan, 2004 p.2). He identifies the more prominent western naturalists, including Reeves, and seeks to place their work in an historical context. He demonstrates, for instance, the effect of the restrictions placed on westerners by the Chinese authorities and identifies the relatively few places where plant specimens could be collected. He also examines the relationships between the two cultures. However, Fan is dismissive of Reeves’ work:

He did not dig deep into any of the sciences and never obtained more than a modest familiarity with technical knowledge, such as taxonomy and anatomy, in natural history. He published only a few brief notes in obscure journals, collaborating with the missionary- sinologist Robert Morrison on a paper about Chinese *materia medica* and a report on a solar eclipse, neither of which received notice from the scientific community in Britain... John Reeves’s success derived less from his learning than from his zeal, social connections, and economic resources (Fan, 2004 pp.43-44).

One point of contention would perhaps be over his assertion that Reeves knew no Chinese (Fan, 2004 p.22). One of his arguments relates to the fact that Reeves was not identified by Stifler (1938) as one of the language students at the Canton factory. This point will be considered in the light of the Reeves correspondence and to the residence of Chinese nationals in London referred to by Chambers (2000), Barrett (1988) and Parkinson (1937).

Following his apprenticeship, Reeves spent his entire working life in the employment of the East India Company, of which 18 years were spent in China, with two periods of leave during which he worked in London. The work of a tea inspector in Canton was described by Phipps (1836) in *A Practical Treatise on the China and Eastern Trade*. The Diaries of Transactions and Consultations from the Canton Factory held by the British Library appear in a condensed form

as a running commentary on the Factory's affairs edited by Morse (1926-29), who provides footnotes, explanations, maps and diagrams. These five volumes entitled *The Chronicles of the East Indian Company in China: Trading to China 1635-1834* give the names of Canton residents and salaries, record intermittent difficulties with the Chinese authorities and, for the purpose of this chapter, have been used to identify the possible location of Reeves' office and lodgings.

Life in Canton and living arrangements were researched, particularly since at least one source, *The Gardener's Chronicle* of 1856, suggested that Reeves supervised the painting in his own house. There are several contemporary descriptions of the Factories along the northern bank of the Pearl River, but for the purposes of this chapter the writings of W. C Hunter have been selected. Writing under a *nom de plume*, Hunter ('An old Resident', 1882) was employed by the American firm of Russell & Co and lived and worked in Canton from 1825 until his death in 1842. His lively portrayal of life in Canton and his meticulous attention to detail, particularly in his description of the British Factory, provide insight into the life that Reeves and other Company men were living. This has been supplemented by Milburn's (1825) account of commerce with China in which he gave a short description of the exterior of the English Factory, while Osbeck (1771) has been used to describe the work of the Chinese servants within the Factory. An extensively researched work by John Francis Davis (1972), *The Chinese: A General Description of the Empire of China and its Inhabitants* was originally published in 1836 in New York, and makes useful references to Reeves, Chinese plants and to Chinese traditional and export art, as well as to paper making.

One of the restrictions imposed by the Chinese prohibited foreigners from living in Canton outside the trading season. This meant that the Factory was packed up each autumn and sailed the sixty miles downstream to Macao for the summer months. Coates' *A Macao Narrative* published in 1978 (Coates, 1978) briefly describes the Company's premises at Praia Grande, where Reeves lived. He also describes Thomas Beales' famous garden and aviary, and The Casa Garden (a large residence leased by the Company from a Portuguese merchant for accommodating travelling dignitaries). Descriptions of the streets and houses of Macao, including the East India Company's premises, as well as some of the colourful characters who inhabited the place, such as the portrait painter Chinnery, are given by Porter (1966) and Berry-Hill (1970). Life on the island seems to have been extremely relaxed and a flavour of this can be gleaned from Hodges and Hummel (2002), editors of Harriett Low's diary written from 1829-1834.

1.3 John Reeves: Early Life to 1812

John Reeves was born on 1st May 1774⁷ one of six children and the youngest son of the Rev. Jonathan Reeves and his wife Mary. His father was vicar of All Saints Church, West Ham in the county of Essex⁸. Shortly after his sixth birthday, on 25th May 1781, young John was ‘clothed’, that is, entered, into Christ’s Hospital School in the City, where he remained a pupil until date of discharge, 17th June 1789. The circumstances of his discharge were recorded as ‘John Reeves is this day discharged from the Hospital for ever by Elizabeth Reeves his mother living at West Ham who is to provide a Master for him’.⁹

On 1st September 1790, he was apprenticed for seven years to Richard Pinchback of Fenchurch Street London, a tea broker and member of the Worshipful Company of Cordwainers, to learn the trade of a tea broker, for which five shillings was paid.¹⁰ By the time he was admitted into the Freedom, on 3rd February 1802, Reeves was living at No. 1, New Court, Broad Street.¹¹ In the following year, on 19th February, he married Sarah Russell who gave birth to four children: John Russell (‘Jack’) born 10th June 1804, Sarah born 27th March 1805, Elizabeth (‘little Betsy’) born 31st March 1808, and James (‘little Jim’) born 26th October 1809.¹² According to the Linnean Society’s obituary¹³, Reeves had acquired such a comprehensive knowledge of teas in the counting - house at Pinchback’s that he was recommended to the post of Chief Inspector of Teas in England for the United Company of Merchants of England trading to the East Indies, more generally known as the East India Company, a post he took up in January 1808. His salary was two hundred pounds per annum¹⁴ and it is highly likely he acquired this position through what is today termed ‘networking’. A large part of his expertise in the tea trade is likely to have been gained in the tea auctions held at the East India Company’s warehouses, and new warehouses had been constructed in Fenchurch Street, in 1806.¹⁵ He was almost certainly regularly meeting East India Company men during the course of his working day.

On 18th May 1810, Sarah Reeves died¹⁶. Whether her death prompted him to consider a change in environment remains a matter of conjecture, but on 19th March 1812 Reeves entered into a Deed of Covenant¹⁷ with his employers by which he was to take up employment as Assistant

⁷ *Oxford Dictionary of National Biography*, 2004, Vol.46, p.352.

⁸ *Oxford Dictionary of National Biography*, 2004, Vol.46, p.352.

⁹ Christ’s Hospital Children’s Registers. Ms 12818/11. Guildhall Library.

¹⁰ List of Apprenticeships for 1790, p.462. The Worshipful Company of Cordwainers.

¹¹ List of Admissions for 1802, p.374. The Worshipful Company of Cordwainers.

¹² The Goodman Family Archive.

¹³ *Journal of the Proceedings of the Linnean Society*, 1855-61, p.xliii. The Linnean Society.

¹⁴ India Office Records IOR/B/146, p.149. British Library.

¹⁵ O1OC: H/763B, f.7. British Library.

¹⁶ The Goodman Family Archive.

¹⁷ India Office Records IOR/B/515, pp.1, 763 and 1,800. British Library. The Goodman Family Archive.

Inspector of Teas in China at a salary of seven hundred pounds per year, plus board.¹⁸ Leaving his children in the care of his sisters¹⁹, he embarked for Canton aboard the twelve hundred ton Company ship, the Alnwick Castle, on the 25th March, and arrived in Canton six months later (Kirkpatrick, 2007 p.184). It would appear that at the outset he may not have intended to spend very many years in China. In the first of the surviving letters to his sisters, which deals principally with the children's education, with reference to his elder daughter Sarah who was aged seven at the time, he wrote 'her education at present need not be very expensive-I trust I shall be back in time to finish it.'²⁰

1.4 John Reeves: Introduction to Sir Joseph Banks

Prior to leaving for Canton, Reeves was introduced to Sir Joseph Banks at his house in Soho Square by his cousin, a barrister of Middle Temple, also called John Reeves.²¹ From Banks, Reeves collected a Letter of Introduction dated March 17th 1812²² addressed to Sir George Staunton, a polymath and sinologist, who headed the East India Company's Canton Factory. The first two paragraphs are telling, and worth reciting:

I take the liberty of Recommending to your notice the Bearer, Mr. Reeves, a man of more than ordinary talents, who, I have no doubt, you will take under your Protection, as a man who has made some progress in Chinese Literature under the most discouraging Circumstances: he was introduced to me by his Relation, John Reeves of the Alien Office; & I Have from the traits of his character that I have observed conceived a Friendship for him. Your friends here have heard with much Pleasure that one of the Friendly Mandarins who accompanied Lord MaCartney to Canton has succeeded to the office of Viceroy, & has renewed his ancient Friendship. I hope & trust that Benefit will arise from this connection, either to him, to you, or to the Public, & possibly to all the three ...²³

They reveal that Reeves' abilities had already been recognized, that he had attempted to start learning the Chinese written language prior to leaving England and, further, that friendship with Chinese officials was to be exploited for Banks' purposes.

¹⁸ The Goodman Family Archive.

¹⁹ Reeves, J (1812) Letter to his sisters dated 31st December. The Goodman Family Archive.

²⁰ Reeves, J (1812) Letter to his sisters dated 31st December. The Goodman Family Archive.

²¹ Dawson Turner Collection, 1790-1827, Vol.18, pp.153-154. British Museum (Natural History).

²² This was dated two days prior to the date of the Deed of Covenant. It may be surmised that preparations for the trip were put in hand before the Deed was formally entered into.

²³ Dawson Turner Collection, 1790-1828, Vol.18, pp.153-154. British Museum (Natural History).

From written instructions issued by Sir Joseph to other travellers to the Celestial Empire, such as the Kew gardener William Kerr in 1803²⁴, papers regarding the appointment of Dr. Clarke Abel who accompanied the Lord Amherst's Embassy to Peking in 1816-17 as a collector for Kew²⁵, and from the surviving Reeves-Banks correspondence, it may be surmised that he elicited from the latter an agreement to send regular reports about Chinese culture, materials and methods of manufacture, as well as plant and animal specimens.

By 1812, Banks was nearing the end of a long and prodigiously productive life. In his youth he had acquired practical experience of voyages of discovery, having accompanied Captain Cook as naturalist on his Endeavour voyage to the Pacific (1768-71), and later undertook his own expedition to Iceland with Daniel Solander. He became President of the Royal Society in 1778, a Privy Councillor in 1797, and as a friend and advisor to the George III, established himself as a key figure in the establishment of the supremacy of 'His Majesty's Botanic Garden at Kew' (Desmond, 1995). He also had considerable influence with the East India Company, and had been one of the founder members of the Horticultural Society. As Métaillé describes, Sir Joseph was '... a passionate naturalist and...an outstanding scholar with great audience... [who could create] his own research centre with a library [and] was the centre of a network which kept him informed of any advance in the scientific field' (Métaillé, 1994 p.157). Métaillé looked particularly at Banks' introduction of the tea plant to India and concluded, in the beginning at least, that the transportation of *Camellia sinensis* was simply part of 'a general policy of investigating exotic floras in order to develop new products in England and the dependencies of the British crown' (Métaillé, 1994 p.166).

Thus Reeves became one of an influential group of 126 'Banksian collectors' identified by Mackay (1966) as working for Sir Joseph outside Britain and Europe between 1770 and 1820. According to Hepper (1989 p.15) Sir Joseph looked for particular character traits in his collectors, informing two of them, Allan Cunningham and James Bowie, that they had been chosen for their 'virtues of honesty, sobriety, diligence, activity, humility and civility' (Hepper, 1989 p.15). Hepper notes that Sir Joseph also seems to have had a preference for bachelors with no family commitments, and to Scots (Hepper, 1989 p.15). Like many of the other collectors, Reeves was reimbursed his expenses. This is evidenced by a letter to Banks of 24th March 1820

²⁴ Banks, J (1803) Letter to Kerr dated 18th April in which the recipient was exhorted to collect plants 'deemed most curious and desirable'. Dawson Turner Collection, 1790-1827, Vol.14, pp. 61-68. British Museum (Natural History).

²⁵ Banks, J (1815) Letter to Lord Amherst dated 9th December. Dawson Turner Collection, 1790-1827, Vol.19, pp.223-225. British Museum (Natural History).

in which Reeves wrote, 'I believe my expenditure on your account amounts to about 100m dollars so that I have plenty of funds on hand for the next season.'²⁶

It is apparent that the trust that Sir Joseph had placed in Reeves was well-founded. On 7th December 1813 Sir George Staunton wrote to Sir Joseph from Devonshire Street as follows:

... I feel also much obliged to you for the perusal of Mr. Reeves' letters. He seems a very intelligent man, and an accurate observer. I understand also from other quarters that he is an excellent judge of teas-If he acquires, in addition, to this talent, a competent knowledge of the Chinese language, and continues to have his curiosity alive to the objects around him, he can scarcely fail in a short time, to make us thoroughly acquainted /which we are by no means at present/with [the] whole history of the culture and manufacture of that important article of our Commerce.²⁷

Reeves' intelligence was again mentioned in a letter from Sir Joseph to Clarke Abel, the botanist selected to accompany the Amherst Embassy to Peking in 1817:

We are not well acquainted with the different varieties of the Tea Plant; & the Public have expressed much curiosity on the subject. Mr. Reeves a most intelligent servant of the Company is probably possessed of several of them growing in his Garden.²⁸

Sir Joseph Banks died on June 19th 1820²⁹, and his correspondence scattered. Reeves' letters to Sir Joseph account for much of the information available about his life and work in China.

1.5 The Chinese Years 1812-1831

1.5.1 Introduction

John Reeves arrived in Canton in September 1812³⁰ and spent the next twenty-nine years in China with two breaks, one in 1816/7,³¹ and the second in 1824/5.³² Perhaps the earliest indication of his propensity to methodically record information lies in two manuscript volumes entitled *Voyages to China in 1812, 1817 and 1825 and from China 1816, 1824 and 1831*

²⁶ Reeves, J (1820) Letter to Banks dated 24th March. MS 33.982 ff. 213-216. British Library. Note that this letter would have arrived after Banks' death. The reference to '100m dollars' may refer to Mexican dollars that were in circulation in Canton at the time.

²⁷ Staunton, G (1813) Letter to Banks dated 7th December. Item 5217/23. Wellcome Institute.

²⁸ Banks, J (1816) Letter to Abel dated 10th February. Dawson Turner Collection, 1790-1827, Vol.19, pp.239-245. British Museum (Natural History).

²⁹ *Oxford Dictionary of National Biography*, 2004, Vol.3, p.695

³⁰ Banks, J (1816) Letter to Abel dated 10th February. Dawson Turner Collection, 1790-1827, Vol.19, pp.239-245. British Museum (Natural History).

³¹ The East India Company Consultations Nov. 15th 1815-Jan. 8th 1816 contains an extract of Reeves' letter dated Dec. 5th 1825, requesting leave to go to Europe 'as my health suffered considerably during the past season.' IOR G/12/200. British Library.

³² The Goodman Family Archive.

(Reeves, n.d.). These were catalogued by Woodhayes (auctioneers) in 1877³³, but were withdrawn from sale and have been subsequently lost, although the catalogue itself remains in the Goodman Family Archive.

Before considering Reeves' living and working conditions in Canton and Macao, and the way in which these may have impacted on his work as an amateur natural historian, it is considered helpful to investigate whether Reeves mastered the Chinese written language, and Cantonese dialect, sufficiently to enable him to send back accurate information as to Chinese plant names and to provide his own transliteration for the Royal Horticultural Society's pictures. Fan (Fan, 2004 p.22) states unequivocally that Reeves did not know Chinese and cites as his authority Morrison's *Memoirs of the Life and Labours of Robert Morrison DD* (1839) and a letter from Reeves to Banks dated 24 March 1820.³⁴ This is curious. There are several references to Reeves in Morrison's work, but none which would indicate any lack of knowledge of Chinese on his part. At page 20-21, one of the references supplied by Fan, there is a printed letter which deals with Chinese medicine and the writer's difficulties, 'particularly my ignorance of the Chinese language' (Morrison, 1839 p.20-21). However, this letter was written to Robert Morrison by Dr. Livingstone, the East India Company's surgeon based at Macao, and not by Reeves. Similarly, in the cited letter to Banks dated 24th March 1820, Reeves made no mention of his ability, or otherwise, to speak and write Chinese. A further argument by Fan relates to the fact that Reeves was not identified by Stifler (1938) as one of the language students at the Canton Factory, Chinese studies having been taught by Robert Morrison from the summer of 1810 onwards. Even if it is accepted that Stifler's research in tracing the names of all the students was beyond reproach, the fact that Reeves' name does not appear among the list of students may equally well indicate that his knowledge was at least adequate.

From the letter from Banks to Staunton dated 12th March 1812, part of which is quoted above, it is clear that Reeves had started to learn Chinese prior to leaving England. A number of Chinese visited and resided in England at this time. In 1788, Sir Joseph Banks himself had noted that 'The inhabitants of Canton are now in the habit of Shipping themselves on board our India-men whenever hands are wanted' (Banks quoted in Chambers, 2000 p.116), and it was not unknown for people to bring their Chinese servants home with them.³⁵ Barrett (1988 p.91) relates how a Chinese named Yang Sam Tak lived in Clapham for a number of years and in 1805 taught the language to Robert Morrison, a missionary in Canton and a contemporary of Reeves. It is entirely possible that Reeves also took lessons from him.

³³ *Auction Catalogue of Woodhayes*, (Auctioneers) 1877. The Goodman Family Archive.

³⁴ Reeves, J (1820) Letter to Banks dated 24th March. MS.33.982 Ff213-216. British Library.

³⁵ The East India Company Consultations 1811-1812, p.58. IOR G/12/176. British Library.

There are, in fact, two indications in the early correspondence with Banks which indicate that Reeves had difficulties with the language initially. In a letter dated 14th January 1813, he wrote, 'I do not mean to relinquish my enquiries about the 8 *Tchin*-but I cannot expect any satisfactory account yet: some acquaintance with the language will be necessary for this purpose.'³⁶ This was reiterated in an undated copy of the Banks-Reeves correspondence, again on the subject of spirits and deities:

But tis difficult indeed to make yourself understood by a China man when you attempt to talk to him about a subject not connected with his own business: for it appears to me that the Chinese trademen learn no more of their language than sufficient for the purpose of carrying on their own particular occupation & a few terms of the common occurrences of life.³⁷

Dr. Frances Wood of the British Library Department of Oriental Manuscripts and Printed Books has confirmed that many ordinary Chinese would not have had access to vocabulary other than that required for their daily needs.³⁸ Nevertheless, Reeves was clearly attempting to speak Cantonese.

Despite Imperial edicts which forbade the Cantonese from teaching their language to the *fan quai* (foreign devils), some Europeans did manage to learn Chinese. Parkinson quotes a Captain Hall, who visited Canton in 1816, and who noted, 'Until very lately, all business was transacted by the British Factory in this most absurd language [pidgin]. Of late years, however, the Company's servants at Canton have made themselves acquainted both with the written and spoken Chinese, and everything material now passes in the language of the country (Hall quoted in Parkinson, 1937 p.63). The 'natives' were said to 'lament' this newly-acquired ability; one of the Hong merchants was overheard to express regret that the days when the English "drank a great deal of wine" and "spoke not a word of [Chinese]" had now passed so that "[now] the English speak Chinese as well as I do, and drink nothing but water" (Hall quoted in Parkinson, 1937 p.63).

In 1822, Staunton set out the Company's position:

The Chinese government has always openly set its face against the acquisition of the language of the country by foreigners. It expressly forbids the natives instructing them in it... Still the East India Company perseveres in giving

³⁶ Reeves, J (1813) Letter to Banks dated 14th January. Item MS 5217/5 Wellcome Library. The '*Tchin*' were Chinese deities in which Banks had taken an interest because they were depicted on Lady Banks' china teacups.

³⁷ Reeves, J (n.d.) Copy Letter to Banks. Item MS 5217/7&8. Wellcome Institute.

³⁸ Dr. F. Wood, British Library Department of Oriental Manuscripts and Printed Books. Pers. Comm, 12th November 2009.

encouragement to the acquisition of this suspected and dangerous talent (Staunton, 1822 p.25).

Given that many of Reeves' letters to Banks and others have black printed or hand-written Chinese characters with his explanation as to their meaning, that he assisted Morrison in the preparation of his Chinese dictionary by naming plants and the constellations and that his notebooks contain lists of Chinese characters against fish specimens, coupled with his innate inquisitiveness and propensity to educate himself, it seems entirely probable that Reeves in time acquired a reasonable working knowledge of the spoken Cantonese, and probably the written Chinese language also.

1.5.2 The East India Company Factories

Due to restrictions placed on foreigners by the Chinese authorities, all American and European traders were obliged to live and work in 'Factories'; these were three-storey, multi-purpose buildings located outside the walled city, arranged along the northern bank of the Pearl River. The Factories were owned by about a dozen influential businessmen known as the '*Hong*' merchants, jointly called the '*Co-hong*', and were leased to the British, French, American, Swedish, Dutch, Spanish and Danish trading companies. The *Hong* merchants acted as sureties, and as such, were held responsible by the Chinese authorities for all the dealings within the Factories and for the behaviour of their inhabitants. Apart from small purchases from local tradesmen, all trade was conducted through the *Hong* merchants. This arrangement was known as 'the Canton System' (Farrington, 2002 p.85; Van Dyke, 2005). Local administration was in the hands of a commissioner, appointed by the Emperor himself, who was assisted by a battery of lesser functionaries, including the *Hoppo* (customs man), who collected import and export taxes. This individual features regularly in contemporary accounts of Sino-British trade.



Figure 1. The *Hongs* on the Pearl River, Canton. (Christie's 2005 p.117)³⁹

³⁹ The fenced and planted garden indicates that this picture was probably painted after the *Hongs* had burnt down in 1822 and prior to Fortune's visit in 1843, by which time the garden was almost empty.

Pictures of the waterfront at Canton were a staple of the export art trade and many of these have survived. They can be fairly accurately dated from small changes in the buildings, and from the relative position of each nation's flags as different trading companies came and went. Pictures of the garden to the New English Factory are of particular interest. In the early years of the nineteenth century, the garden appears small and unplanted. By 1830, the garden had been extended, re-fenced and planted up (Figure 1). Whether this was entirely due to Reeves is unclear, but Robert Fortune seems to have attributed the garden to him (see below).

The rear entrances to the Factories were from Thirteen Factory Street. Running at right-angles from this road, between the Factories and towards the river, ran three smaller streets: New China Street which ran between the Danish and Spanish Factories; Old China Street which passed between Minqua's Factory and the American Factory; and Hog Lane which was bordered on either side by the *Chowchow* (miscellaneous) Factory and the East India Company's New English Factory.⁴⁰ On the other side of the New English Factory, was a small un-named passageway separating it from the Dutch Factory. Abutting the river, there were two gardens; the larger was the American garden, and a smaller English garden.



Figure 2. Map of Factory Area showing the City of Canton and the Pearl River. The Factories are shown edged red and the Fa Tee Gardens are shown edged blue. (Fan, 2004 facing p. 90)

One of the best descriptions of the Factory buildings as they were in 1825 was given by W. C Hunter writing as 'An Old Resident':

⁴⁰ The New English Factory was also known as the British Factory (Morse, 1926-29 Vol.III facing p.1) (Fan, 2004 Figure 2, no pagination).

Entrance to the rear Factories was by arched passages running through those in front. The lower floors were occupied by counting-rooms ... and store-rooms, by the rooms of the Compradore, [and] a massively built treasury of granite ... The second floor was devoted to dining and sitting rooms, the third to bedrooms. Almost all were provided with broad verandahs and the buildings put up with care, they were quite comfortable (An Old Resident, 1882 p.24).

According to Tillotson, each Factory was 'divided into numbered "houses" which were let to commercial companies', [so that] 'the American firm of Russell and Co, could give as their address "No. 2, Swedish Factory" ' (Tillotson, 1987 p.73). Hunter described the luxurious interior of the English Factory which 'entertained with unbounded hospitality and in princely style' with 'choice service amidst quantities of silver plate' beneath 'huge chandeliers'; here Company men enjoyed an 'amply stocked' library and a billiard room (Hunter, 1882 p.31). The building was equally impressive from the outside: according to Milburn 'the English factory far surpasses the others in both elegance and extent', having a 'large veranda... raised on handsome pillars, paved with square marble slabs' (Milburn, 1825 p.454). Such affluence was later to cause considerable criticism at home.

Sufficient original material exists to throw some light on the probable location both Reeves' office and his living accommodation.

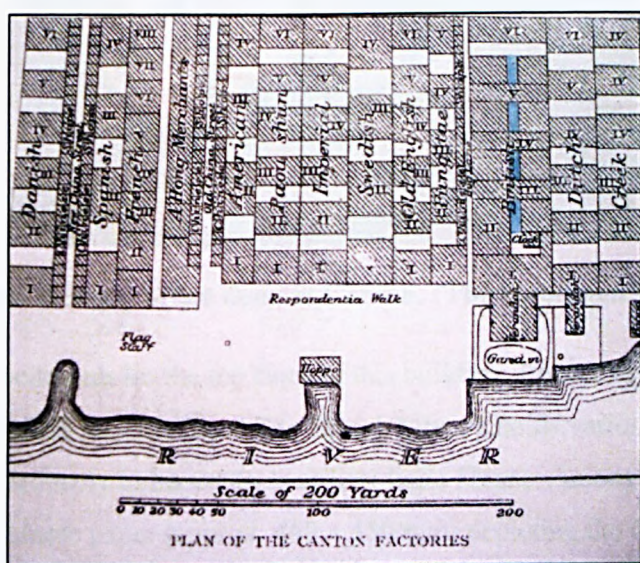


Figure 3. Plan of the Canton Factories. (Morse, 1926-29 Vol. III facing p.1)

Morse provides a ground plan of the Factories (Morse, 1926-29, facing p.1). The Old English Factory appears to comprise six buildings presumably with doors or archways leading from Thirteen Factory Street to Respondentia Walk. The British (New English) Factory also appears to have consisted of six buildings, with a series of interconnecting archways as described by

Hunter (Figure 3). However, in this instance, there appear to have been open areas flanked by buildings on either side, creating a partially uncovered central thoroughfare, shown coloured blue (Figure 3). It is not clear how many archways there may have been, but the plan would suggest that there were at least four and that there may have been further arches beneath the verandah.

In the Goodman Family Archive, there is a painting by George Chinnery, depicting a passageway, with a series of archways above, and a set of steps leading to a door to the left of the scene (Figure 4).⁴¹ It is understood by the family that this picture shows the door to Reeves' office.⁴² Read together, it may be deduced that this office was on the ground floor (which would again accord with Hunter's description), towards the front of the Factory, which faced Thirteen Factory Street, with an entrance onto the central walkway. The long, narrow thoroughfare depicted would tend to suggest that Reeves' office was situated in the New English Factory.



Figure 4. Street scene: Reeves' office door at Canton. (The Goodman Family Archive)⁴³

Although there were bedrooms on the top floor of this building, Reeves did not live there, at least towards the end of his stay in China. The British Library holds various papers and pictures sent back by Reeves, probably to his contacts at East India House. Among these there is a pen and ink drawing on Chinese paper (approx. 460 × 150 mm) depicting the Canton waterfront, with each building labelled 1-23 and open spaces marked 'A' and 'B'. Accompanying this, headed 'References to the sketch of Canton', there is Reeves' hand-written list of the premises,

⁴¹ This painting, which is un-titled and not signed, was sold at auction as Lot 1000 by Dukes, auctioneers of Dorchester, on 28th November 2008.

⁴² Jonathan Goodman. Pers. Comm. 7th June 2008.

⁴³ This picture is an oil painting by George Chinnery (1774-1852). There is a sketch of this picture in the collection of Jardine Matheson & Co. Ltd, which was exhibited in Hong Kong in 1965.

which includes, '8. Company's Old Factory-in which I live.'⁴⁴ The 'Chowchow Factory' (marked '*Fung tae*' on Figure 3), according to Reeves, was used as temporary accommodation 'for officers of the Kings ships'.⁴⁵ The building marked '5' on the plan is described by Reeves as 'Company's Verandah & Hall- At the back of the library are the Companys new warehouses- the back of the Hall is the New Factory'⁴⁶. This is likely to be a reference to the New English Factory, which was erected following a fire at the Company's warehouse in 1822, which then gives an indication as to the date of the sketch.

The sketch has the appearance of an architectural drawing about it, and although it is on Chinese paper, the drawing appears western in execution. The unusual width to height ratio of the paper is also of interest. The Wellcome Institute holds handmade copies of some of Reeves' correspondence and notes, the originals of which appear to have been sent to John Goodhall. According to the accompanying notes, copies of the originals were made for Sir Joseph Banks, and it is these copies which are held by the Wellcome Institute. This would mean that these papers can be dated to prior to 1820, the year of Sir Joseph's death. Within this bundle of correspondence are pages at the heading of which there is a handwritten note, 'Mr Reeves to Mr Goodhall 1815', in which the following appears:

If you should happen to fall by accident upon a Storers delineator, reasonable say about 5 or 6 £ pray buy it for me, I think I remember seeing one or two in a shop in the alley leading from St. Martins Church to the Mews. If you get one have 6 or 8 extra rough glasses made up for it. I can get some views taken of the tea country & the pass up & down for the use of it.⁴⁷

I bought an old patched one at Roberts's sale for a couple of Dollars, but 'tis much out of order & has only one of Storers glasses.⁴⁸

William Storer, an instrument maker, designed a type of portable camera obscura which he named the 'Royal Accurate Delineator'⁴⁹. Due to its technical superiority, it was able to produce a bright well-focused picture which would have enabled Reeves to produce panoramic outlines such as the sketch held at the British Library. It seems likely therefore that on receipt of the 1815 letter, Goodhall sent a delineator to Reeves who used it to send back accurate views.

The Chinese authorities, headed by a local commissioner, effectively controlled every aspect of life in the port and city of Canton, including the Factories and their inhabitants. This was

⁴⁴ WD3811. British Library.

⁴⁵ WD3811. British Library.

⁴⁶ WD3811. British Library.

⁴⁷ Copy Correspondence marked 'Mr. Reeves to Mr. Goodhall 1815'. Item 5217/36. Wellcome Institute.

⁴⁸ Copy Correspondence marked 'Mr. Reeves to Mr. Goodhall 1815'. Item 5217/37. Wellcome Institute.

⁴⁹ [Online image and information] Available from: <http://www.precinemahistory.net/1750.htm> [Accessed 15th October 2008].

achieved partly by issuing edicts. In 1760, the Chinese issued a set of written regulations for the control of foreigners, which included the following 'IV. Each factory is restricted to employ eight Chinese', whose functions were specified (Morse, 1908 p.276). This fourth rule was imposed as a result of excessive numbers of Chinese undertaking what were perceived as menial tasks for westerners. Peter Osbeck, writing in 1771 about his voyage to the Swedish Factory some 20 years earlier, noted that Chinese servants 'wait at table in the factories, bring in the meat, wash the dishes etc., clean the knives and forks, fill the lamps in the yard and rooms with oil at night, clean the vessels, and do the like business' as well as 'assisting in carrying the tea chests, and other wares in and out,' (Osbeck, 1771 p.213). These servants and the Chinese cook were paid by the Company but 'Besides these, every one,[sic] or several together, hire a Chinese servant, who is paid some dollars per month' (Osbeck, 1771 p.213).

Little seems to have changed by Reeves' time. Writing in 1822, Staunton noted:

Besides [the *hong* merchants], a few other persons were permitted to attend upon foreigners, [as interpreters or victuallers]; but with the exception of these persons and the individuals in their immediate employ, the natives ... were withheld, by the denunciation of severe penalties, from ... frequenting the houses of foreigners, or holding any species or intercourse with them (Staunton, 1822 p.131).

The possible significance of monthly paid 'personal servants', and the later limitation on servant numbers, will be considered further in the next chapter in relation to Reeves' painters.

1.5.3 Life in Canton: Trade

Life in Canton centred on the tea trade, tea being the most valuable Chinese export carried by the Company's East Indiamen back to the East India Docks at Blackwall and other ports. The 'trading season' ran from late autumn until the following spring, during which time the Canton Factory oversaw the selection, purchase, packing and shipment of teas. As assistant, and later as chief tea inspector, it fell to Reeves to attend the weighing of teas and to taste and identify the best teas which he then recommended for purchase to the Select Committee. The skill and demanding nature of this work was described by Phipps in 1836:

On its arrival in Canton, sample chests of the chop *are instantly forwarded to the Tea Hall ... where they immediately undergo the most vigilant examination by the aid of various tests [by the Company's tea inspectors]. These officers then writing, and chops are raised or lowered in price, according as the inspectors declare them to be superior or inferior to the contract; ... The chops are inspected again, when weighed for shipment; one out of every twenty chests is selected by the receiving officer, and its contents

accurately compared with the muster chests, when the fate of the whole chop is finally decided on as to acceptance and price.

*A chop of black tea consists of about 600 chests; and of green, of from 50-300 chests (Phipps, 1836 p.73).

Osmond Tiffany, an American visitor, noted that 'The East India Company's tea tasters were occasionally of eminent service in detecting frauds, [contamination] and the negotiations for tea cargoes are always conducted through the inspectors' (Tiffany, 1849 p.111). Reeves described the intensity of the work in a letter to his sisters, written from Canton and dated 11th January 1815, as follows:

We got up to this place [Canton] on the 10 of last month and since that time have loaded one Fleet of 11 ships which will be despatched tomorrow and half loaded the remaining ships which will sail in a bout [*sic*] a fortnight more: you may therefore suppose we have been busy enough-indeed we have been engaged morning and evening without a single spare hour consequently I have only time to send you a short note instead of a long letter.⁵⁰

In the following month, Reeves wrote to Banks in a similar vein, saying that 'The pressure of business still continues...' ⁵¹ Staunton's letter of December 1813 to Sir Joseph Banks makes clear that Reeves was a good employee.⁵² This is confirmed by The East India Company Register and Directory for 1818, which lists Samuel Ball as inspector of teas and John Reeves as assistant, 'and to succeed as Inspector on the death or coming away of Mr. Ball'.⁵³ The significance of the pressure of Reeves' work during the trading season at Canton will be considered in relation to the drawings in the next chapter.

Besides the Chinese trade, the East India Company also engaged in 'Country Trade' between India (and goods shipped to India from Britain), the Malacca Straits and China, often by means of hired ships. To give some idea of the goods carried, the list of imports from Country ships during the 1811-12 season included 'Birds nests, pepper, Tin, Becho de mar [sea cucumber], rattan, sandalwood, cotton, elephants teeth, Prussian Blue, sharks fins, ivory, sandalwood oil, mother of pearl, cornelian, camphor, olibanum, lead, tobacco, soap, redwood [and] blackwood' while some of the exports from China 'per Country ships' were listed as 'Chinaware, green tea, black tea, white lead, Silk goods, coloured paper, Allum, camphor, lacquer ware, nutmegs, cloves, china writing paper, white paint, Turmeric, soy, vermillion, [and] wood furniture'.⁵⁴

⁵⁰ Reeves, J (1815) Letter to his sisters dated 11th January. The Goodman Family Archive.

⁵¹ Reeves, J (1815) Letter to Banks dated 4th February. MS 33.982 ff.84-86. British Library.

⁵² Staunton, G (1813) Letter to Banks dated 7th December. Item 5217/23. Wellcome Institute.

⁵³ *The East India Company Register and Directory* for 1818. OIR 354.54. British Library.

⁵⁴ The East India Company Diary of Transactions. Jan. 1812 pp.20-21. IOR G/12/182. British Library.

The third type of trade carried by Company ships was known as 'Private Trade', that is investments which the commanders and officers of the Company's ships were permitted to make on their own account. In 1825, Milburn noted that imports from England in Private Trade included 'Prussian blue, cochineal, window glass and scarlet cuttings' while exports were listed as tea as well as 'nankeens, China ware, drugs etc' (Milburn, 1825 p.460).

The significance of some of the traded products, particularly Prussian blue, will be considered in chapter four.

1.5.4 Life in Canton: Recreation

Opportunities for recreation in Canton were limited. There was a garden fronting the river at the New English Factory; pictures of the Canton waterfront indicate that this was extended during Reeves' time and that the garden itself underwent improvement, for which Reeves appears to have been responsible. Fortune visited the garden in 1843 and noted 'The garden... is but a small plot of ground ... having broad ... walks round it ... with a few trees in the middle. Since Mr. Reeves' time no one seems to have paid any attention to the plants here, and if there ever were any rare species, they are now all lost' (Fortune, 1987 p.156).

Orange (1924 p.197) says that in the evenings the gentlemen of the Factories were in the habit of strolling along a piece of ground known as Respondentia Walk (approximately 367 metres in length and 233 metres wide) which ran between the length of the line of Factories (other than the British and American, which had gardens) and the river (Figure 3). However, according to W.C. Hunter, after a great fire in 1822 during which the *Hongs* burnt down, the railings disappeared and 'it became the resort of itinerant peddlers and hawkers in a small way of business. There were sellers of pickled olives, ground nuts, pastry, tea, *congee* [rice water] ...' ('An Old Resident' quoted in Orange, 1924 p.195-6). Orange also quotes the Rev. W. H. Medhurst, writing in 1835, that 'The government does, indeed, allow foreigners to take the trip, in parties of eight or ten, about once a month, to the flower gardens ...' (Medhurst quoted in Orange, 1924 p.197). This is probably a reference to the *Fa Tee* (Flowery Land) nursery gardens on the Island of Honan, situated in the Pearl River opposite the Factories (Figure 2). A letter from John Livingstone, which was read to the Horticultural Society on 16th November 1819, advised 'The state of botany in China may be pretty correctly understood by examining the *Fa Tee* or Flower Gardens ... It is from these nurseries that Europeans are generally supplied with the plants which they send or carry home'.⁵⁵ Le Rougetel (1981-82 p.71) conjectures that the majority of the plants drawn by Reeves' painters were sourced from these nurseries. Reeves himself made reference to the gardens in an undated letter to Banks, 'By the Thames Capt.

⁵⁵ *Transactions of the Horticultural Society*, 1819, Vol. III, pp.421-429. The Royal Horticultural Society.

Riches I forwarded you a pot containing some seedling plants of the Honan tea which I procured from the flower gardens at *Fa Te* (Flower Ground) situated upon the island of Ho (river) nan (south) which lies opposite Canton ...⁵⁶

Tiffany gave a fairly detailed description of these grounds, to which access was limited to the 8th, 18th and 28th of each month on payment of eight dollars:

The gardens are owned by a number of the rich natives of Canton, are of great extent, and filled with rare and beautiful plants, and at certain seasons the eye may be gratified with the magnificent display of ten thousand japonicas in bloom at any one time.

... You enter the gardens through a sort of lodge for the gardeners, and which serves also as a sort of storehouse for every thing necessary connected with their vocation; there were thousands of flower pots plain and ornamented, glasses for delicate young plants, and for others covers pierced through with holes to allow the young green shoots to spring out and curl all over the form. There were also porcelain seats and chairs for gardens ... The plants were arranged in long rows on benches, on the ground, or planted against the brick wall, and every one in the vast number looked vigorous and healthy (Tiffany, 1849 pp.159-160).

He then goes on to describe the orange and 'cumquat' trees, the Chinese method of dwarfing plants and speculates on the difficulties of transporting the plants to England and America, and continues :

There were several bridges and summer houses placed amidst pools of water, but these frog ponds were used chiefly for watering the plants. The gardeners were men who evidently thoroughly understood their vocation, and were stimulated by enthusiasm at the same time. They were polite and anxious to show us their plants, and did not with-hold any information we asked for (Tiffany, 1849 p.163).

Reeves was rather less complimentary about these gardeners. In 1835, he contributed to a biography of Consequa, one of the *Hong* merchants, published in *Loudon's Gardener's Magazine*, in which he expressed his frustration in dealing with the gardeners at these nurseries:

Of Chinese gardening and gardeners, I entertain myself a very low idea: it was only by engaging to purchase them, that I got the Wisteria propagated for sale; and I have tried in vain to get the gardeners at *Fa Te* [Flower Ground] to collect their own wild plants, of which they have so many beautiful ones (and of which I have drawings) not yet brought to England: nothing will drive them out of 'old custom' (Staunton, Arniston and Reeves, 1835 p.112).

⁵⁶ Reeves, J (n.d.) Letter to Banks. Item 5217/7&8. Wellcome Institute.

The reason why he may have been anxious to collect live specimens of wild plants, rather than cultivated varieties, was clear from an early letter to Sir Joseph Banks in which he wrote, 'In the gardens at *Fa The* [Fa Tee] (Flower Ground), where the chief nursery grounds & collections of flowers are, I see but few new ones'.⁵⁷

Another source of plant material was to be found in the lavish gardens of the *Hong* merchants on Honam Island, including those of Chowqua and Consequa. The latter was the source of a cutting of *Wisteria sinensis* (see below). Punkequa II and Howqua II, wealthy *Hong* merchants, also lived on the island (Fan, 2004 p.33). Despite the difficult official relationship which existed between the Chinese and westerners, recorded in the East India Company's Diaries and Consultations, and by Morse (1926-29), it is clear that friendships between western residents and Chinese *Hong* merchants were not unknown. Joseph Sabine, Secretary to the Horticultural Society, writing about some early Chinese plant drawings in 1826, noted that '... the fifth plant figured is called the *Wong Moutan Fa*, and is represented as having a double yellow flower. The drawing is said to have been taken from a plant which flowered in the house of a Mandarin at Canton, in February, 1810'.⁵⁸

John Reeves also made use of the well-stocked Factory library, situated on the second floor of the New English Factory. Established by subscription in 1806, according to the catalogue published at the Company's Press in Macao in 1819 (The East India Company, 1819), the library held the following collections: 1. Divinity, law and philosophy; 2. Biography, history, travels and voyages; 3. Arts and sciences, commerce and politics; 4. Classics, antiquities, translations, philology; 5. Poetry, drama and novels and 6. Miscellanies. In the 'Arts and Sciences' category, the library contained many volumes of natural history, including Aiton's five volumes of *Hortus Kewensis*, Buffon's *Natural History* (6 volumes), Smith's *Botany, Flora Cochinchinensis* as well as five titles by Linnaeus. Barrett (Barrett, 1988 p.24), citing the *Catalogue*, notes that by the time this library was dismantled in 1832, it held some 1600 titles. References to some of these titles were made by Reeves in his correspondence with Sir Joseph Banks; it is clear that he made extensive use of Loureiro's *Flora Cochinchinensis*, published in Portugal in 1790, and 'one of the greatest landmarks in the taxonomy of the area' (Needham, 1976, Vol. 5, Pt. III p.223). Uncharacteristically, in a copy letter, the original of which was probably sent to John Goodhall, Reeves complained about the library:

I have long been of your opinion that it would be handsome conduct in the Court to furnish our Library here with some of those more valuable works-

⁵⁷ Reeves, J (1812) Copy Letter to Banks dated 27th December. Banks Correspondence, 1765-1821, Vol.18, pp.61-68. British Museum (Natural History).

⁵⁸ Joseph Sabine 'On the *Paeonia Moutan*, or Tree Paeony, etc.' in *Transactions of the Horticultural Society of London*, 1826, Vol.VI, p.484. The Royal Horticultural Society.

which tho essentially-necessary [*sic*] in a library like ours, are not within the limits of its Funds. You are I presume aware that our Funds arise from an annual subscription of 40 dollars, most cheerfully paid, from each person in the factory...⁵⁹

There was also a Company library at Macao which, according to Van Dyke, by the early 1800s had a stock of some 4300 volumes; the later established Morrison Library held some 2000 works (Van Dyke, 2005 p.108). The libraries were supplemented by Reeves' purchase of his own second-hand books on natural history, ordered from England, a few of the titles and prices being recorded in two notebooks held at the British Museum (Natural History).⁶⁰ As from November 1827, the first commercial newspaper, the *Canton Register*, kept foreigners informed of local events. This was followed by several other publications, although these did not come into print until after Reeves' final departure from China.⁶¹

Apart from the library, and limited opportunities for physical recreation, contemporary accounts suggest that the main attraction in Canton was the shops. Morse's plan of the Factory area of Canton (Morse, 1926-29 vol. 3 facing page 1) (Figure 3) shows rows of small Chinese shops on one side of Hog Lane and on both sides of Old China and New China Streets. If this plan is correct, then there may have been about 120 shops packed tightly together along these three streets alone. This would take no account of shops in Thirteen Factory Street, itinerant traders shown on contemporary paintings peddling their wares outside the back entrances to the Factories or the trade carried on from river boats. According to Phipps, commerce was conducted in the Factory area, where the streets were 'very narrow' and 'laid out for the supply of strangers': in China Street particularly 'the productions of almost every part of the globe are to be found' (Phipps, 1836 p.134). In the same vein, Tiffany wrote that 'The shops in Old and New China street are those in which Europeans principally deal, and here one finds almost every article produced under the Chinese sun' (Tiffany, 1849 p.68). Reeves made no mention of these shops in his surviving letters, although he sent home to the family sets of pictures (on paper and pith paper), inlaid needlework boxes for his sisters, jade, horn and porcelain ornaments, curios such as shoes for bound feet and buttons, lengths of fabric and a finely - worked bedspread, as well as larger items of furniture.⁶²

A great number of painters' studios are recorded as existing in these streets, and these will be discussed in further detail in chapter 2. He may have had it in mind to visit one of these when he wrote from Canton to his sisters on 31 December 1812 about his elder son Jack (John Russell

⁵⁹ Copy Correspondence marked 'Mr. Reeves to Mr. Goodhall 1815' Item 5217/36. Wellcome Institute.

⁶⁰ Reeves, J (1829) 'Reeves Chinese Fish' 88 ff. R and 'China Fishes' 89.f.R. British Museum (Natural History).

⁶¹ (n.d.) A Research Guide to China Coast Newspapers pp.168-169. British Library.

⁶² The Goodman Family Archive.

Reeves), ‘...tell him if he behaves well I will send him some brushes and colours’, but he evidently had second thoughts, adding as a footnote... ‘Colours can be got better in England-but I have sent him brushes-ink and Drawing books’.⁶³ Reeves must also have visited other tradesmen and learnt the manufacturing methods for commodities such as horn lanterns,⁶⁴ inlaid shell-work,⁶⁵ the water-proofing of fishing nets⁶⁶ and lead sheet-making,⁶⁷ all of which he reported to Sir Joseph Banks.

1.5.5 Life in Macao

When the last fleet had been despatched from Canton at the beginning of each year, the Factory was required to pack up and transport itself 60 miles downstream to the Macao peninsular, which was under the jurisdiction of a Portuguese governor (Van Dyke, 2005 p.167). Here the Honourable Company had another Factory overlooking the sea on the Praia Grande (Figure 5). The precise date for departure and return each year varied according to the start of the typhoon season.⁶⁸

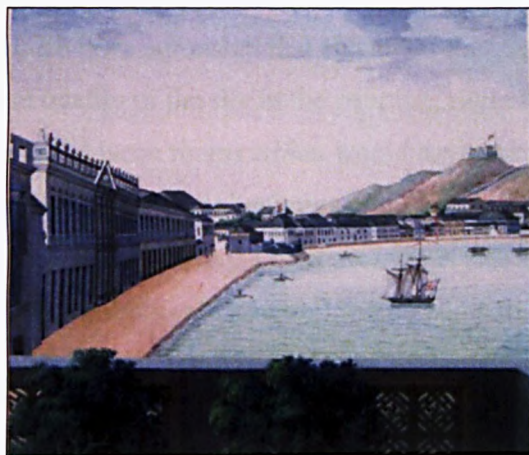


Figure 5. Macao, view of the Praya Grande, from a porch. (circa 1840)

The East India Company house is shown as the second complete building on the left of the picture. [Online image] Available from:

http://ocw.mit.edu/ans7870/21f/21f.027/rise_fall_canton_04/gallery_places/pages/cw

[Accessed 13th February 2011].

⁶³ Reeves, J (1812) Letter to his sisters dated 31st December. The Goodman Family Archive.

⁶⁴ Reeves, J (1815) Letter to Banks dated 4th February. MS 33.982 Ff. 84-86. British Library.

⁶⁵ Reeves, J (1815) Letter to Banks dated 4th February. MS 33.982 Ff. 84-86. British Library. Note that in a copy letter to Goodhall of 1815, Reeves expressed the view that ‘this might be introduced as an amusing employment among the ladies & t’would be quite as genteel as shoe making’. Item 5217/36 Wellcome Institute.

⁶⁶ Reeves, J (1814) Letter to Banks dated 10th October. MS 33.982 Ff. 61 & 62. British Library.

⁶⁷ Reeves, J (1814) Letter to Banks dated 6th July. Banks Correspondence 1765-1821, Vol.6 1810-21, Ff 56 & 57 Add MS 33.982. British Library.

⁶⁸ The East India Company Consultations 1811-1830. IOR G/ 12/ 176- G/12/242. British Library.

At unrecorded dates, Reeves evidently took his delineator.⁶⁹ The British Library holds scenes of the waterfront at Macao, in a similar style to that of the Canton scene, with copious written descriptions of houses, convents and churches and other landmarks in Reeves' handwriting. The 'view of Macao No 1' shows the bay at Praia Grande with '...the Company's House the right end of which is the chapel-formed out of rooms I before lived in...The centre rooms or house is made use of as an office ...-the front being a billiard room-the next set to the left-say 4 windows above forms my rooms-'.⁷⁰

Reeves gave more details 'In further explanation of the views of Macao sent you last year' in which he plotted the view from the shore to the outlying islands 'as they appear from my window...I have drawn 3 pencil lines which show nearly all my view seaward-and you may suppose my house situated at the angle where these lines meet'.⁷¹ The fact these archives were transferred from the India Office would suggest that Reeves originally sent this information to the Company and in all probability to his colleague, John Goodhall.

The Goodman Family Archive includes a picture of the interior of an office, with three empty desks, the fenestration of which does not match that shown on the Canton office picture. This, together with the translucent quality of the sky in the painting, suggests this picture may have been a record of one of Reeves' Macao rooms which would have overlooked the sea (Figure. 6).⁷² It is suggested that this is where Reeves' painters may have worked under his supervision during the summer months at Macao; hence the reference to his artists working 'in his house' (The Gardners' Chronicle and Agricultural Gazette, 1856 no pagination).

Life in Macao seems to have been in complete contrast to the stifling atmosphere in Canton. On his first trip to Macao, Reeves was taken by John Livingstone, the Company's surgeon (also a corresponding member of the Horticultural Society, who gave summer lectures in botany and chemistry to the expatriate community), 'upon a botanical excursion during the summer vacation to the islands to the eastward of Macao'.⁷³

⁶⁹ In 'Views of Macao No 3' the accompanying notes say 'This is taken by a camera.' WD3814 British Library.

⁷⁰ Reeves, J (n.d.). WD 3812 and WD3813. British Library.

⁷¹ Reeves, J (n.d.). WD 3819. British Library.

⁷² This picture was sold at auction by Dukes, auctioneers, of Dorchester on 28th November 2008.

⁷³ Reeves, J (1812) Letter to Banks dated 27th December. Banks Correspondence 1765-1821, Vol.18, pp.61-68. British Museum (Natural History).

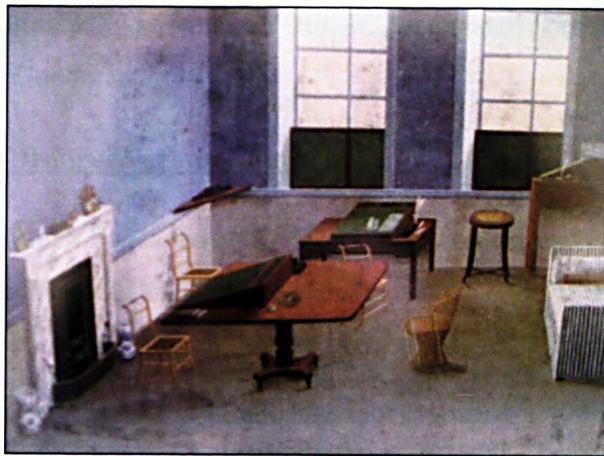


Figure 6. One of Reeves' rooms, Macao? Gouache on Paper. (The Goodman Family Archive)

The fenestration does not match that shown in the building depicted in Figure 4. The incoming natural light would suggest that this picture shows a room in Macau; the fenestration is not inconsistent with that shown in Figure 5.

Orange quotes the Rev. Medhurst, who speculated that 'a foreigner has only to rent the dwelling off a Portuguese citizen, & that house is his castle; where he may print books, in any quantities...he may even have a Chinese school (Medhurst quoted in Orange, 1924 p.275).

Harriett Low, the first American woman to live in China (1829-1834), recorded details of her daily life in a diary, from which it would appear that time was spent in a steady round of operas, sightseeing trips, visiting and picnics. Reeves evidently joined in on these occasions, as her entry for Saturday 14th [November] [1829] reveals that she 'Passed a delightful day...Mrs Cleveland ... insisted on our joining the water party [which] consisted of Mr. and Mrs. M, Mrs Shaw and Mr. Rieves [John Reeves] with Aunt and myself. We went to the Isle de Verd...' (Hodges and Hummel, 2002 p.83).

The peninsular boasted a number of landmarks and places of interest; most notably a cave where the Portuguese poet Camoens wrote his *Lusiad*, The Casa Garden which was an imposing residence owned by a Portuguese merchant and leased to the Company for use by visiting dignitaries, and Thomas Beale's famous garden and aviary. Beale was a permanent resident who had made a fortune in the opium trade. A keen amateur horticulturalist, he and Reeves appear to have collaborated in the despatch of plants to England. There is a number of descriptions of Beale's garden, and these, together with The Casa Garden, both of which provided material for the Royal Horticultural Society's pictures, will be described in the next chapter.

Mention should also be made of the painter George Chinnery, a Macao resident who fled to China to avoid creditors in Calcutta. Chinnery painted scenes of Macao, but made his name

among the expatriates principally as a portrait painter. An undated portrait of Reeves by Chinnery is held by the Goodman Family.⁷⁴

1.5.6 Reeves' Natural History Work in China

In his first letter to Sir Joseph Banks, dated 27th December, Reeves makes clear that he was somewhat apprehensive about the task that lay ahead:

Proud do I feel myself in this liberty permitting me in opening a correspondence with you- but I should also feel mortified in being obliged to announce the failure of your commissions-did such failure arise from any neglect of mine.

...It was my intention, when I left England, to forward some plants, if I found any worth notice-but tyro as I am in botany, how can I presume to send any to you?

...It will give me much pleasure to be able to execute any Commissions you may have here within the reach of my ability-but this extends not far.⁷⁵

Thus started a flow of correspondence which ended with Banks' death in 1820. None of Banks' replies survive, but Reeves' letters indicate that he lost no time in noting the chrysanthemums growing in the garden of the brother of the *Hong* merchant Puankequa II, a retired official nicknamed 'the Squire', with whom he had had 'a Chop-stick dinner'⁷⁶, or obtaining the promise of tea plant seeds from the local manufacturers. As has been noted above (para. 1.5.4), Reeves appears to have inherited a legacy of the transmission of horticultural knowledge, and possibly also of plant exchanges, of which he was able to take full advantage.

The Reeves' letters to Banks are characterized by the sending of information about various manufacturing processes and plants, and the enclosure of seeds, samples of teas, and other items of interest such as bird's nests and tinder. There were frequent references to numbered pictures of plants at East India House, which will be considered in further detail in the next chapter. However, the work undertaken for Sir Joseph was no easy sinecure due to the prevailing difficulties in dealing with the Chinese. A letter dated January 7th 1820 from the missionary Robert Morrison to a correspondent, M. Remusat, refers to some of the difficulties Reeves encountered in carrying out Sir Joseph's commissions:

⁷⁴ The Goodman Family Archive.

⁷⁵ Reeves, J (1812) Copy Letter to Banks dated 27th December. Banks Correspondence Vol.18, pp.192-198. British Museum (Natural History) and Item 5217 Wellcome Institute.

⁷⁶ Orange quotes J. McLeod, surgeon, as follows: 'The entertainment given by the Hong merchants at Canton to their European friends are considered to be very superb' with over 100 people sitting down to dinner to eat birds-nest soup and 'the best viands, wines and fruits' (McLeod quoted in Orange, 1924, p.193).

He has also sent to Sir Joseph Banks a good many dried plants and seeds, to which he has for several years paid attention, although the Chinese are very reluctant to assist him in what they deem "idle curiosity" (Morrison, 1839 pp.28-29).

In 1816, Reeves returned to England bringing with him 100 potted plants, of which 90 survived. This was no mean feat, particularly since Wardian cases had yet to be invented and this success was recorded by Livingstone (1820 p.425). In the same year, on the 20th June, he married Isabella Andrew at Saint Giles Church Camberwell.⁷⁷

On 18th February 1817 the Horticultural Society accepted his offer to send plants and drawings and made both Reeves and John Livingstone 'Corresponding Members'. Whitehead says that, 'Thereafter, until Reeves' retirement, hardly an Indiaman sailed for England without its decks decorated with little portable greenhouses filled with potted plants' (Whitehead, 1974 p.18). The difficulties of obtaining and transporting desirable plants from here were outlined by Livingstone. These included the fact that strangers had limited access to the *Fa Tee* gardens, referred to in para. 1.5.4 above, the soil was heavy alluvial clay which ill- suited potted plants for the journey to the west, and that the 'botanical arrangements' of the Chinese were 'extremely defective' (Livingstone, 1820 p.422). By this he meant that the Chinese had no access to Linnaean taxonomy and no standard nomenclature. The difficulties which Reeves must have overcome were summed up by Livingstone: 'Every new adventurer must feel himself quite insulated, for he neither can receive adequate help himself, nor impart to his assistants the necessary instructions' (Livingstone, 1820 p.422). Also in 1817, Reeves was elected a Fellow of the Linnean Society and of The Royal Society as 'a gentleman well versed in various branches of natural knowledge, & particularly well acquainted with the commerce & manufactures of China.'⁷⁸

From the letter dated January 7th 1820 from the missionary Morrison to M. Remusat, Reeves' willingness to assist others in their research endeavours is clear:

The [Chinese characters] I have called in my Dictionary a corundum stone; but Mr. Reeves, a Fellow of the Royal and Linnaean Societies, resident here, thinks, with you, that it is a species of lapis nephritis, or jade ... However, if you will lend us a list of those plants contained in the [Chinese characters]

⁷⁷ Extracted Marriage Record (1816). Available from: http://www.familysearch.org/eng/search/igi/individual_record.asp?recid=500155595353&lds=1&regio [Accessed 25th September 2008].

⁷⁸ Certificate of Election. EC/1817/10 (1817). Available from <http://rovalsocietv.org/Dserve/dserve.exe?dsqIni=Dserve.ini&dsqApp=Archive&dsq> [Accessed 19th September 2008].

which you have ascertained, with the Linnaean names, we shall do our best to add to the number. I say we, for I must be much indebted to Mr. Reeves' aid... (Morrison, 1839 pp.28-29).

Reeves had also made modest contributions to Morrison's dictionary by supplying a list of the flowering times of 148 Chinese plants (Morrison, 1822 p.159) and by his *Chinese Names of Stars and Constellations* which was bound into Part 2 of Volume 1 as *Reeves' Astronomical Appendix* (Morrison, 1839 p.70).⁷⁹

During this time he kept up correspondence with Banks, and probably other correspondents also. He also continued to purchase and despatch hundreds of potted plants, thus providing rarities for British gardens and rich research material for articles written by Joseph Sabine and Dr. John Lindley, which appeared in the *Transactions of the Horticultural Society of London*. Lists of Reeves' living plant introductions, and plants discovered by him recorded by botanists from his herbarium specimens are given by Bretschneider (1898 pp.256-263). He was also overseeing drawings for the Horticultural Society and his own collection as well as possibly collecting pictures for the Emperor of Austria (Potts, 1821-1822b, no pagination),⁸⁰ and Sir Joseph Banks.

The East India Company's Consultations for the Canton Factory for the 1819-20 season record Reeves' contribution to the transfer of plants to the Botanical Gardens at Calcutta. These were under the superintendence of Dr. Nathaniel Wallich who wrote to the Honourable Committee on 12th April 1819 enclosing an extract which included the following '...His Excellency in Council...authorizes you to empower Mr. J. Reeves to disburse a sum not exceeding 400 dls [dollars] per ann [annum] on account of the entertainment of two Chinese gardeners at Canton for the purpose of collecting plants and seeds and preparing them for transmission...'⁸¹. This additional work seems to have been carried out successfully by Reeves and was followed by a similar request ten years later for plants required by the Company's Botanical Garden at Dapooree. The Secretary at Macao wrote back on 12th November 1829 in the following terms:

The List of Plants required for the Botanical garden has been put in the hands of Mr. John Reeves, Inspector of Teas to this Factory, who has acquired much reputation by his cultivation of Botanical Science in this Country, and the communication of the result of his searches to Societies established for that purpose in England ... I have the honour to enclose a Report which has been

⁷⁹ Dr. Milne (1820) Letter to R. Morrison reproduced in Samuel Kidd's Critical Notices of Dr. Morrison's Literary Labours (n.d.) which was bound in as an introduction to *Morrison's Memoirs of the Life and Labours of Robert Morrison* (Morrison, 1839).

⁸⁰ Potts, J (1821) Diary entry for December 11th.

⁸¹ The East India Company Consultations. March 28th 1819 to 20th October 1819, Vol.1, pp.56 and 57. IOR/G/12/216. British Library.

received from Mr. Reeves upon the capabilities of this Country to supply the Plants, Seeds and Fruits.⁸²

In 1820, having observed a comet in May of that year while at Macao, Reeves wrote a short piece on his observations, which was incorporated into an article entitled 'A Comet Observed in China', which appeared in the *Indo Chinese Gleaner* of October of that year (Reeves, 1820).

The Horticultural Society, anxious to acquire more Chinese plants, sent one of its gardeners, John Potts to China in 1821. According to his Rough Journal, written up as his Fair Journal (Potts, 1821-1822 a. and b. no pagination), he arrived at Canton on November 4th of that year, and was taken by Reeves to visit 'the Squire's' garden on the following day. The journals give some insight into the horticultural work that Reeves was carrying out. Potts was taken to several gardens, including the *Fa Tee* nursery, where plants were purchased, but most days were spent packing boxes of plants in pre-Wardian wooden crates including 'plants brought down from the Hills near Canton' and '*Boo-ee sham*' [Bohea] (Potts, 1821-1822 a. and b. not paginated), as well as seeds from Fukien'.⁸³ He also met Thomas Beale and looked over samples of flower pots. On December 31st, Potts arrived in Macao where he visited several gardens in the company of Dr. Livingstone, including the largest garden in the locality, that owned by Antonio Pieriero. Despite being ill, he managed to pack seeds, (presumably collected and dried in the late summer and early autumn) and visited Chinese market gardens. Potts' illness was referred to by Reeves in a letter⁸⁴ to another correspondent, Robert Brown, formerly librarian and curator to Sir Joseph and by this time the first Keeper of the Botanical Department of the British Museum, to whom Reeves also sent dried and preserved specimens.

In 1823, the Horticultural Society sent another of its gardeners, John Damper Parkes, to Canton. Arriving in Macao in the middle of August, he met Reeves on his first morning, the 19th August, and on the same day was taken to see Beale's garden. Like Potts, he kept a Rough Journal, recording the collecting of plants in the hills of Macao and Casa garden, and noted the difficulties surrounding the transportation of plants. This led him to have wooden cases inlaid with oyster shells to let in the light, since glass was scarce in China. Again, Reeves seems to have taken an active part to ensure the success of the trip, for which he was praised by Parkes:

Sir, ...you could not have placed me under a better person than Mr. Reeves, for he has shown me every attention and respect that I could expect, indeed I may say with propriety I have received more favors [*sic*] as a stranger to Mr. Reeves than I ever did from any gentleman in my life-and I shall for ever feel

⁸² The East India Company Consultations. 1829, Vol.2, p.64. IOR/G/12/242. British Library.

⁸³ Reeves, J (1815) Letter to Banks dated February 4th MS 33.982 ff.84-86. British Library.

⁸⁴ Correspondence of R. Brown (1760-1858), Vol.II, 1813-1825 MS 32440 pp.316-317. British Library.

myself bound in duty to serve him on all and any occasions whatever it may be - I have been at his house the whole time I have been in China.⁸⁵

On 9th October of that year the Factory at Macao was packed up and set sail in a Chinese *chop* boat on the following evening, arriving in Canton on the morning of the 13th October (Parkes, 1823- 1824 no pagination). The horticultural work continued and on the 14th October Parkes recorded in his Rough Journal 'Going sometimes with Mr. Reeves about Canton etc' (Parkes, 1823 no pagination). He too was taken to the *Fa Tee* gardens, and spent much time potting plants for the journey home. This Rough Journal is also interesting on two further counts. Firstly, Reeves' interest in the transfer of plants from west to east is noted, 'Mr. Reeves and Mr. Beale considered the currants would not do any good with them in their gardens, as the climate does not suit them-likewise gooseberries they do not wish for' (Parkes, 1823-1824 p.43). Secondly, a considerable amount of time was taken up with re-potting plants, many of which arrived from the hills with little root, and dividing consignments between ships to maximize the chances of success.

In 1824, Reeves returned to England on The Warren Hastings (Kilpatrick, 2007 p.209). Patrick Synge cites Joseph Sabine, secretary to the Horticultural Society, as recording that he brought two new chrysanthemums with him (Sabine cited in Synge, 1953 p.213). On the 27th July of that year, 'in order to manifest the sense entertained by the Council of the services rendered by Mr. Reeves' (1824, no pagination) he was elected Fellow of the Society⁸⁶ and on the 13th May 1825 he was elected to the Royal Astronomical Society.⁸⁷

Prior to 1826, Reeves had used the coat of arms of the entirely unrelated Thwaite family from Norfolk as a collector's mark for his own collection of drawings. Whitehead and Edwards refer to this as a 'bogus crest' and as 'the spurious version' (Whitehead and Edwards, 1974 p.22). There is a suggestion here of dishonesty on the part of Reeves. However, the Office of Richmond Herald at the College of Arms suggests that it was relatively common for people in the eighteenth and nineteenth centuries to purchase arms from heraldic stationers, which were based upon surnames.⁸⁸ On 6th February 1826, a grant of arms was made to Reeves by the College of Arms (Whitehead & Edwards, 1974 p.22). It would appear that he must have attended to this matter during his 1824-1826 stay in England.

⁸⁵ Parkes, J (1823) Letter to Royal Horticultural Society dated 20th November. A manuscript copy of this is contained within his Journal. Royal Horticultural Society.

⁸⁶ Minutes of Council of the Horticultural Society Vol.6 dated May 19th 1824 and Vol.7 dated July 27th 1824. The Royal Horticultural Society.

⁸⁷ Librarian and Archivist of the Royal Astronomical Society, Pers. Comm. 10th July 2009.

⁸⁸ Jeremy Goldsmith, research assistant to Clive Cheeseman, Richmond Herald, College of Arms. Pers. Comm. 4th July 2010.

By 1828, Reeves had returned to China with his elder son, John Russell Reeves. The *East India Company Register and Directory* for that year shows John Reeves as ‘Inspector of Teas’, and his son as ‘Assistant Inspector’ (1828 no pagination). In the same year, Reeves published *An Account of some of the Articles of the Materia Medica employed by the Chinese* in the *Transactions of the Medico- Botanical Society of London* (Reeves, 1828 pp.24-27), which, according to Bretschneider ‘is of little importance’ (Bretschneider, 1898 p.263). Two surviving notebooks held at the British Museum (Natural History) record the painting of Chinese fish in 1829/30 at Macao. Reeves had four copies of the drawings made: his own set, a second set sent to General Hardwicke in 1829/30, a third set which was lent to Sir John Richardson and another set which was left with Beale in Macao. These drawings formed the basis of Bridgman’s work, *A China Chrestomathy, in the Canton Dialect* (Bridgman, 1841) and are discussed at some length by Whitehead (1969). The importance of these notebooks for the purposes of this research will become clear in the next chapter.

1.6 John Reeves: Later Life

On 7th August 1829 Reeves’ cousin, the barrister who had introduced him to Sir Joseph Banks’, died unmarried and without issue, at his home in Parliament Place, Westminster (*Oxford Dictionary of National Biography*, 2004 Vol. 46. p.351). This Reeves, very successful at the Bar and author of several legal treatises, also held a number of public offices, including that of King’s Printer and Inspector of Aliens. The two men appear to have remained on good terms for he headed the list of proposers for Reeves’ acceptance as a Fellow of the Royal Society in March 1817.⁸⁹ It also appears that they remained in correspondence during the Canton years, although none of these letters has been traced. Reeves mentions in a letter of February 4th 1815 to Sir Joseph Banks ‘To Mr John Reeves I have sent a book of drawings illustrative of the ideas of the Chinese about ...reward and punishment’.⁹⁰

This cousin had accumulated considerable wealth, including a large mansion in the Old Town part of Clapham, known as the Manor House. By his Will, he bequeathed his estate to his four cousins in equal shares (*Oxford Dictionary of National Biography*, 2004. Vol. 46. p.351), and John Reeves inherited this property, a fact which was evidently a topic of conversation among the small community at Macao and recorded in Harriett Low’s diary entry for June 1st 1830, ‘[John Russell Reeves]...is a very superior young man...His father has lately come in possession of a large property’ (Hodges and Hummel, 2002 Vol. 1. p.154). It is likely that this inheritance provided the financial stability which enabled Reeves to contemplate retirement; shortly afterwards, on 14th October 1830, he wrote to John Lindley from Canton ‘By one of the

⁸⁹ The Royal Society Certificates of Election and Candidature. EC/1817/10. The Royal Society.

⁹⁰ Reeves, J (1815) Letter to Banks dated February 4th. MS 33.982 ff84-86. British Library.

ships of the present season I intend to leave China and expect to be in England in about April'.⁹¹ In the early spring of 1831,⁹² he sailed for England for the last time, leaving his elder son to continue the work of inspecting tea and sending back animal and plant specimens. Before he embarked, he wrote to John Lindley about the plants he was intending to send or carry home and also informed him, 'I have also two of the Long Tail Pheasants-and some mandarin ducks'.⁹³ The pheasant is now classified as *Syrmaticus reevesii*, or the 'Reeves Pheasant'. According to John Francis Davis' account, Gray in his *Zoological Miscellany* 'has given the descriptive characters of twelve species of birds belonging to a large collection brought home by Mr. Reeves' (Davis, 1972 Vol. 2. p.317).

By the time Reeves returned, he was fifty-seven years old. In *Loudon's Gardeners Magazine* of February 1835 he was recorded as having exhibited Chinese tiles at the London Horticultural Society on October 21st 1834.⁹⁴ On the same day, he also made a significant contribution to a biography of Consequa, one of the *Hong* merchants who had died in 1823 (Staunton, Arniston and Reeves, 1835 pp.111-112). This was followed in the April edition of the same year by a *Notice of two Chinese Tiles used for Garden Purposes in the Suburbs of Canton. From a Communication by J. Reeves Esq* (Reeves, 1835 p.171). Reeves not only provided a description of the way in which the tiles were used to create ornamental openings in the walls of Chinese gardens, but he also presented the tiles to enable them to be copied by an artificial stone manufacturer. On June 3rd 1835 he replied to a query raised by another correspondent about American magnolias in China, and this was published in the August edition.⁹⁵

He seemingly remained active at the Horticultural Society and elsewhere. The Council Minutes for 31st March 1837⁹⁶ record that he was one of four names put forward for nomination as a Member of Council, although he was subsequently unsuccessful. On the same day he was appointed one of four auditors to audit the Society's accounts for that year. On 1st April of the same year, he donated 'A Chinese Map of Canton' to the Royal Asiatic Society⁹⁷. The Horticultural Society's Minutes for 1839⁹⁸ record Reeves as standing as a reserve nominee for membership to the Council, but the three principal nominees withdrew and on a second ballot Reeves name was not one of the three selected. From 28th December 1842 until February 23rd

⁹¹ Reeves. J (1830) Letter to J. Lindley. Letters to J. Lindley, Vol.2, ff 754-756. RGB Kew.

⁹² *The East India Register and Directory* for 1832 (no pagination). British Library.

⁹³ Reeves, J (1830) Letter to Lindley dated 14th October. Letters to J. Lindley L-Z (Vol.2) Ff754-756. RGB Kew.

⁹⁴ *Loudon's Gardeners Magazine*. February 1835, p.110.

⁹⁵ *Loudon's Gardeners Magazine*. August 1835, p.437.

⁹⁶ The Horticultural Society Minutes of Council, 31st March 1837, Vol.10,(no pagination). The Royal Horticultural Society.

⁹⁷ *Journal of the Royal Asiatic Society*. April 1837, p. xiv. The Royal Asiatic Society.

⁹⁸ Horticultural Society Minutes of Council 11th April 1839, Vol.11, (no pagination). The Royal Horticultural Society.

1843,⁹⁹ Reeves is recorded as a member of the Chinese Committee of the Horticultural Society, under the chairmanship of nurseryman George Loddindge, which was instrumental in sending Robert Fortune on his first expedition to China. Apart from the more public committee work, Reeves was evidently more directly assisting Fortune and Dr. Lindley by lending equipment and a Chinese vocabulary, by advising which plants to collect and by arranging for Letters of Credit through his son in China.¹⁰⁰ In one of his letters to Dr. Lindley, Reeves advised that he was in difficulty in making and keeping appointments due to a forthcoming court case in which he was to be a witness. This may well have been a reference to *Reeves v Elliot*, a case in the High Court of Chancery involving land in Cumberland in which he was successful and to which he referred in a Codicil to his Will.¹⁰¹

The Economic Botany Museum Entry Book for the Museum at Kew 1847-1855¹⁰² records three entries for 1847 pertaining to gifts made by Reeves, including specimens of 'rice' paper (*Tetrapanax papyrifer*), spices - nutmegs, cinnamon, cassia and star aniseed, samples of coffeea [*sic*], indigo and cocoa as well as seeds from *Quercus cornea* and *Arbus precatorius*. In 1850 he donated artificial flowers (Nesbitt, Prosser and Williams, 2010 p.3) and William Hooker recorded a gift of an earthenware slab for cutting pith (Hooker, 1852 p.53). One of the most valuable gifts was a set of pith paintings depicting tea production, gifted in 1847.

John Reeves died at Old Town, Clapham on 22nd March 1856.¹⁰³ According to the obituary in *The Proceedings of the Linnean Society*¹⁰⁴, John Reeves deposited dried and preserved fish specimens and part of his substantial collection of Chinese coins at the British Museum. At the Natural History Museum in the Botany Library there is a small manuscript book of plant names, made from Chinese paper and with a Chinese binding, which was donated by him in 1831.¹⁰⁵ Carter credits Reeves for having bought at auction at East India House the Java diary, manuscripts and pictures of plant collector Louis Deschamps (Carter, 1988 p.413) and these also found their way to the British Museum. That he remained actively 'botanizing' until the last few days of his life is clear from the obituary which appeared in the *Gardener's Chronicle and Agricultural Gazette* of 29th March 1856, 'At last the kind good old gentleman has left us.

⁹⁹ The Horticultural Society Minutes of the Chinese Committee 28th December 1842-February 23rd 1843. Royal Horticultural Society.

¹⁰⁰ Reeves, J (n.d.) Letters to Lindley(?). Royal Horticultural Society.

¹⁰¹ Probate of Will and Codicil of John Reeves. Cat. Ref: prob.11/2233 and case papers ref.C13/3119. The National Archives.

¹⁰² Economic Botany Museum Entry Book 1847-1855, pp.2, 3, 5 and 9. RBG Kew.

¹⁰³ *Oxford Dictionary of National Biography*, 2004, p.352.

¹⁰⁴ *Journal of the Proceedings of the Linnean Society*. 1855-1861, Vol.I, p.xliii and xlv. The Linnean Society of London.

¹⁰⁵ 'Chinese list of plants presented by John Reeves esq. 1831' held at the Botany Library. British Museum (Natural History).

One short week ago he was still to be seen examining the plants in the meeting room of the Horticultural Society' (Gardener's Chronicle and Agricultural Gazette, 1856 p.212).

1.7 Conclusions

Without scientific or horticultural training, Reeves was nevertheless selected by Sir Joseph Banks as an able and diligent correspondent, and this appointment seems to have set the pattern for his subsequent collecting of paintings, plant material and information. Although in his surviving correspondence Reeves expressed few opinions and gave away little in the way of personal details, the volume of meticulous work he undertook in support of the research interests and professional reputations of others, together with the complimentary remarks made by some of his contemporaries, indicate a man who was intelligent, industrious and well-liked. The learned societies which stood to benefit from his work include the Horticultural Society, the British Museum (Natural History), The Royal Asiatic Society, The Royal Astronomical Society, The British Museum, the Zoological Society, the Linnean Society and RBG Kew. Perhaps the most fitting tribute paid to Reeves' work was that found in the Linnean Society's obituary:

During the whole period of his residence in China, from 1812 to 1831, he contributed largely to English Horticulture, and to the Horticultural Society in particular, not only by his own direct shipment of plants, but also by collecting plants during the spring and summer, establishing them well in pots previous to the shipping season, and then commending them to the care of the captains of the Company's ships, to whom he was also always ready to commend the most desirable plants for transportation to England.¹⁰⁶

Of all his introductions, Reeves' name is particularly associated with three plants. According to Britten, *Primula sinensis* was first known in England from a drawing sent back to the Horticultural Society by Reeves in 1819, from which the Society 'so strongly attracted by its beauty' (Britten, 1897 p.427) immediately ordered seeds and plants, which were duly procured by Reeves and sent back, although these did not survive. A plant collected by Reeves was eventually established by a Captain Rawes,¹⁰⁷ who passed it to a relative, Thomas Palmer of Bromley (Britten, 1897 p.427). The introduction of this plant was subsequently attributed to the latter by Bretschneider (1898 p.253). Britten also states that Reeves had sent a specimen to Brown in 1818, and that his was to be found in the Banksian Herbarium (Britten, 1897 p.427).

¹⁰⁶ *Journal of the Proceedings of the Linnean Society*, 1855-61, Vol.I, pp. xliii and xliv. The Linnean Society of London.

¹⁰⁷ Britten (1897 p.427) confounded the names and refers to a 'Captain Reeves', but the East India Company records refer only to a 'Captain Rawes'. East India Company Consultations 1811-1831, IOR G/12/176-177, IOR G/12/245.

Wisteria sinensis, (*Glycine sinensis*) was, according to Bretschneider (1898 p.260), first brought to England in 1816 by Captain Wellbank for a Mr. Turner of Rook's Nest, although the introduction was incorrectly attributed to Reeves. Reeves did, however, bring back a notable specimen which was planted in the Horticultural Society's garden at Chiswick (Bretschneider, 1898 p.259). An extract from *Edward's Botanical Register* of 1840 noted that, 'The *Wisteria sinensis* in the Garden of the Hort. Soc. is a magnificent specimen 180 feet long, covering about 1800 square feet of wall. In the spring of 1839 it produced 675,000 flowers. The latter are lilac-coloured and fragrant' (Lindley, 1840 p.41).

Dried specimens of *Reevesia thyrsoidea* (*Monadelphina polyandria*) were first sent to the Horticultural Society by Reeves some time prior to 1827, and, according to Lindley's own account, he considered the plant of such importance that drawings of the fruit were subsequently obtained 'from the same indefatigable correspondent of the Society' (Lindley, 1829 No. 1236). Lindley went on to record that in January 1829 a specimen brought back from China by John Damper Parkes had blossomed in the Society's garden and in his footnote to this entry in *Edward's Botanical Register* he paid a handsome tribute to John Reeves, as follows:

Named in honour of John Reeves, Esq. now resident at Canton, to whom we are indebted for our knowledge of this plant; from whose unwearied exertions in the cause of science, the Botany of China has received material assistance; and to whom our Gardens are indebted for many of the fairest ornaments they contain (Lindley, 1829 No. 1236).

Additionally, as Whitehead notes, the name *reevsii* was attributed to twenty-seven species of mammals, reptiles, birds, fish and molluscs (Whitehead, 1969 p.195).

Drawing heavily on archive material, particularly his letters to Sir Joseph Banks, the purpose of this chapter has been to provide an overview of the life and work of John Reeves. Scholarship has been advanced in this area by the discovery of a small cache of hand-copied notes and letters at the Wellcome Institute and also Reeves' own notes and topographical information which came to light at the British Library. This material was not referred to by Fan (2004). Similarly Whitehead (1969) and Whitehead and Edwards (1974) appear to have been unaware of its existence. Whitehead (1969) seems also to have made no reference to the original documents and published material held at the Lindley Library relating to Robert Fortune's first expedition to China. It is suggested that by reading the primary material relating to Reeves in the light of published accounts of trade and topography in China at the time, a more accurate view of his working life and activities as a naturalist has now been made possible.

CHAPTER 2

THE FORMATION AND SUBSEQUENT HISTORY OF THE COLLECTION

2.1 Introduction

In this chapter, the origin of the Collection is examined, together with the possible studio and supervision arrangements of the Chinese painters. It has not been possible to trace a complete documentary record detailing the way in which Reeves chose his artists and selected plants for depiction, defining which pictures were commissioned and which were purchased as stock pictures, and describing precisely where and how the painting was undertaken. Reliance has been placed on archive material, including Reeves' two notebooks, the records held in the Lindley Library at the Royal Horticultural Society and documentary evidence on the face of the pictures themselves, to ascertain Reeves' methodology and the probable sequence of events. Some details remain a matter of conjecture.

The latter part of the chapter is concerned with the later history of the Collection, from the piecemeal disposal of surplus pictures and the subsequent sale of the Society's entire library including the Collection in 1859. Finally, the early binding and subsequent history of the Collection up to its re-acquisition in the first half of the twentieth century is dealt with. A timeline in Appendix I outlines the history of the Collection.

2.2 The Reeves Drawings in Context

Although this part of the project involved largely historical research and reliance has been placed upon piecing together the narrative from a number of primary sources, reference has also been made to published material. Drawings similar to those sent back by Reeves were held by the East India Company. These are the subject of two works by Mildred Archer (1962, 1972). Many of the Company drawings are held at RBG Kew Library and Archives and at the British Library.

No information is available as to the working arrangements of Reeves' painters, but it was understood by Joseph Sabine, then Secretary to the Horticultural Society, that Reeves had engaged 'one of the best native artists' (Sabine, 1824 pp.412-428). This painter was most likely to have been involved with the export art trade, and therefore published contemporary accounts of Cantonese artists' studios have been sourced. There are several contemporary accounts, including one by La Vallée (1849), and another by Toogood Downing (1838), whose description is one of the most comprehensive. A remarkably similar narrative was published in French some years later by Paul Émile Daurand Forgues writing under a pen name ('Old Nick', 1845); in this instance the text was accompanied by illustrations by Borget. Osmond Tiffany

(1849), an American, also left a comprehensive account of his stay in Canton, describing, for instance, the shops, the *Fa Tee* (Flower Land) gardens and the work of the tea inspectors. Apart from the principals of the better-known studios, such as Lamqua and Sunqua, the workforce behind the export trade went largely un-recorded, a fact acknowledged by Van Dyke who dedicated his book ‘... to all Chinese who have no records or memories of their ancestors who lived, worked and died in the Pearl River Delta’ (Van Dyke, 2005 no pagination). The Collection is exceptional in that Reeves recorded the names of four artists. These are referred to by Whitehead (1969), who estimated their rate of output and rate of remuneration and again by Whitehead and Edwards (1974).

Fan (2004) has made assertions about where Reeves’ artists worked, which are challenged in this chapter. The possible significance of the prefix ‘A’ or ‘Ah’, used to denote familiarity in Cantonese, is considered in the light of information provided by Morrison’s *A Dictionary of the Chinese Language* (Morrison, 1815-22) which was brought out in several parts. For the position of domestic servants Staunton (1822) has been consulted. It would seem that the painting was largely carried out at Macao. Harriet Lowe (Hodges and Hummel, 2002) describes life on the peninsula in the nineteenth century, and this information has been supplemented by Porter (Porter, 1996).

Reeves’ plant introductions are the concern of Kilpatrick (2007), whose research is well-referenced. Her *Gifts from the Gardens of China: the Introduction of Traditional Chinese Garden Plants to Britain 1698-1862* focuses upon the contributions made by individual plant-hunters, including John Reeves and his elder son, John Russell Reeves. Botanical exploration in China was also the subject of an earlier work by Cox (1945). In this chapter his work has been used to highlight the discrepancy between Lindley’s account of the instigation of the Collection and the wording of the Horticultural Society’s Minute of Council of 18th February 1817. The original Minutes in manuscript are held at the Royal Horticultural Society’s Lindley Library and have been extensively quoted to trace the incoming consignments of pictures and their binding, disposal and re-acquisition. The chronology of the Collection has been contextualized by reference to history of the Society, for which Elliott (2004) has been consulted.

In 1859 the contents of the Horticultural Society’s library were sold by auction by Sotheby and Wilkinson, whose catalogue (Sotheby and Wilkinson, 1859) has been quoted in part. At the time when the three Chinese Drawings Large Volumes came onto the market, in 1953, limited background research into the Collection was carried out by Carden (1953), and this was then written up as an article by Patrick Synge in the *Journal of the Horticultural Society* (1953, p.209). A 1998 auction catalogue produced by Christies Fine Art dealers (Christie’s, 1998) has

also been used in connection with the Horticultural Society's Reeves drawings which came onto the market from Lord Derby's Collection.

2.3 The Origin of the Reeves Collection at the Royal Horticultural Society

The Horticultural Society of London was founded in 1804, the first members including Sir Joseph Banks and John Wedgwood (son of Josiah), (Elliott, 2004 p.1) but it was not until 1809 that the Society became formally established with its first charter (Elliott, 2004 p.10). Whether Reeves was one of the early members is not known, since the membership records are not available. It is nevertheless clear that by 1817, on his first return from Canton, Reeves was a member because the manuscript Minutes of Council dated 18th February 1817 record:

That the proposal of John Reeves Esq. to send plants and drawings from China, for the use of the Society, be accepted with thanks-and that the Secretary do offer to Mr. Reeves the advance of such sums as he may require towards the cost of the same.¹⁰⁸

This Minute clearly identifies Reeves as the originator of the proposal. However, Cox quotes John Lindley, writing in 1821, as follows:

“One of the main objects which occupy the Horticultural Society is the introduction of ornamental plants ... and the free distribution of them... As it is difficult to form a very correct idea of the beauty of the plants ... when dried ... it was determined ... that a person should be employed in making drawings of plants in the country where they grew. For several reasons China was selected for a beginning, and particularly as being the residence of John Reeves, Esq., a correspondent and very active member of the Society, under whose immediate superintendence the draughtsman could be placed” (Lindley quoted in Cox, 1945 p.57).

This extract is of interest on two counts. Firstly, there appears to be a discrepancy between the Minute and John Lindley as to who made the original proposal. Secondly, regardless of the originator of the idea, it seems clear that China was selected due to Reeves' residence there, that he was 'very active', and that the drawings he sent back were the first to be commissioned by the Society.

The Society evidently lost no time in drawing up written instructions, for a Minute dated 1st April 1817 records that:

The instructions prepared by the Secretary for our corresponding members Messrs. Reeves & Livingstone,¹⁰⁹ at Canton in China, having been read and

¹⁰⁸ (1817) The Council of the Horticultural Society of London Minute dated 18th February. Vol.2 (no pagination). The Royal Horticultural Society.

¹⁰⁹ John Livingstone was surgeon to the East India Company living in Macao.

approved twenty five pounds was ordered to be advanced to Mr. Reeves for executing the said instructions.¹¹⁰

Reeves returned to Canton prior to the commencement of the trading season for that year (Kilpatrick, 2007 p.200). Before he departed, he wrote to the Court of Directors by letter dated 18th December 1816 requesting a loan of the Company's drawings so that copies could be made. The Court agreed to this request, provided that the copies were made in the library at East India House.¹¹¹ Reeves made reference to these drawings in his letters to Banks, which may have been copies of the ones procured by Kerr (see below). According to a copy of an undated letter to Sir Joseph, he wrote:

... you may command me here to the extent of my abilities-in procuring you or your friends plants or seeds-should they chuse [*sic*] any of those of which drawings are deposited in the museum at the East India House-it will be sufficient to send me only the number of the Drawing.¹¹²

It is likely that at this time he also had two collectors' seals made: one for the Horticultural Society and one for himself (see below).

2.4 Early Drawings at Canton

John Reeves was by no means the first European to commission botanical paintings in China. In 1803 the Directors of the East India Company wrote to the Factory in Canton requesting pictures of plants and miscellaneous subjects (Archer, 1962 p.59, Whitehead, 1969 p.194). Archer quotes part of the reply contained in a letter dated 29th January 1804:

A Botanical Painter has been constantly employed in copying the plants, fruits and flowers of this Country, as they come successively in Season ... Mr. Ker, His Majesty's Botanical gardener, directs his employment and sends a description of those already painted which go ... together with Drawings of the Malacca Fruits by the same artist (Archer, 1962 p.60).

Another letter from the Canton Factory, dated 26th February 1806, records that 'We have continued to employ this Artist ... under the directions of Mr. Ker in completing an additional set of Botanical Drawings (Archer, 1962 p.60). William Kerr,¹¹³ who had been appointed by Sir Joseph Banks to collect plants in China in 1803, had a Letter of Instruction which in turn included a reference to an earlier set of drawings, 'The book of Chinese drawings that Mr. Lance carries out with him will enable you to enquire after many plants that might not possibly

¹¹⁰ (1817) The Council of the Horticultural Society of London Minute dated 1st April. Vol. 2 (no pagination). The Royal Horticultural Society.

¹¹¹ The East India Company Court Book (Sept. 1816-Apr. 1817) p.801.IOR B/164. British Library.

¹¹² Reeves, J (n.d.) Copy Letter to Banks (?) (no pagination). Item MS 5217/7&8. Wellcome Institute.

¹¹³ Kerr's name appears in publications spelt as both 'Kerr' and 'Ker'.

have become known either to Mr. Lance or to you'.¹¹⁴ Despite the opportunities afforded to him by his appointment, Kerr himself seems to have been less than enthusiastic about the mission, and wrote to Kew gardener William Aiton that 'There certainly can be no place more unfavourable to Botanical researches than the European Factories at Canton situated in the middle of a great & populous town'.¹¹⁵ Nevertheless, it is possible that the drawings he sent back to East India House were the ones copied by Reeves and formed the basis of Reeves' early collecting activities for Sir Joseph Banks.

2.5 Reeves' Painters: Names, Status and Studio Arrangements

There is nothing to suggest that Reeves appointed the same artist as had been used for the East India Company drawings. A visual comparison made between the Collection, and several East India Company botanical pictures now held at RBG Kew, as well as a selection of retained pictures held at the British Library, all identifiable by the Company's stamp, would suggest that many different artists were used. While in each case the painting technique is undoubtedly Chinese, there are clear stylistic differences between all these paintings as between themselves and the pictures in the Collection. Different papers were also used. This tends to confirm western written accounts of great numbers of Chinese painters participating in this branch of the trade. It is likely that Reeves found his painters from one or more of the numerous studios in New China Street, Old China Street, or Thirteen Factory Street and that they would have been painting stock pictures for the export market. Quite possibly, they also specialized in natural history drawings, which would account for Sabine's reference to 'one of the best native artists' (Sabine, 1824 p.425), information which probably originated with Reeves.

There are a few accounts of Chinese artists' studios in Canton at this time. The most descriptive is that given by Toogood Downing who visited the shop of the famous portrait painter Lamqua in China Street. In order to understand the probable working arrangements of Reeves' artists, it is worth reciting the relative parts of his narrative:

The house of the artist is ... distinguished ... by the small black board placed over the door, with his name and occupation inscribed in white paint upon it ... Lamquoi [is] at the very top of the building. On the first floor is situated the workshop, where the rice-paper and other drawings are executed, whilst the ground floor is occupied by ... the shop. This is the general arrangement of the domicile of all the artists in this outside city ... Upon entering ... you pass into the shop where the finished articles are exposed for sale. The most valuable of these are the rice-paper drawings ... There are many things sold

¹¹⁴ Banks, J (n.d.) Letter to Kerr. Dawson Turner Collection Vol.14, pp. 61-68. British Museum (Natural History).

¹¹⁵ Kerr, W (n.d.) Letter to Aiton. Add.MS.33981. pp.138-139. British Library.

here which are not made on the premises, kinds of stone...carved in a curious manner...[On the] first floor...you see from eight to ten Chinese at work, with their sleeves turned up, and their long pigtailed tied round their heads lest they should be in the way of their nice and delicate operations. Light is ... admitted from large windows... The room is not large...but the pictures which are arranged and fastened up so as to cover the walls on all sides. These are of various kinds...for sale...Native drawings of boats, villages, landscapes etc are among the rest ...and have often a curious and grotesque appearance. Long benches...are placed about the room, with just sufficient space between them to allow the artists to move freely in and out. (Toogood Downing, 1838 pp.92-95).

The 'things sold here which are not made on the premises' will be considered in chapter 4. Pictures of the interior and exterior of Lamqua's studio by Auguste Borget appeared in Paul-Émile Daurand Forgues' account of this establishment, in which the wording on the shop sign was recorded as 'Lam Qua, handsome-face painter' ('Old Nick', 1845 p.55). The studio of an equally well-known painter, Tinqu, gives some idea of a Cantonese export studio at this time (Figure 7).



Figure 7. Tinqu's studio painted *circa* 1855. (Crossman, 1972 p.105)

Tiffany also visited Lamqua's studio and added that:

[Lamqua] sits in the upper story [*sic*] and is very glad to have you come and look at his paintings, and talk over the fine arts. His walls are decorated with his own copies of English paintings, and he possesses the engraved works of several British artists. His admiration for Sir Thomas Lawrence is profound (Tiffany, 1849 p.85).

The Reeves notebooks (unpublished) are titled *China Fishes*, sub-titled 1829 March. *Fishes of Macao* (Reeves, 1828- 1830a) and *Reeves Chinese Fish* (Reeves, 1828-1830b). Both notebooks record the names of four painters: Asung, Akam, Akew and Akut and payments made to them in dollars. While the second volume deals only with the painting of fish, *China Fishes* (Reeves,

1828-1830a) also records the occasional painting of plants. For instance, page 12 contains the following entry:

[21st April] C3 *Urtica T* [?]issa / Japan painted by akew in flower at Beales
 23rd [i.e. 23rd April] D3 *Deutzia scabra*/Thun/Japan in flower at Beales
 (Reeves, 1828-1830a p.12).

Page 14 of this notebook records the painting of 'E1 *Hypericum patulum*/Thun/Beale' (Reeves, 1828-1830a). These entries have been compared with the list of plant names represented in the Reeves Collection at the Lindley Library.¹¹⁶ C3, D3 and E1 do not appear on the Royal Horticultural Society's list. However, the Collection does hold a picture of a *Hypericum* on page 18 of Chinese Drawings Small Volume III, which may be the drawing referred to by Reeves. Reeves Chinese Fish (Reeves, 1828-1830b) contains many entries such as the following:

Paid Akew 4 dolls [sic] 3rd May
 10 Paid Akew 3 dols [sic].
 19 Paid Akew 2 dolls [sic] (Reeves, 1828-30b p.50).

This notebook also records:

w/e 57[?] . List of fishes painted by Akew for his wages (Reeves, 1828-30b no pagination).¹¹⁷

It seems clear from the entries that the painters were being paid according to the number of pictures produced. Whitehead (1969 p.200) estimates that Reeves paid one dollar for three drawings, although he points out that it is unclear whether each payment was made for three separate drawings, or whether the price was attributable to the three copies of one drawing. According to this writer, Akut completed 54 drawings in forty-eight days, and Asung 120 drawings in 149 days, so that the rate of painting appears to have been roughly one picture per day (Whitehead, 1969, p.200). It is perhaps interesting to note that compared to the painters encountered by Osmond Tiffany, who were paid 'one to two dollars a dozen' (Tiffany, 1849 p.84) for their pictures, Reeves' artists seem to have been relatively well-remunerated.¹¹⁸

The reference to Akew's wages raises another interesting point. Fan is of the view that 'Evidence suggests that Reeves had the artists initially come to his house to execute botanical and zoological illustrations under his close supervision; and once the artists learned the principles, they worked at their studios' (Fan, 2004 p.51). For the first part of this statement, he cites as his authority the obituary in the *Gardeners' Chronicle and Agricultural Gazette*, the relevant part of which reads, 'Among the methods by which Mr. REEVES ascertained what

¹¹⁶ (n.d.) Typed sheets headed 'REEVES, John'. The Royal Horticultural Society.

¹¹⁷ Reeves' 'Chinese Fish' is partially paginated.

¹¹⁸ Although it is appreciated that Tiffany's painters may have been producing smaller works, so that this may not be an entirely fair comparison.

would be acceptable in England was the transmission of drawings, executed in his own house, under his own superintendence in order to secure himself against the deceptions practised by the native draughtsmen.’ (*Gardeners’ Chronicle and Agricultural Gazette*, 1856 p.212). Fan then concludes, from the wording in the notebooks, that the artists subsequently worked at their own studios. It is difficult to see how this conclusion was reached based solely on this material.

Whether the painters worked at Reeves’ house in Macao must remain a matter of conjecture. However, there are a few indications which, it is submitted, would tend to militate against Fan’s conclusion, not least of which is that the verifiable factual information given in the obituary was correct and there is no reason to suppose that the author was not equally careful to accurately record other details. The notebooks record numerous small payments being made to each artist, and the fact that there is a reference to Akew’s ‘wages’ suggests that he may have been regarded as a servant or employee. This is in contrast to an entry relating to other types of payments where no mention is made of wages:

Boat from Goqua [a tea merchant] paid Jack 7 dolls [*sic*] anchor. [?] and 5 dols [*sic*] Kunsha [?] and 4 men each 1 dolls.[*sic*]4=16 [?] (Reeves, 1828-30a p.7).

It has already been shown that private servants were employed by Company men (para. 1.5.2). The names given for the painters are of interest because they were not their family or trade names. The prefix ‘A’ or ‘Ah’ denotes a degree of familiarity and, according to the Chinese-English part of Morrison’s *A Dictionary of the Chinese Language*, it denoted someone of the second or inferior class. He states that ‘This is the appellative so common in the names of poor people, as A-lan, A-pin etc’ (Morrison, 1815: Part 2 p.1). Also in Part 2 of the *Dictionary of the Chinese Language*, ‘KEW - 6295’ [the number of the character] is stated to be a surname (Morrison, 1815: Part 2 p.458). Part 3 of the work, which is an English-Chinese dictionary, gives the character for the sound ‘A’ or ‘Ya’ as ‘an appellation which precedes the names of the labouring part of the community, is in the provincial dialect of Canton, pronounced as a *broad*. Thus they say A-lam, A-wong’ (Morrison, 1822: Part 3 p.1). It seems likely therefore that the family names of Reeves’ painters would have been Sung, Kew, Kut and Kam respectively and that they were servants, regarded as belonging to one of the lower orders of Cantonese society. Two further examples of this appellation appeared in Harriet Low’s diary:

Our servant or compradore is [a] very shrewd fellow, speaks pretty good English...I asked him how he knew how old I was. O, he says; “I can see; I can Sava, (know)”... His name is Apew. The boy’s name is Apun. (Hodges and Hummel, 2002 p.70)

These names can be contrasted with some of the studio names of the men who set up their own establishments; Lamqua and his younger brother the water-colourist Tinquua, Sunqua, Fatqua, Youqua and Pu Qua, for example (Crossman, 1991 pp.188-189). Berry-Hill says that:

The word “Qua” which tails many Chinese names approximates to the English “Mister”, “Sir” or “Esquire”: It indicates a far lower station than that of Mandarin, but considerably superior to a worker or coolie ... [for example] merchants Hou Qua, Tin Qua, Consequa etc ... (Berry-Hill, 1970 p.47).

The author of *Tinquua Paintings from his Studio* states that “Qua” is a corruption of “kuan” or “koon” which is merely a term of respect and the prefix was seldom a part of an actual name’ (Warner, 1976 p.4). The names of Reeves’ artists suggest that they may have been regarded more in the way of domestic servants than successful freelance painters operating from their own studios. This view is further supported by the fact that they travelled to Macao with Reeves, as was recorded in the two unpublished notebooks. These notebooks record the painting carried out as late as 1828-1830, yet Reeves was still exercising close supervision over the work. In *Reeves Chinese Fish* (Reeves, 1828-1830b), under the heading of ‘Fishes copied at Macao’, the following entry appears; ‘Eight species of *Labrus* [?]. No 86 looks so like an artificial painting that I procured another specimen and had painted by another man - which is added now’. (Reeves, 1828-1830b. p.1). This painting was again referred to at page 63 in the list of drawings sent to General Hardwicke, ‘No. 86 looks so like an artificial painting that I procured another specimen and gave another painter to do - which is added here... The colours are very changeable’. (Reeves, 1828-1830b p.63). This suggests that Reeves was keeping close scrutiny of the specimens and of painting process, which may also be borne out by graphite pencil inscriptions made on several Chinese papers in the Collection.

For instance, Chinese Drawings of Plants Small Volume 4, page 145 contains two small pictures on Chinese papers. Picture 145a (*Alteranthera sessilis*), referenced ‘2r’ by Reeves, is inscribed on the verso in Reeves’ handwriting ‘7 April 1828’, and picture 145b (*Altingia chinensis*) is inscribed ‘59 Achew 18 Aug Akut 59’. The painting of *Bulbophyllum bicolor* at Chinese Drawings Small Volume V, p.22, picture ‘a’, which was referenced by Reeves as ‘2m’, is inscribed ‘6 May 27 Akut’, and similarly the painting of *Glochidion rubrum* (Chinese Drawings of Plants Small Volume IV, p.118) is inscribed on the verso ‘Copy Akam’. Akam’s name also appears in graphite pencil on the verso of a picture of *Phyllanthus emblica* (Chinese Drawings of Plants Small Volume IV, p.115, painting ‘c’) and a picture of *Salvia japonica albiflora* (Chinese Drawings Small Volume IV, p. 60). Chinese Drawings of Plants Small Volume V, page 23 holds two pictures, ‘a’ and ‘b’. On picture ‘a’ (of *Ludisia discolor*), Reeves noted ‘Beale 17/5’. While none of the above inscriptions prove that the painting was carried out at Reeves’ house in Macao, they do go to show that a very close degree of

supervision was being exercised, which would be consistent with this *modus operandi*. They also serve to confirm that the botanical paintings were undertaken by at least three of the four painters who carried out work on the fish pictures, and in this respect they are entirely compatible with the entries in the two notebooks.

Some of Reeves' letters to Banks and to Brown would also suggest a close connection between the drawings and the fate of the drawn specimens, which would again be more consistent with a watchful employer than an arm's length patron of a local studio. For instance, in a letter to Banks, Reeves wrote, 'In spirits will be found part of a bunch of the flowers & a fruit of the male Papaya from which a drawing now sent to the Horticultural Society was made – this fruit was taken from a tree at Macao ...'¹¹⁹ and to Brown, he wrote in March 1822:

You will find in Mr. Pott's charge a box with dried specimens & another with some in spirits – in the former are several of the *Adenodus* of Lourcero Dg no 144 and which in the book you sent me you have marked in pencil as the *Eleocarpus* of the Banks. Herb *Cookia anisata* from which Dg No 49 was made¹²⁰.

The difficulty with the notion of the painters living as domestic servants was outlined by George Staunton (para. 1.5.2). However, it is clear that Reeves was able to obtain paintings to order and, from his notebooks, it is equally clear that painting was carried out by his artists at Macao. Porter (1996) makes several references to the comfortable and westernized life led by Europeans and the wealthier Macanese, and this is substantiated by the entries in Harriet Low's diary (Hodges and Hummel, 2002). The Chinese authorities appear to have been rather less insistent on strict compliance with their regulations and Porter, referring to Harriet Low's journal, cites as an example the use of sedan chairs:

In Canton, foreigners were prohibited from riding in sedan chairs, and the use of Chinese servants as bearers in Macau was outlawed by the Chinese. But the practice was generally ignored by the Chinese authorities, and by the nineteenth century, many foreigners, not only the Portuguese, were using large sedans carried by Chinese servants (Porter, 1996 p.138).

Reeves himself made reference to Chinese servants in connection with the care of plants¹²¹ and on 16th November 1819 a paper by John Livingstone was read to the Horticultural Society concerning the transportation of plants from China, in which he advocated the sending out of a gardener, who 'should reside at Macau, having a suitable establishment, a house, garden, and

¹¹⁹ Reeves, J (n.d.) Letter to Banks. Item MS5217/7&8. Wellcome Institute.

¹²⁰ Reeves, J (1822) Letter to Brown dated 16th March. Correspondence of R. Brown 1760-1858, Vol.II, 1813-1825, pp.16-317. MS32440. British Library.

¹²¹ Reeves, J (n.d.) Letter to Lindley[?]. The Royal Horticultural Society.

native assistants' (Livingstone, 1820 p.421). Clearly, he saw no insuperable difficulty in the employment of Chinese gardeners.

2.6 Painting in Canton and Macao

It is suggested that, in Macao at least, Reeves may have installed the painters in the Company's premises, either in the offices or in his 'house', described in the previous chapter, where there would have been sufficient natural light. There are several reasons for concluding that much of the painting was undertaken at Macao, rather than in Canton.

Firstly, the trading season was short and occupied the autumn and winter months, and Reeves' letters to his family and to Banks reveal that his work was intensive (see previous chapter). The larger part of the year was spent at Macao where there would have been time to select specimens, and oversee the painting.

Secondly, the two notebooks record a very substantial number of fish paintings carried out at Macao, and include references also to a few plant paintings. It is known that Reeves went plant-hunting with Livingstone on the outlying islands (see para. 1.8), and that plants were also collected from the surrounding hills. John Potts noted in his Fair Journal that Beale sent his gardener 'up country to collect plants where the British are not permitted to go' (Potts, 1821-1822b no pagination) and John Damper Parkes in his Rough Journal recorded plant-hunting trips to 'the hills', 'to Lapa Hills' and 'to Moha Hills' (Parkes, 1823-1824 p.44).

There were also flower gardens on the peninsula, again recorded by Harriet Low:

April 1st [1830] Went to the flower gardens. Bought some beautiful flowers to put on our terrace, a beautiful white *Camelia Japonica* [*sic*], passion flowers, and some others. One called a nun flower is a very singular one (Hodges and Hummel, 2002 p.128).

Another ready supply of plants was Beale's garden and The Casa Garden. There were also other private gardens at Macao, such as that owned by a Mr. Fearon. This was described by Harriet Low as '... the most romantic place ... very extensive and abounds in serpentine walks. A fine view of the sea, you ascend hills, immense rocks and trees. There are several temples in the garden ... In another part a cave in the rocks, where ... Camoen[s] wrote his *Lusiad*' (Hodges and Hummel, 2002 p.71). Porter says the 'Gardens [in Macao] were and still are one of the greatest delights of the city's residents and ... Many of the early foreign residences had attached walled gardens for the private enjoyment of the owners and their guests' (Porter, 1996 p.153). In other words, Reeves appears to have had access to many new plants at Macao.

Thirdly, it would seem that parts of the inscriptions on the small pictures referred to above record dates - '6 May 27', '7 April 1828', 'Beale 17/5', for example, which relate to the summer months when the Factory would have been at Macao.

However, perhaps the most compelling evidence is that which lies within the Collection itself. Almost all the flowering plants (as opposed to the vegetables and a few bonsai specimens) were painted in flower. This would partly have been due to the need to provide as much information as possible to botanists and horticulturalists to aid identification and classification, but also because the Society was concerned to introduce useful, new and interesting plants. Such decisions could best be made with the inflorescence in view. As would be expected, the flowering periods for the majority of the indigenous plants coincided with the spring, summer and early autumn months, i.e. the months when the Factory moved to Macao. This is borne out by Reeves' naming of 148 flowering plants listed in Morrison's *Dictionary of the Chinese Language* according to the Chinese lunar calendar; 'First Moon's Flowers, Second Moon's Flowers' etc., for which Morrison acknowledged his indebtedness in print (Morrison, 1822: Part III: Section 6 p.159 et seq.).¹²² For example, *Yun lan haw* [Yu lan hue], which Reeves named *Magnolia Yuan*, was listed as one of the First Moon's Flowers, and would therefore have been in flower during the period from the end of January and during February. The majority of the plants listed flowered during the Second Moon to the Seventh Moon, roughly corresponding from March to mid-August. There were no plants listed for the Thirteenth Moon which equates approximately to the end of December and into January (Burkhardt, 1953 pp.11-72.). The dearth of flowering plants during the late autumn and winter months was recorded by John Dampier Parkes in his *Rough Journal*, 'Its been a mere speculation respecting the beauty of plants collected in a wild state; as there has been scarce any thing in blossom since my arrival in China; being the autumnal part of the year (Parkes, 1823-24 p.5).

Interestingly, S. Leigh Sotheby and John Wilkinson, auctioneers' sale catalogue of 1859 includes the following wording in the description of the pictures in the five Chinese Drawings Small Volumes '... the greater part were made under the eye of the late Mr. Reeves, at Macao;...' (Sotheby and Wilkinson, 1859 p.48). It seems likely that the information contained in the catalogue would have been supplied by the Horticultural Society, and probably also checked and approved by the Society's Secretary prior to publication.

The only surviving letter of Reeves making detailed reference to plant collecting, and incidentally to the drawings, is an undated original held at the Lindley Library, among papers

¹²² Prior to the introduction of the Western calendar into China in 1912, the Chinese used the lunar calendar comprising 13 months, each of 28 days. Chinese New Year's Day fell (and still falls) on a fluctuating date between the end of January and the end of February.

dated December 28th 1842-February 23rd 1843, which relate to the work of the Chinese Committee. It would appear that, like the others in this small collection, the letter was addressed to John Lindley. In it, Reeves advised which plants to concentrate on collecting and outlined the reasons for his failure to send home more live plants:

... look at the Drawings I sent home to the Society from China more particularly those upon the smaller sized papers - and see how many of the plants growing then near me at Macao & Canton are yet unknown at home - if theres [*sic*] many at hand almost all are still wanted ...

The E. I Company's Factory were obliged to be at Canton during the season for business - as examining receiving & shipping teas etc - and when the business was over & the ships despatched the factory returned to Macao for the summer months. However tho I saw the Flowers & had sketches made of several plants - I seldom or never could see the seeds: being then necessarily absent. And if at any time I procured young plants and potted them/and some hundreds I may say I did in this way /yet unless a conveyance was at hand they were necessarily left behind us - and perished before our return - Do not suppose a Chinese servant / the few who remained /would think of them of value enough to attend to in our absence.

I think then the gardener if sent out should remain at least 12 months. the [*sic*] passage money will be the same - the extra expense his board etc during this period: he could then pot and establish some live plants-and send home-and could collect seeds and specimens. I would recommend him at all times to collect whatever seed he can from the Hedges (the Macarteney Rose is a hedge Rose /Ditches Fields & Plains-and recommend the same plan to anyone going [out?] even for a walk.

The Chinese will not pay attention to them - calling them weeds... Of the profusion in which some of the Plants can be obtained - I have had [?] literally brought in by baskets full - even had as much of your Drawing 113-as would carpet a Room.¹²³

It is not entirely clear from the wording of this letter whether Reeves was referring to sketches being made in Canton or at Macao. It seems more likely that he was referring to Macao, since most plants flowered during the summer months, and by the time the plant had set seed during in the autumn, he would have been on his way back to Canton. Furthermore, he refers to the collection of seed from the hedges, which, given the restrictions on foreigners, would not have been possible in Canton. The reference to potting up plants may relate to work carried out both at Macao and Canton. It is clear from the journals of Potts and John Damper Parkes that potting up was carried out at both venues, possibly in the gardens adjoining the Factories. According to entries in Potts' Rough Journal and Fair Journal, Beale had given permission for all the plants intended for the Society to be placed in his garden where they were cared for by his gardener

¹²³ Reeves, J (n.d.) Letter to Lindley [?]. The Royal Horticultural Society.

(Potts, 1821-1822a no pagination; Potts, 1821-22b no pagination), although it is not clear whether the potting up was carried out in this garden or at the Company's premises. At the Canton Factory, it would seem Reeves had to rely on the Company's skeleton staff of Chinese servants to care for his plants during the summer months.

While much of the painting may have been carried out at Macao, and the painters may have lived as servants in Reeves' house, as did Parkes (Parkes, 1823-1824 no pagination), it seems unlikely that the same situation would have obtained in Canton for the reason given by Staunton. During the winter months at Canton, Reeves would have had access to plants at the *Fa-Tee* [Flower Land] gardens, where he took both Potts and Parkes, and to the gardens of the *Hong* merchants at Honam. He also had plants brought down by Chinese collectors¹²⁴ and it seems unlikely that he would have missed opportunities to record these. While there is no archive material to elucidate the arrangements with the painters in Canton, it seems probable that Reeves would have continued to select plants for painting, camellias and magnolias for example, which flowered during the winter and early spring months.

From descriptions of the layout of the New Factory, it seems likely that the ground floor rooms, where the servants were employed, would not have been sufficiently well-lit for painters. Painting may have taken place in the open air beneath the veranda (adjoining the garden) or in one of the courtyards between the buildings. Archer gives an example of the outdoor supervision of indigenous artists in India by reference to Lady Raffles' diary, which she kept during her husband's tour of duty at Bencoolen 1818-1822, '[Sir Stamford Raffles] wrote, read, studied natural history, chemistry and geology, superintended the draughtsmen, of whom he had constantly five or six employed on a verandah...' (Archer, 1962 p.61). However, this seems unlikely at Canton during the winter months and during the course of this research, no published or unpublished accounts have been traced of Chinese export painters working *al fresco*. Another possibility is that the painters were based in the Old Factory, where Reeves lived. It seems more likely, however, that Reeves' artists were export painters who had previously worked in a Canton studio and that on their return to the city they resumed work in one of approximately thirty studios located near the Factories (The Chinese Repository, 1836 p.291). This would have overcome the problem of the restriction on numbers of servants, and the studio would have been within easy walking distance of the Factory.

In summary, the predominance of pictures of spring, summer and autumn flowering plants within the Collection, coupled with the inscriptions on a few of the paintings, the abundance of available specimens at Macao and the fact that Reeves would have had the time and opportunity

¹²⁴ Reeves, J (1814) Letter to Banks dated 10th October. Banks Correspondence 1765-1842. Vol.6, 1810-1821. ff 56&57. Add MS 33.982. British Library.

to closely supervise his artists all tend to show that the majority of the work was carried out on the island. It is suggested that it was quite possible that the four painters lived in Reeves' quarters within the East India Company building overlooking the Praia Grande where they worked in good natural light. On the other hand, the pictures of winter flowering plants, such as the magnolias, were probably painted in Canton where the artists may have recorded their specimens in their own studios which would have been close to the East India Company Factories.

2.7 The Drawings in China

John Reeves kept at least some of his drawings in Canton and Beale similarly had drawings there (Potts, 1821-22a no pagination; Potts, 1821-22b no pagination), although whether they were supplied by Reeves is not known. It is clear that Reeves deposited with him with one copy of his fish drawings (Whitehead, 1969 p.199). Reeves may also have supplied him with an additional set of flower paintings in recognition of the assistance Beale gave him in supplying plants and arranging for his gardener to care for them (Potts, 1821-22a no pagination; Potts, 1821-22b no pagination).¹²⁵

Potts made several relevant diary entries during his stay at Canton:

- Nov. 13 [1821] Visits several Chinese gardens, looking over Mr. Reeves drawings, picking out the Chrysanthemums
- Nov. 21 [1821] Goes with Mr. Reeves to look at some samples of flower pots. looks over Mr. Beales drawings
- Nov. 28 [1821] Sows some seeds in the boxes packed yesterday looking over Mr. Reeves & Mr. Beales drawings
- Dec. 6 [1821] looking over Mr. Reeves drawings...
- Dec. 11 [1821] Packing some boxes of Plants, receives some Camellias from Macao, looking over some Chinese drawings intended for the Emperor of Austria (Potts, 1821- 22b. no pagination).

Parkes also made a reference to one of the drawings while at Canton:

- Nov. 20 1823 A Camellia which is scarce at Canton...It has flowered. I have seen a drawing of [it] with Mr. Reeves (Parkes, 1823-24 no pagination).

John Reeves himself made several references to the Society's drawings in his letters (see below). It is not clear where the drawings were kept, but since the Factory had a library, it seems likely that they were kept there in comparative safety and in readiness for despatch.

¹²⁵ Reeves, J (1830) Letter to Lindley dated 14th October. Letters to J. Lindley L-Z Vol. 2, ff754-756 RBG Kew.

2.8 Reeves' Numbering System

The drawings will be considered in further detail in the next chapter. For the purposes of this chapter, an explanation of Reeves' numerical and alphabetical systems is required in order to trace their arrival at the Society's headquarters in Regent Street. The two types of drawing will be dealt with separately.

2.8.1 Drawings on Western Papers

An example of a full-page drawing on western paper is given below in Figure 8.



Figure 8. Drawing on western paper of *Nelubium speciosum*. Chinese Drawings of Plants Small Volume 1, p.23. (The Royal Horticultural Society)

The drawings executed on these large papers were numbered by Reeves 1, 2, *et seq* (Figure 9). This was established by comparing the hand-written numbers with known examples of Reeves' written numbers in his letters and in the two notebooks (Figure 10). The numbers '4', '5', and '7' in both documents in Figure 9 and Figure 10 bear a strong resemblance to each other.

In almost all cases the numbers were inked (using iron gall rather than Chinese ink) within a cartouche which formed the lower part of the collector's mark. This was applied to the bottom right hand side of the page, as was the collector's mark portraying the coat of arms used for Reeves' own copies, now held at the British Museum (Natural History). Some of these numbers are intact, from which it has been possible to reconstruct the original sequence of painting in part. In order to do this, the numbers from the pages of all eight volumes were collated.

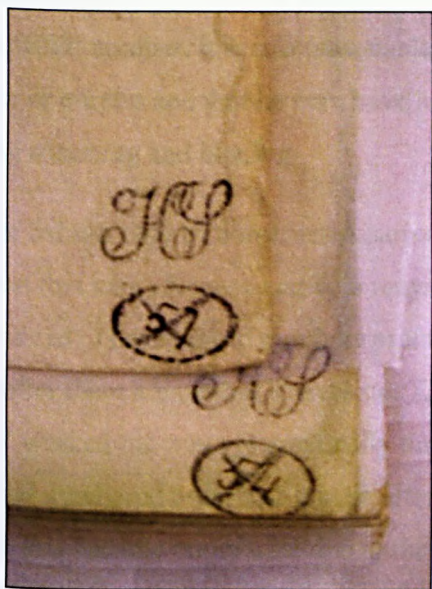


Figure 9.

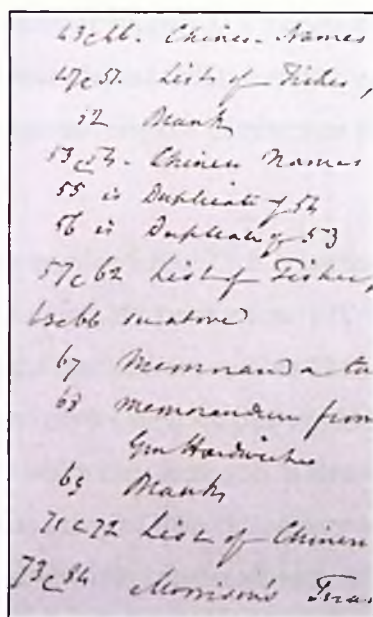


Figure 10.

Figure 9 (Left) Handwriting sample. Chinese Drawings of Plants Small Volume IV, pp.81 and 82. (The Royal Horticultural Society)

Figure 10 (Right) Handwriting sample. China Fishes, p.12. (British Museum (Natural History))

It was noticed during this part of the research that in very many instances where the inked collectors mark had been removed, or substantially removed, probably during binding, the initials 'EJD'¹²⁶ and a number were endorsed on the verso in graphite pencil and that these initials and numbers never appeared on drawings where the Reeves number remained intact. The 'EJD' numbers were therefore incorporated into the list of Reeves numbers. The resulting list of plant drawings appears in Appendix IV.

A few conclusions can be drawn from this exercise, as follows:

1. Reeves appears to have duplicated his own numbers in only one or two instances. For example, there are two pictures numbered 20 and 26, but in each case only one has been inked within its cartouche. It seems likely that the numbers without a cartouche formed part of a separate series. This certainly holds true for a collection of pictures of *Camellia japonica* which appears in Chinese Drawings Large Volumes I and II. These were numbered 1-65 in ink, but none of these numbers appears within an inked cartouche. It may be concluded that these pictures form a separate sub-series.

¹²⁶ It has not been possible to identify 'EJD'. Dr. Brent Elliott, historian to The Royal Horticultural Society, has confirmed that a Dr. Daniels was working at the Society during the 1850's, but no further information about him, such as his fore-name, has come to light. Pers. Comm 23rd June 2009.

2. There are only a couple of instances where the same number appears as a Reeves number and as an 'EJD' number. It seems reasonable to conclude that the letters 'EJD' were the initials of a binder or curator and that he may have been recording Reeves' original numbers on sheets during trimming and binding.

3. The list can only be constructed partially up to picture number EJD 373. It is perhaps of interest that many Reeves numbers remain intact up to number 211 (with a few 'EJD' numbers intermixed). The endorsed numbers prefaced 'EJD' expand the list from number 221 to 373 and thereafter there are neither Reeves nor EJD numbers. One explanation for this would be that 'EJD' worked his way systematically through the sheets while they were still in Reeves' original numbered order and that he attempted to retain as many of Reeves numbers as possible. When this became impossible due to the need to fit the sheets into smaller albums, he continued to record the numbers on the verso. The fact that this methodology was abandoned at some point after drawing 373 suggests that a different person took over the work and trimmed away Reeves' numbers, without recording them. It is suggested that 'EJD' may have been the binder who removed the drawings from the guard books into which they had been bound in Reeves numerical sequence by the earlier binder named 'Francis', whose work is recorded in the Society's Minutes (see para. 2.9 below).

4. The list can be compared with the comparatively recently typed Royal Horticultural Society's list of Reeves drawings.¹²⁷ The latter sets out the drawings alphabetically according to plant name, with the addition of a few Chinese plant names. Some entries can be matched to plants named in Reeves' correspondence. For example, in a letter to the botanist Robert Brown¹²⁸ Reeves makes the following references:

I. *Adenodus*: Drawing No. 144

This drawing is named in Royal Horticultural Society's typed list as *Eleaeocarpus chin.* *Adenodus*. The drawing, which is to be found in Chinese Drawings of Plants Small Volume IV at page 145, is not numbered, except for '144' appearing in graphite pencil on the verso. This suggests that the pencilled references on the verso of many of the drawings were endorsed as a record of Reeves' original number (see para. 2.10 below).

II. *Scutula*: Drawing No. 143

Drawing number 143 is located in Chinese Drawings of Plants Small Volume V, page 114. There are two pictures on this page, one of *Lilium brownie*, the other of *Memecylon*

¹²⁷ (n.d.) Typed sheets headed 'REEVES, John'. The Royal Horticultural Society.

¹²⁸ Reeves, J (1822) Letter to Brown dated 16th March. Correspondence of R. Brown 1760-1858, Vol.II, 1813-1825, pp.316-317. MS32440. British Library.

floribundum. The latter is marked ‘*scutula*’ and ‘*memecylon*’ on the verso in pencil. This appears to be an example of a plant which has been re-classified or re-named since Reeves knew it.

III. *Cookia anisata*: Drawing No. 149

Drawing 149 in Chinese Drawings of Plants Small Volume II at page 129 is now re-named *Clausia anisata* (on account of its distinct aniseed flavour).

IV. *Adenodus* : Drawing No. 138

Apart from the *Eleaeocarpus* referred to above, there are four other *Eleaeocarpus* plants found in the Royal Horticultural Society’s alphabetical list. *Eleaeocarpus huletti* (Chinese Drawings of Plants Small Volume IV, p.146) is endorsed ‘EJD 226’ and *Eleaeocarpus spp* appears as two small adhered pictures referenced by Reeves as ‘20’ and ‘21’ at page 147 of Chinese Drawings of Plants Small Volume IV. It may be concluded that drawing 138 is either *Eleaeocarpus stipularis* (Chinese Drawings of Plants Small Volume IV, p.148) or *Eleaeocarpus sylvestris* (Chinese Drawings of Plants Small Volume V, p.92).

V. Red air plant: Drawing No. 45

Drawing numbered 45 is named in the Royal Horticultural Society list as *Dendrobium sp* and appears in Chinese Drawings of Plants Small Volume V at page 38. The ‘red air plant’ would have been a reference to one of the epiphytes, about which there was much interest from British botanists at this time. It is suggested that either Reeves mistakenly referred to the wrong number, or more probably, that this drawing was one of the series of small drawings on Chinese papers, some of which were also numbered chronologically.

The information provided by the letters assists in confirming the dates of the drawings, where they can be identified within the Collection. All the above must have been painted prior to the date of the letter (16th March 1822) and this information serves to support the information provided by the Society’s Minutes, referred to below.

The references to numbered drawings in Reeves’ correspondence with Sir Joseph Banks almost always refer to the drawings held in the museum at East India House. However, there is a reference to Horticultural Society’s drawing No. 56,¹²⁹ which is *Lagerstoemia speciosa*, now found in Chinese Drawings of Plants Small Volume III at page 26.

¹²⁹ Reeves, J (n.d.) Copy Letter to Banks. Item MS 5217/7&8. Wellcome Institute.

It has been contended by Whitehead (1969) referring to research carried out by Archer, (Archer, 1962 and 1969) that some of the pictures in the Reeves collection at British Museum (Natural History) were not commissioned, but were stock pictures. He says:

... there is a drawing of a water melon in the Reeves Collection [at the British Museum (Natural History)] which exactly matches one in the India Office Library (Cat. No. HND. 42). But this drawing could not have been commissioned by Reeves since it was in the India Office before Reeves went to China (Whitehead, 1969 p.196).

At plate 12 of Archer (1962 Plate 12 and p.100) there is reproduced a monochrome print of a watermelon, *Citrillus vulgaris*. There is no copy of this drawing among the pictures in the Collection and no reason to suppose that the drawings on western papers in the Collection were other than original commissioned work. There is evidence for the Society having copies made of East India Company Chinese pictures and from Chinese flower pictures in the ownership of Lady Banks.¹³⁰ It is also now known that Reeves took a set of copies of East India Company drawings with him to Canton (para. 2.3). If any duplicates of Company pictures come to light in the Reeves collection at the British Museum (Natural History) or in the Collection at the Royal Horticultural Society, this may be due to Reeves' copies of the Company drawings made at East India House having become inter-mixed with his commissioned work.

A comparison has been made between the countermarks on the papers and the year of execution of the drawing estimated from its number. The results of this exercise are considered in the conclusions to this chapter.

2.8.2 Drawings on Chinese Papers

The remaining part of the Collection comprises a selection of small paintings on Chinese papers without graphite under-drawing, collectors' mark or ideograph, which have been adhered to large western sheets and bound into the volumes, intermixed with the larger pictures (Figure 11).

These are thought to be stock paintings, purchased rather than commissioned. Several graphite pencil inscriptions in Reeves' handwriting giving the names of the painters (para. 3.3.3.2), dates of painting and to the information provided about the painting of pictures referenced C3, D3 and E in the notebooks, referred to above, together indicate that these paintings were likely to have been executed by Reeves' painters.

¹³⁰ (1826) *Transactions of the Horticultural Society of London*. 6, pp.483 & 485. The Royal Horticultural Society.

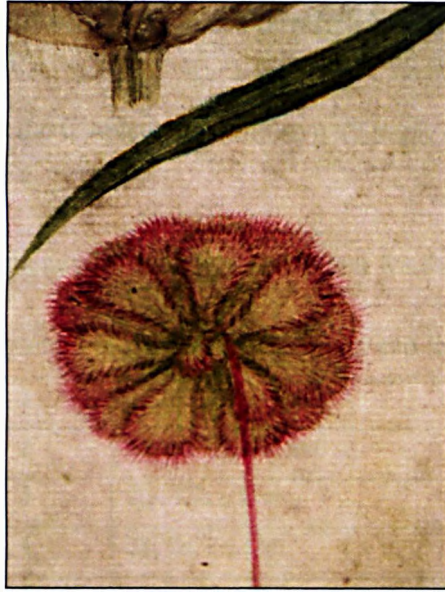


Figure 11. Drawing on a Chinese paper of *Drosera rotundifolia*. Chinese Drawings of Plants Small Volume III, p. 116. (The Royal Horticultural Society)

This would then account for the references to ‘Miscellaneous Drawings’ in the Minutes, almost from the outset of the project, and it would also explain why Reeves urged Lindley, and coincidentally Robert Fortune, to concentrate on the plants depicted in the smaller pictures in his undated letter to Lindley.¹³¹

Producing these drawings on Chinese paper using Chinese materials would have been entirely consistent with the artists’ former practice. It must remain a matter for speculation, but it seems likely that between commissions from Reeves executed on western papers, during quiet periods his artists continued to produce small drawings for sale. It seems equally likely that since Reeves had not commissioned these pictures, he was reluctant to pass them on to the Society with any guarantee as to accuracy, and therefore sent them separately annotated, and on at least on one occasion, on approval.¹³²

It is worthy of note that when the contents of the Lindley Library were sold by the auctioneers Sotheby and Wilkinson in 1859, only three years after Reeves’ death, the catalogue rubric to Lot 965 (the five Chinese Drawings of Plants Small Volumes) included the following wording:

The greater part [of the set] were made under the eye of the late Mr. Reeves, at Macao; the remainder were purchased by him for the Society, after being

¹³¹ Reeves, J (n.d.) Letter to Lindley[?]. The Royal Horticultural Society.

¹³² (1821) The Council of the Horticultural Society of London. Minute dated December 19th. Vol.4, (no pagination). The Royal Horticultural Society.

compared with the specimens from which they had been taken (Sotheby and Wilkinson, 1859 p.48).

This would be consistent with the conjecture set out in paragraph 2.6 and with Reeves’ close supervision already noted.

There appear to be several sequences of numbers and letters for these pictures, as follows:

Sequence	Reference numbers and letters
1	1, 2, 3, etc.
2	aa, dd, gg, hh, etc.
3	B2, C2, E2, etc.
4	2a, 2c, 2e, etc.
5	a, b, c, h, etc.
6	C, E, F, etc.
7	A2, A4, A7, etc.
8	B2, B3, B5, etc.

There is no complete sequence; for example, in sequence 8, B1 and B4 are missing. It may be surmised that since Reeves was obliged to use a number of sequences, there must originally have been a considerable number of these small pictures.

Sequences 7 and 8 are referred to in a letter to Brown dated 13th November 1820¹³³:

Specimens of female plant of Drawing A2 also of A11 of *Rhamnus* A30 *Barbula* (Loureiro/B9). Some plants of two minute species of [orchids?] as A7. *Cornutis Luinata* / Lour /A29 *Cornuta Pyramid* A8 - a small bulbous rooted plant with 2 or 3 round fleshy leaves ...

The drawings referred to can be cross-referenced with pictures in the Collection. Drawing A2 is *Cinnamomum parthenoxylon* (Chinese Drawings of Plants Small Volume V, p.97a); A7 appears as *Eriocaulon*, which is not an orchid, (Chinese Drawings of Plants Small Volume V, p.73a); A8 is the reference which appears for a picture of *Vitex trifolia* (Chinese Drawings of Plants Small Volume IV, p.92) and B9 is named in the Royal Horticultural Society’s list as *Caryopteris incana Candida* with the word ‘*Barbula*’ appearing alongside (Chinese Drawings of Plants Small Volume V, p.102b). This letter to Brown, dated only three years from the start of the Collection, again confirms that the smaller drawings were acquired early on, and that these

¹³³ Reeves, J (1820) Letter to Brown dated 13th November. Correspondence of R. Brown.1760-1858, Vol.2, 1813-1825. MS 32440. p.284. British Library.

were the same drawings as those referred to in the Horticultural Society's Minutes as 'Miscellaneous Drawings'.

2.9 The Arrival and Early Binding of the Collection in London

It is most likely that each consignment of paintings arrived packaged, and possibly also boxed; Reeves referred to parcels, packages and boxes in his correspondence with Sir Joseph Banks.¹³⁴

The Minutes of Council of the Horticultural Society of London are held at the Royal Horticultural Society's Lindley Library. These must be read in conjunction with the Minutes of the Drawings Committee, which were brought to light in the Library as a result of this research. The latter were stated to start from 6th June 1815 and to continue until 31st March 1824; nevertheless, some of the early Minutes are missing, so that the first available relevant Minute is dated Thursday 20th July 1820. The last entry is dated 31st March 1824. Later volumes containing Minutes of the Drawings Committee have not been found. However, taken together, these records are a valuable source of information about the early life of the drawings.

The Minutes of Council for 16th June 1818 record that:

Mr. Sabine stated that he had received from Mr. Reeves an account for his expenditure in plants and drawings in China for the Society, the particulars of which he was not able, at present, to lay before the Council, but it should be prepared for a future meeting, and that in the meantime it would be expedient to ascertain the extent of the expenditure by Mr. Reeves in the next season; it was therefore ordered that a further advance of £25 be paid this year to the agent of Mr. Reeves, on account of the Society.¹³⁵

This was followed on the 7th July, by a further Minute:

Twenty-nine drawings of Chinese plants executed for the Society in China, under the direction of Mr. Reeves were examined and approved.¹³⁶

As an acknowledgement for his work, the Society presented Reeves with a complete set of its *Transactions of the Horticultural Society of London*. The first indication of the numbers of drawings received came in a Minute dated August 26th 1819:

The Secretary stated that he had received from Mr. Reeves of China 39 new drawings numbered from 43 to 81, inclusive, executed by the artist employed by him for the Society : these were exhibited and approved, as were also a

¹³⁴ Reeves, J (1812) Copy Letter to Sir Joseph Banks dated 27th December, for example. Banks Correspondence. Vol.18, pp.192-198. British Museum (Natural History).

¹³⁵ (1817-1818) The Council of the Horticultural Society of London. Minute dated 16th June 1818, Vol.2, (no pagination). The Royal Horticultural Society.

¹³⁶ (1817-1818) The Council of the Horticultural Society of London. Minute dated 7th July 1818, Vol.2, (no pagination). The Royal Horticultural Society.

collection of Miscellaneous Drawings 49 in number purchased by Mr .Reeves in China for the Society at the price of 16 dollars, executed by different artists.

Ordered that £25 be paid to Mr. Goodhall, the agent of Mr. Reeves, to be placed to Mr. Reeves account with the Society for drawings and plants sent home by him.¹³⁷

This Minute makes clear that, almost from the outset, purchased pictures labelled 'Miscellaneous Drawings' by the Society, were being collected by Reeves, in addition to the commissioned drawings. The price of 16 dollars for 49 pictures was considerably less than the amount paid by Reeves for commissioned work in 1829 (para. 2.5).

A Minute dated Wednesday, April 19th 1820 recorded the Assistant Secretary's Report as follows:

The Chinese Drawings executed for the Society under the direction of Mr. Reeves of Canton, are 81 in number; proper Guard Books have been prepared for them, calculated to contain 50 each, the Guard Book formerly prepared for them, having been assigned to a Collection of Miscellaneous Drawings bought by Mr. Reeves at Canton, for the Society.

Ordered that £40 be paid to Mr. Goodhall on account of John Reeves, Esq of Canton towards his account with the Society, to be charged to the expense of Foreign Importations.¹³⁸

It would seem that the pictures arrived as un-bound sheets, and that the Society's original intention was to keep separate the commissioned and purchased drawings. The next relevant Minute of Council, dated July 7th 1820 ¹³⁹ related to the payment of a cheque to Reeves which had inadvertently been sent to China, rather than to Reeves' agent in London, John Goodhall. A Minute of the Drawings Committee for Thursday, July 20th 1820 referred to the drawings which had been received to date:

Examined Chinese Drawings from No 82 to 111, inclusive just received from China, being 29 in all, and approved them, as also three extra Chinese Drawings which are to be put into the same portfolio with the extra ones received last year.¹⁴⁰

¹³⁷ (1817-1818) The Council of the Horticultural Society of London. Minute dated 26th August 1819, Vol.2, (no pagination). The Royal Horticultural Society.

¹³⁸ (1819-1820) The Council of the Horticultural Society of London. Minute dated 19th April 1820, Vol.3, (no pagination). The Royal Horticultural Society.

¹³⁹ (1819-20) The Council of the Horticultural Society of London. Minute dated 7th July 1820, Vol.3, (no pagination). The Royal Horticultural Society.

¹⁴⁰ (n.d.) The Horticultural Society of London. Drawings Committee. Minute dated 20th July 1820, Ref. F1/019. (no pagination). The Royal Horticultural Society.

The 'extra drawings' were probably additions to the collection of 'Miscellaneous Drawings' previously referred to.

The Minutes of Council also include items such as the arrangement for the handling of plants on arrival at the Thames, an offer from a captain of an East Indiaman to take one of the Society's gardeners to China and record payments to Reeves on account of the drawings and 'foreign importations' (plants). It is not usually possible to relate these sums accurately to the drawings or the plants, and therefore the total expenditure by the Society on the drawings cannot be estimated. While the Minutes of Council provide useful background information, they are not considered to be strictly relevant to the drawings and are therefore omitted from this chronology.

A Minute of the Drawings Committee dated Friday, December 14th 1820, recorded that 'Six drawings recently received from Mr. Reeves in China being No 112 to 117 inclusive were examined and approved.'¹⁴¹

On April 26th 1821, the Drawings Committee agreed to present their report to the Council on 30th April, 1821. This was intended to be 'a full view of the state of all the drawings belonging to the Society' and included two entries, the 11th and 12th, which summarized the position with regard to the Reeves pictures:

11th. In the last season 36 drawings of Chinese Plants by the original artist of the Society have been received from Mr. Reeves at Canton; these make the number of the collection at present 117: they are kept in volumes which hold 50 drawings each. Fresh additions to this collection are now arrived in the Thames Indiaman, but have not yet been landed.

12th. The Collection of 49 miscellaneous Drawings of Plants and Fruits received from Mr. Reeves in 1819, together with 3 received in 1820 making together 52 Drawings are placed together in one large volume.¹⁴²

The following batch of drawings was recorded in a Minute of the Council dated December 19th, 1821, 'Approved the purchase of a collection of Miscellaneous Drawings sent from China by Mr. Reeves (being in all 218 at half a dollar each) with an option to the Society to take them or send them to his agent, Mr. Goodhall.'¹⁴³ Early in the following year, the Society was evidently rationalizing its collection of Chinese drawings; A Minute of the Council dated 18th January 1822 records that it was 'Ordered that the Duplicate Chinese Drawings, as well as the Drawings

¹⁴¹ (n.d.) The Horticultural Society of London. Drawings Committee. Minute dated 14th December 1820, Ref.F1/019 (no pagination). The Royal Horticultural Society.

¹⁴² (n.d.) The Horticultural Society of London. Drawings Committee. Minute dated 26th April 1821, Ref.F1/019 (no pagination). The Royal Horticultural Society.

¹⁴³ (1820-22) The Council of the Horticultural Society of London. Minute dated 19th December 1821, Vol.4, (no pagination). The Royal Horticultural Society.

of Insects be disposed of as the Council hereafter direct'.¹⁴⁴ There is no reference to Reeves or to the 'Miscellaneous Drawings' in the wording. However, it is clear from the wording of the next relevant Drawings Committee Minute that it was Reeves material which was being referred to.

On April 25th 1822, the Drawings Committee again gave a resumé of the various collections of drawings in its care. Reeves' drawings were listed as paragraphs 11 and 12:

11. Chinese Drawings by the original artist of the Society. To the 117 last reported 18 have since been added making 138 in all. These fill the whole of the 1st and 2nd volumes which hold 50 each and the remaining 35 are in the 3rd volume; the rest of the volume and a 4th volume are to receive those which may arrive hereafter.

12. Miscellaneous Chinese Drawings. There are 52 all in one volume. In addition to these Mr. Reeves has sent a large Miscellaneous Collection which are not at present arranged; some of them, being duplicates, as well as some drawings of insects which are amongst them have been ordered by the Council to be disposed of after the whole collection has been arranged.¹⁴⁵

There are no Minutes dated after April 1822 which record precisely the numbers of drawings arriving from China, although they clearly continued to be sent because by 1859 the Chinese Drawings of Plants Small Volumes contained 708 sheets and four Chinese Drawings Large Volumes were stated in writing to contain 132 drawings (Sotheby and Wilkinson, 1859). The highest number currently recorded in the Collection in Reeves' own handwriting is 681.¹⁴⁶ Furthermore, a Minute of Council dated December 15th, 1824 records that 'Mr. Reeves is indebted to the Society in the sum of £41-3-0 the same having been overpaid to him on account of Drawings so that the actual balance due to him is £64-9-1. The difference will be carried to the credit of expenditure for Drawings'.¹⁴⁷

During the 1820s the Horticultural Society mismanaged its affairs. Elliott says that 'the first major sign of financial difficulty came in February 1826' (Elliott, 2004 p.15), which he attributes to poor financial management, particularly on the part of Joseph Sabine, and to embezzlement by John Turner, the Assistant Secretary. The fact that the Society fell behind with the payments due to Reeves, is perhaps indicative of its problems at this time. A Minute of 25th April 1828 records it was 'Ordered that £43-9-3 be paid to the account of Mr. Reeves being the

¹⁴⁴ (1820-22) The Council of the Horticultural Society of London. Minute dated 18th January 1822, Vol.4, (no pagination). The Royal Horticultural Society.

¹⁴⁵ (1822) The Horticultural Society of London. Drawings Committee Minute dated 25th April 1822, Ref.F1/019 (no pagination). The Royal Horticultural Society.

¹⁴⁶ Chinese Drawings of Plants Small Volume IV, p.111. The Royal Horticultural Society.

¹⁴⁷ (1824-26) The Council of the Horticultural Society of London. Minute dated 15th December 1824, Vol.7, (no pagination). The Royal Horticultural Society.

amount due to him for plants and drawings sent from China in 1825'.¹⁴⁸ By 1830, the true extent of the Society's financial problems was becoming clear. On April 30th 1830, a Council Minute records that it was 'determined to sell by auction such duplicate drawings as is not thought necessary to retain'¹⁴⁹ and a committee was appointed to select books and drawings to be sold. On 15th May 1830, the Minutes of Council referred to the work which this committee had undertaken:

The Committee have also selected 90 duplicate Chinese drawings, and 112 drawings of birds and insects for sale: they have also selected some other drawings, which although not strictly speaking duplicates, appear to them to be of very little importance for the Society to retain, but of which the Committee were unwilling to order the sale without the sanction of the Council. These drawings are now laid before the Council for their decision ... The report was received and it was ordered that the books and drawings selected by the Committee ... and 44 additional drawings were selected for sale ...¹⁵⁰

Apart from disposing of some of its assets, the Society also attempted to curb expenditure. A Minute dated 2nd July 1830 records that '[it was] Ordered that Mr. Reeves be written to, to discontinue the importations and drawings now forwarded by him to the Society'.¹⁵¹ Reeves would not have received this letter until well into the autumn. By that time, according to Harriet Low's diary entry for June 1st 1830 (Hodges and Hummel, 2002 p.154), Reeves had inherited property in England and was probably already arranging to leave China.

The Minutes set out above relate only to the drawings, and form a modest proportion of the entire Minutes recording the Society's business during these years. There are also Minutes relating to the binding of books. For example, a Minute of 4th April 1823 records the payment of bills including '£17-0-10 to Francis for binding books',¹⁵² a Minute of 19th May 1824 records payment of a bill to 'Francis for tools, repairs, glue'¹⁵³ and on 2nd July 1824 payments included 'Francis for guard books for drawings 19-6-6'.¹⁵⁴ It seems likely that Francis also produced the

¹⁴⁸ (1826-28) The Council of the Horticultural Society of London. Minute dated 25th April 1828, Vol.8, (no pagination). The Royal Horticultural Society.

¹⁴⁹ (1830-37) The Council of the Horticultural Society of London. Minute dated 30th April 1830, Vol.10, (no pagination). The Royal Horticultural Society.

¹⁵⁰ (1830-1837) The Council of the Horticultural Society of London. Minute dated 15th May 1830, Vol.10, (no pagination). The Royal Horticultural Society.

¹⁵¹ (1830-1837) The Council of the Horticultural Society of London. Minute dated 2nd July 1830, Vol.10, (no pagination). The Royal Horticultural Society.

¹⁵² (1823-1824) The Council of the Horticultural Society of London. Minute dated 4th April 1823, Vol.6, (no pagination). The Royal Horticultural Society.

¹⁵³ (1823-1824) The Council of the Horticultural Society of London. Minute dated 19th May 1824, Vol.6, (no pagination). The Royal Horticultural Society.

¹⁵⁴ (1824-1826) The Council of the Horticultural Society of London. Minute dated 2nd July 1824, Vol.7, (no pagination). The Royal Horticultural Society.

first guard books to hold the Reeves drawings, since he appears to be the only binder working for the Society at this time.

Ramsden (1956) records three entries for the name James Francis, at 4, Chapter House Court, St. Pauls (1832), at 2, Bridge St. Lambeth (1817) and at 50, Hatfield St. Blackfriars (1828, 1829 and 1831) respectively. The name of John Francis, binder and tool-cutter, of 5, Dean St. Holborn and 10, Hatton Garden is recorded for the years 1829, 1831, 1832, 1836, 1838, and 1840 (Ramsden, 1956). It has not been possible to make a clear link between any of these names and 'Francis' who undertook the binding for the Society. Furthermore, no binder has been traced with the initials 'EJD'.

2.10 The Collection 1831-1859

There is a dearth of archive material relating to the later history of the Collection. It may be concluded that not all the drawings on the western papers were bound into guard books, since guards remain intact on the drawings marked with the lower Reeves numbers only. Visual inspection of the very fine Chinese papers would suggest that these were not adhered prior to 1837, although they may have been inserted into separate guard books, as the Minutes record, by an alternative means.¹⁵⁵ However, work on the Collection was clearly carried out during this time. Three separate procedures can be identified:

1. All the Chinese papers were adhered to western papers. Where a countermark is visible, all are dated 1837.
2. The western papers were removed from their original guard books. A sub-collection was formed of drawings portraying camellias, peonies and chrysanthemums and these were bound separately. These are contained within the three Chinese Drawings Large Volumes. In very many instances, the pages were not trimmed, and Reeves' original numbers remain intact. The remaining western papers and the 1837 pages to which the Chinese papers were adhered, were inter-leaved and trimmed to fit the five Chinese Drawings of Plants Small Volumes half-bound in green leather. It is suggested that the 'EJD' graphite numbering, referred to above, may have been added during this process.
3. At some time, the name of the plant in Reeves' own transliteration¹⁵⁶ was added beside the Chinese characters (on the western papers only). A comparison between known examples of Reeves' handwriting in the letters and notebooks confirms that this was not done in his hand. However, the handwriting is very distinctive and is a very good match

¹⁵⁵ Alternatively, they may have been adhered into the early guard books, and subsequently trimmed to remove all traces of old adhesive.

¹⁵⁶ Dr. Frances Wood of the British Library Department of Oriental Manuscripts and Printed Books. Pers. Comm. 12th November 2009.

with the handwriting which recorded many of the Society's transactions in the Minute books (Figure 12 and Figure 13).

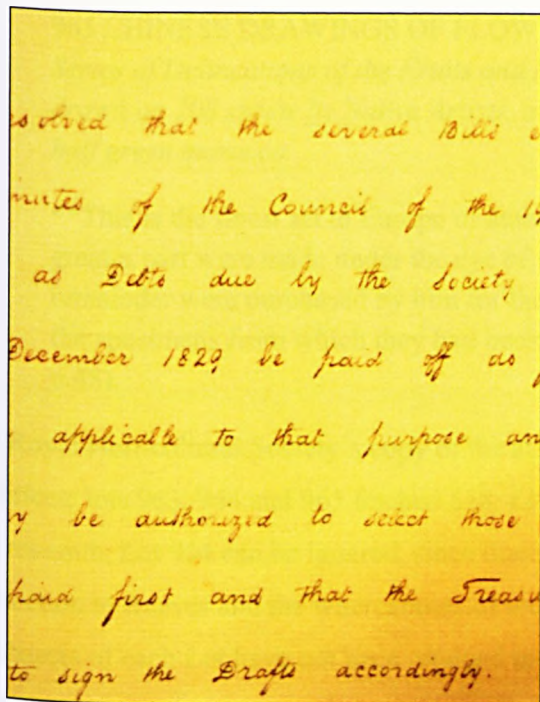


Figure 12.

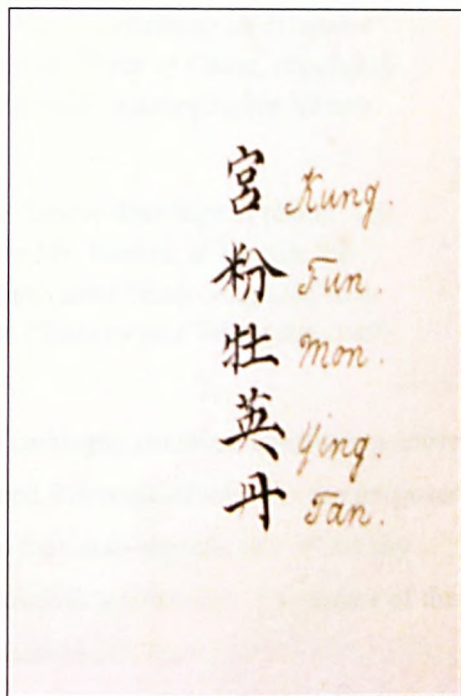


Figure 13.

Figure 12. (Left) Handwriting sample. Horticultural Society Minutes of June 1830 Vol. 10 (no pagination). (The Royal Horticultural Society)

Figure 13. (Right) Handwriting sample. Transliteration from a drawing of *Ixora incanata*. Chinese Drawings of Plants Small Volume III, p.72. (The Royal Horticultural Society)

It is likely that since Reeves had a working knowledge of the Cantonese dialect (para. 2.4), he assisted with the information, which was then inserted by one of the Society's clerks. He may well also have had a hand in the re-arrangement of the Collection.

2.11 Sale and Re-acquisition of the Collection by the Horticultural Society

Due to the Society's further financial difficulties, in May 1859 the entire Horticultural Society's library, including the Collection, was sold at auction by Messrs. S. Leigh Sotheby & John Wilkinson of Wellington St, Strand. The sale, which took place over four days, included the disposal of 'ten portfolios by native Chinese artists' (Sotheby and Wilkinson, 1859 front cover) on the final day. The entries relating to these were:

963 CHINESE DRAWINGS. 4 vol. containing 132 DRAWINGS OF FLOWERS, EXQUISITELY PAINTED IN WATER COLOURS BY NATIVE ARTISTS *half russia* (Sotheby and Wilkinson, 1859 p.47).

964 CHINESE DRAWINGS OF FLOWERS by Native Artists, with MS. Remarks by Fortune, 14 *Drawings in most brilliant colours on Rice-Paper, in a portfolio, with Leaves* (Sotheby and Wilkinson, 1859 p.48).

965 CHINESE DRAWINGS OF FLOWERS, 5 vol. *containing an extensive Series of Delineations of the Fruits and Flowering Plants of China, exquisitely drawn on 708 sheets by Native Artists, and admirably coloured after Nature half green morocco.*

******This is the finest set in Europe of authentic Chinese drawings of plants. The greater part were made under the eye of the late Mr. Reeves, at Macao; the remainder were purchased by him for the Society, after being compared with the specimens from which they had been taken (Sotheby and Wilkinson, 1859 p.48).

The Royal Horticultural Society's copy of the auction catalogue contains handwritten entries of the prices: lots 963, 964 and 965 fetched £18, £1/2/0 and £70 respectively. For the purposes of this research, Lot 964 can be ignored, since there is no reason to suppose that it had any connection to Reeves and the whereabouts of these drawings is unknown. The names of the purchasers of each Lot have not been retained in the auctioneer's records.¹⁵⁷

2.11.1 Lot 963

Elliott is of the opinion that Lot 963 comprised the Chinese Drawings Large Volumes devoted to chrysanthemums, peonies and camellias which John Lindley arranged and annotated, and that 127 drawings from these volumes were re-acquired by the Royal Horticultural Society in three large half-bound volumes from booksellers Heywood Hill of Curzon Street, London in 1953.¹⁵⁸ This may be correct, although the catalogue entry for Lot 963 did not record the Reeves connection (as per the entry for Lot no. 965, for example), nor the Lindley annotations (as had been the case with Robert Fortune's remarks on drawings in Lot no. 964). There is no doubt, however, that the drawings in the three Chinese Drawings Large Volumes were once the property of the Society, since the Horticultural Society's collector's mark remains intact on many of the sheets. Heywood Hill kept no records of the transaction, from which the identity of the original seller might have been traced.¹⁵⁹ Patrick Synge (1953), writing in the *Journal of the Royal Horticultural Society* at the time of the purchase, and relying on unpublished research previously undertaken in-house by Carden (1953), provided an explanation as to why three sets of pictures, camellias, chrysanthemums and peonies, had been separately treated:

¹⁵⁷ Amelia Harris of Sotheby Fine Art Dealers Pers. Comm. 20th August 2009.

¹⁵⁸ Elliott, B (1998) Internal Memorandum to Gordon Rae headed 'Forthcoming sale of Chinese drawings at Christie's' dated 14th April. The Royal Horticultural Society.

¹⁵⁹ J. Kerr of G. Heywood Hill Ltd. Booksellers. London. Pers. Comm. 23rd June 2009.

These are the only parts of the collection arranged in separate genera and MRS. CARDEW has suggested that probably about 1837 or a little later LINDLEY began the systematic arrangement of the collection by genera. The date 1837 is given by the watermark on the paper on which a number of the Chinese drawings are mounted. All the camellia drawings with only one exception are included in these three volumes, but only part of the Paeony drawings are there, the remainder being in the CORY volumes. It may be surmised that when Lindley became Vice-Secretary of the Society in 1840, he had not time to finish the work and so had the remainder of the paintings bound up haphazardly in the five CORY volumes to protect them from wear and tear, and I have been informed that the character of the binding agrees approximately with this date (Synge, 1953 p.209).

A type-written carbon copy of Carden's report dated February 12th 1953, upon which Synge clearly based his writing, is adhered at the front of Chinese Drawings of Plants Small Volume 1. This is entitled Report on Chinese Flower Paintings, the text immediately below providing the *raison d'être* for the report ; 'Offered by Messrs Heywood Hill, 10 Curzon Street, W1 5 Folio Albums 25 ½ " x 18": containing 127 mounted sheets of painting:- 63 of Camellias, 51 of Chrysanthemums, and 13 of Peonies. Good Condition' (Carden, 1953 p.1). The report then went on to refer to 'the 3 volumes offered us by Messrs Heywood Hill, which practically dispose of the Camellia and Chrysanthemum sections,- (There is only one Camellia painting in the Cory albums), and deal in part with *Paeonia*-' (Carden, 1953 p.2). The only plausible explanation for this is that either Carden inadvertently confounded the number of Chinese Drawings of Plants Small Volumes ('the Cory albums') with the Chinese Drawings Large Volumes on offer, or there was an uncorrected typographical error.

2.11.2 Lot 965

The five Chinese Drawings of Plants Small Volumes, the subject of Lot 965, had originally held 708 sheets. Attached to four of these is the bookplate of 'Wm Gott' which bears the coat of arms of a family of the same name from Battle, East Sussex. The arms of this family died out in the mid-eighteenth century, due to lack of male heirs.¹⁶⁰ It is likely that the bookplate was adhered by book-collector and philanthropist William Gott (1797-1863) who lived at Wyther Grange in Yorkshire. He was not part of the East Sussex family, but appears to have based the design of the bookplate on arms associated with the family name 'Gott' in the same way as Reeves had done with his first collector's seal (para. 1.5.6). It is entirely possible that he purchased the Chinese Drawings of Plants Small Volumes towards the end of his life, possibly at the 1859 auction. At his death, his book collection was dispersed. Despite extensive research,

¹⁶⁰ Jeremy Goldsmith, research assistant to Clive Cheeseman, Richmond Herald, College of Arms, London. Pers. Comm. 5th July 2010.

the whereabouts of the Chinese Drawings of Plants Small Volumes remains unaccounted for until 1908.

The Royal Horticultural Society retains the original letter to Reginald R. Cory from Henry Sotheran & Co, booksellers and bookbinders of Piccadilly and The Strand, dated 15th April 1908 which includes the following wording:

We...have pleasure in sending you, per rail, specimen volumes of the three books referred to...we feel we must comply with your suggestion that we should quote our lowest price for the three, being £48 cash...We annex a cutting from a catalogue in which the same collection formerly appeared, and was then price £63.

The enclosed (undated) printed cutting reads:

A Collection of over Seven Hundred exquisitely coloured Drawings of Chinese Flowers, Fruits, and Plants, by Chinese Artists. Mostly of very large size (19 ½ × 14), and comprising several thousand different specimens; 5 vols. atlas 4 to hf. green morocco gilt (in very fine condition) £63 Sacc.XIX.¹⁶¹

Clearly there is a discrepancy between the wording of the catalogue cutting which refers to '5 vols' and Sotheran's letter which twice refers only to three. Sotheran retains no records of the transaction.¹⁶² It may be that two of the Chinese Drawings of Plants Small Volumes were treated as 'specimen volumes', which Cory has already expressed an interest in buying, and that Sotheran was attempting to sell the remaining three as a separate transaction.

Cory's own records, including his planting scheme for his home 'Dyffryn' in south Wales, were burnt by his executors in accordance with instructions contained in his Will.¹⁶³ It is nevertheless clear that all five of the Chinese Drawings of Plants Small Volumes were in Cory's ownership at the time of his death because they formed part of his bequest to the Royal Horticultural Society. This gift was noted in a Report of the Council:

Cory Bequest – the whole of the unique and very valuable collection of books dealing with botany and horticulture formed by the late Reginald Cory has been bequeathed to the Lindley Library. An account of this munificent and welcome gift will be published in the Journal as soon as the books have been incorporated into the library.¹⁶⁴

¹⁶¹ Adhered within Chinese Drawings of Plants Small Volume, I. London, The Royal Horticultural Society.

¹⁶² Vic Gray archivist to Sotheran & Co. Pers. Comm. 19th August 2009.

¹⁶³ Gerry Donovan, curator Dyffryn Gardens, near Cardiff, South Wales. Pers. Comm. 23rd October 2007.

¹⁶⁴ (1935) *Journal of the Royal Horticultural Society* Vol.LX, p.v. The Royal Horticultural Society.

A full report of the bequest was never made, possibly due to the imminence of the Second World War.¹⁶⁵ While in Cory's ownership the five Chinese Drawings of Plants Small Volumes suffered water damage as a result of a fire at Dyffryn. A series of articles was published about the Dyffryn estate in the South Wales Daily News in October 1911, but since there was no reference to a fire, it is thought to have occurred after that date.¹⁶⁶ Despite extensive investigation, no written record of this fire has been found. Elliott has confirmed that he was told of it by W. T. Stearn, who had worked in the library at the time cataloguing the Cory material.¹⁶⁷ The presence of other water-stained rare books in the Cory collection at the Royal Horticultural Society strongly suggests that there is truth in the account.

In April 1998, Christies Fine Art Dealers approached the Royal Horticultural Society to alert it to a forthcoming sale of Chinese drawings.¹⁶⁸ Lots 22-7, which comprised Anglo-Chinese and Anglo-Indian natural history drawings, were sold by order of the executors of the late 18th Earl of Derby, and had been collected by Edward Stanley Smith (1775-1851), the 13th Earl. Lots 22, 24 (withdrawn), 25, 26, and 27 had no discernable connection with Reeves or the Horticultural Society.

Lot 23 was described as comprising 'an album of studies of flowers, plants and fruit' measuring 19 x 14 $\frac{3}{4}$ inches (48.3 x 37.5 cm). The provenance given was:

John Reeves

The Horticultural Society of London, sold 1859.

The present album is made up of studies by a number of artists, some commissioned by John Reeves (1774-1856) and some by artists working in the same circle as those whom he employed. Twelve of the watercolours (including a) [a picture of a Tiger Lily] are inscribed by John Lindley (1799-1865), and these sheets have had the corners cut to partially remove the collector's mark of the Horticultural Society of London...

In the present album there are a number of repeat compositions by different hands, some on very fine tracing paper (Christies Fine Art Dealers, 1998).

The description of Lot 23 suggests that it is very similar to the Chinese Drawings of Plants Small Volumes both in size and content. The identity of the purchaser remains confidential.¹⁶⁹

¹⁶⁵ Dr. Brent Elliott, The Royal Horticultural Society historian. Pers. Comm. 10th November 2010.

¹⁶⁶ Gerry Donovan, curator Dyffryn Gardens near Cardiff, South Wales. Pers. Comm. 23rd October 2007.

¹⁶⁷ Dr. Brent Elliott, The Royal Horticultural Society historian. Pers. Comm. 10th November 2010.

¹⁶⁸ The sale took place on 19th May 1998.

¹⁶⁹ Miriam Metliss of Christies Fine Art Dealers. Pers. Comm. 20th August 2009.

2.12 Conclusions

The instigation and acquisition of the Reeves Collection was remarkably well-documented from 1817 until the 1830s when the first sales of surplus pictures took place.

Reeves' correspondence, his two unpublished notebooks and the journals of John Potts and John Damper Parkes have been used to suggest Reeves' possible methodology for producing and recording the drawings at Macao and Canton. These have been supplemented by relevant contemporary material, published and un-published.

The early life of the drawings while in the care of the Horticultural Society can be understood reasonably well. This has been greatly assisted by the discovery of the Horticultural Society's Minutes of the Drawings Committee in the Lindley Library. These were held in the 'rare books room', but their presence and significance had not been identified until they were called for as part of this research project. When read in conjunction with the Minutes of Council, they provide a unique record of a substantial collection of early nineteenth century botanical paintings imported from Canton.

However, their later history remains elusive. The whereabouts of the five Chinese Drawings of Plants Small Volumes between 1859 and 1908 remains a mystery, although all these volumes, with the exception of Chinese Drawings of Plants Small Volume V, bear a bookplate with the name 'Wm Gott'. The complete history of the drawings contained in the three Chinese Drawings Large Volumes between 1859 and 1953 similarly remains opaque.

It has not proved possible to identify the dates at which some of the drawings were removed from the Chinese Drawings of Plants Small Volumes, and it cannot be assumed that the Horticultural Society's drawings auctioned by Christies in May 1998 necessarily came from these albums. They may have been separately disposed of during one of the Society's pre-1859 sales.

The original order of painting of the numbered western sheets has been reconstructed as far as possible in Appendix IV. Wilson asserts that 'The production of a [Chinese botanical painting made for the western market] is estimated to be 2-12 years later than the watermark date' (Wilson, 2003 p.12). The reconstructed list, when read in conjunction with the Minutes of the Society, reveals that Wilson's assertion approximately holds true for this Collection. Where reliable drawing numbers exist, Whatman papers watermarked 1804 and 1805 were used predominantly for painting undertaken from 1817 to at least 1821 (i.e. the first 138 drawings

recorded in the Minute of April 1822).¹⁷⁰ Therefore, it appears that the earliest drawings were carried out on paper made a little more than twelve years previously. Papers watermarked 'M&J Lay 1817', which may have been taken out by Reeves in anticipation of his work for the Society, were more commonly used after drawing number 160. If the rate of production of drawings remained roughly the same as at the beginning of the project, these pictures would have been produced within the 2-12 year time span. The infrequent presence of 'J Whatman 1794' papers suggests that old papers may have been left in the Factory by earlier collectors, such as Kerr. It is suggested that no firm conclusions can be drawn from the use of these.

The separate systems of numbering used by Reeves for the small pictures on Chinese papers have been included in this chapter partly for the sake of completeness, but also to show, by reference to some of the correspondence with Brown and Banks, that these pictures were being sent back at the same time as the western sheets. This negates a suggestion by Carden (1953) and Synge (1953) that the supply of English paper ran out at about the time Reeves retired and that the drawings on the Chinese papers were sent later by someone else.

The Horticultural Society records show that the earliest of the drawings were bound into guard books, and there is strong evidence to suggest that they were subsequently removed from the original guard books and re-bound, sometime after 1837. Whether any of the drawings were exhibited must remain a matter of conjecture. However, the five Chinese Drawings of Plants Small Volumes appear to match the description in the Sotheby's catalogue entry for Lot 965, apart from the discrepancy in the number of drawings. It seems likely therefore that the drawings in these volumes remained bound and this conclusion would be consistent with the condition of the drawings described in chapter 4. This conclusion does not preclude the possibility that several drawings may have been individually removed from the Chinese Drawings of Plants Small Volumes, particularly Chinese Drawings of Plants Small Volume I which holds appreciably fewer drawings than the remaining four Chinese Drawings of Plants Small Volumes.

While the emphasis within this chapter has been on the formation and subsequent history of the Collection as a whole, in the next chapter the characteristics of the drawings on both types of paper will be considered in relation to the techniques and artistic conventions of traditional Chinese painting and export art in China, and scientific botanical illustration in the west.

¹⁷⁰ (1822) The Horticultural Society of London Drawings Committee Minutes. Ref.F1/019 (not paginated). The Royal Horticultural Society.

CHAPTER 3

THE DRAWINGS DESCRIBED AND DISCUSSED BY REFERENCE TO EXPORT ART, TRADITIONAL CHINESE PAINTING AND WESTERN BOTANICAL ILLUSTRATION

3.1. Introduction

In the previous chapter, the Reeves pictures were considered as an entity, a body of work singular in its inception and unique in provenance. In this chapter, the focus turns to the pictures *qua* individual works of botanical and artistic expression and the contexts in which they may be read.

The first part of this chapter describes the tripartite contextual framework within which the pictures will be considered: namely, that of export art, traditional Chinese flower painting and western botanical illustration. There is a substantial body of literature pertaining to each discipline. Selective use has therefore been made of available material, which has been chosen primarily for its relevance, but also for contemporaneity or provenance. The relatively recent but authoritative work of Professor Craig Clunas (1984) can hardly be ignored in any discussion on Chinese export art.

The Reeves pictures could also be explored for possible points of connection with the line drawings and descriptive text which are a feature of Chinese herbals, pharmacopoeia and encyclopaedias dating back to at least to the *Erh Ya* [Er Ya] (The Literary Expositor) probably written in the second century BC and discussed at length by Needham (1986). One of the foremost authorities on the development of Chinese plant description and illustration, Professor Georges Métaillé, advances several reasons for concluding that a comparison between woodblock engravings of plants published in herbals and encyclopaedias and Chinese flower paintings is less than helpful. By comparing images of the *wutong* (Chinese Parasol Tree)¹⁷¹ and the *lamei* (Wintersweet),¹⁷² Métaillé (2007) considers that paintings give a 'deeper feeling' of a living plant, partly because engravings in technical books were often reproductions of earlier works, such as the *Chiu Huang Bencao* [Jiu Huang Bencao] (Herbal for the Relief of Famine) produced by Prince Hsiao between 1382 and 1400 (Rudolph, 1966 p.108) or Li Shizhen's great pharmacopoeia completed in 1578, the *Bencao Gangmu* (General Materia Medica) (Needham, 1954 p.147 and Plate X facing p.164; Rudolph, 1996 p.106), reproduced and discussed by

¹⁷¹ *Firmiana simplex* (L.)

¹⁷² *Chimonanthus praecox* (L.)

Haudricourt and Métaillé (1994).¹⁷³ Repeated reproduction, in his view, produced a ‘static’ effect (Métaillé, 2007 p.498).

Furthermore, the techniques differed (the use of brush and pigments for painting), the format was different (paintings were made onto scrolls, fans and screens as well as albums), as was the purpose (in painting the purpose was generally aesthetic, religious and symbolic). The subject-matter also differed. Chinese painters selected plants from a limited number of cultivated varieties, which Métaillé estimates as ‘at most about two hundred, generally far fewer’ (Métaillé, 2007 p.488). Quoting a famed Qing Dynasty painter, Zou Yigui (1688-1772)¹⁷⁴, who stated ‘all the flowers which enter a painting come from a horticultural taming’, Métaillé states that whereas technical books incorporated line drawings of wild plants, ‘only plants with an aesthetic, symbolic, or moral purpose were considered as suitable subjects by Chinese painters of plants’ (Zou Yigui quoted in Métaillé, 2007 p.499). Due to differences in style and content, the Reeves Collection has not been compared either with the line drawings found in early Chinese scientific treatises or decorative flower motifs as part of this research.

By the seventeenth century, the Chinese possessed the technology to print from coloured woodblocks (Jourdain and Jenyns, 1967 p.32; Fisher, 1982 p.158). In the eighteenth century copies of illustrated books such as *The Album of Calligraphy* and *Painting from the Studio of the Ten Bamboos*, which contained coloured prints copied from contemporary Chinese watercolours by master engraver Hou Yue-ts’ong [Hou Yue Cong], were exported to Europe (Jourdain and Jenyns, 1967 p.32; Vedlich, 1979 p.9). In Vedlich’s view, ‘Perfection in printing reached such a degree that it became difficult to distinguish between a woodcut and an original water colour’ (Vedlich, 1979 p.9). However, from visual inspection it is apparent that most of these pictures were either highly stylized or painted in accordance with the ‘boneless’ method, that is, without outlines. While they are aesthetically pleasing, it is suggested that they are of limited value in making a comparative study of the Reeves pictures.

The final part of this chapter is devoted to describing and discussing the defining characteristics of both types of picture within the Reeves Collection by reference to the conventions and techniques adopted by export artists, traditional artists in China and western botanical illustrators, particularly those of the nineteenth century.

¹⁷³ Reeves, J (1835) Letter to G. Bentham dated 3rd March. George Bentham Correspondence. Ref.GEB/1/8 Vol.8, (no pagination). RGB Kew. In this letter, Reeves wrote ‘I do not find any account of it [a plant] in the *Pun Tsao Kang huh* [Bencao gangmu]...’ Reeves evidently had his own copy of this work and could read it, which again indicates his knowledge of the Chinese language (para. 1.5.1).

¹⁷⁴ Author of *Xiao shan hua pu* (Painting Manual of Xiaoshan) dated 1740.

3.2 Contextual Framework

The contextual framework is organized under three sub-headings: export art, traditional Chinese art, and western botanical illustration.

In western writing, two recurring themes emerge in relation to traditional painting, but more particularly to export art. The first relates to the absence of fixed point perspective and foreshortening, which is mentioned as a feature of export art, but also considered separately in the context of traditional flower painting. The second relates to the production of copies. Again, this had its roots in traditional methods of producing art (painting, sculpture etc.) and the teaching of painting and calligraphy in China, but was adopted and adapted to enable the Cantonese art-producers to keep pace with the demands of a seemingly voracious export market. Methods of copying and modular production are therefore also discussed further under a discrete heading.

3.2.1 Export Art

3.2.1.1 Introduction

Clunas defined export art as:

Executed by Chinese artists this 'art made for strangers', strangers with an entirely different set of aesthetic presumptions and expectations, stands outside the major currents of art produced for a Chinese audience. It occupies a space which is neither wholly Chinese nor wholly European. (Clunas, 1984 p.11).

While helpful, it is suggested that this definition was not intended to be definitive and fails to take account of two further defining characteristics of Chinese export art; namely, that it tended to be mass-produced, often on a production-line system, and that it was inherently bound up with the tea trade. The definition nevertheless serves to explain the way in which export pictures differed from traditional pictures, which were imported from China during the sixteenth and seventeenth centuries. Clunas says 'None of these early survivals can be classified as 'export art'. They show no signs of adaptation to western tastes, but are simply Chinese objects which happened to be exported and preserved for their curiosity value and their rarity' (Clunas, 1984 p.10). Toogood Downing gives an account of these pictures, seen at Canton, in the first half of the nineteenth century:

There are some sketchy kinds of landscapes in high repute among the natives at Canton, who consider them quite masterpieces. They are very scarce, and consist of rough outlines of trees, rocks, waterfalls, etc., painted with a brush dipped in one pot of colour. Although to our eye these performances have no

merit whatever ... the Chinese reverence them ... as we do the rough sketches in pencil or chalk done by Raphael, da Vinci, and others... (Toogood Downing, 1838 Vol.2 p.108-9).

The greater part of the Reeves Collection (the commissioned work) can be distinguished from most export art on two counts. Firstly, as has already been shown, Reeves selected the subject-matter and appears to have closely supervised the painting, paying for the pictures as each batch was completed. The Chinese artists were therefore painting to order for a known customer, probably at a pre-arranged price (para. 2.5). This was not art for an anonymous stranger. Secondly, the pictures seem never to have been intended to be viewed as decorative art objects, but rather to function as a flora to be used for plant identification, classification and research, as well as a plant catalogue from which live specimens could be ordered. This is borne out by the use to which the pictures were put on arrival at the Horticultural Society, and their early binding into guard books (para. 2.9).

Having said this, as noted previously (para. 2.5), it is highly likely that Reeves' first painter had been an export artist, as probably were the others. Many such artists set up businesses in the streets adjacent to the European Factories to take advantage of passing trade. It is therefore considered appropriate to consider the commissioned pictures in the light of what is known about export paintings generally, and export botanical pictures in particular. By contrast, the pictures purchased for the Horticultural Society may fall within Clunas' definition. It has already been suggested that these pictures were painted for sale, and that Reeves may have been one of a number of purchasers (para. 2.8).

It has not proved possible to trace any translated nineteenth-century Chinese written accounts of trade painting, although one or two of the better-known painters left pictures of their studios for posterity. Lamqua, whose family name was Kwan Kiu Chin, had a younger brother Kwan Luen Chin, known as 'Tinqu'. Tinqu was a water-colourist who established himself in a modest studio, which he painted on more than one occasion; reference has already been made to this studio (para. 2.5). The pictures depict carved wood and bamboo furniture, lanterns hanging from the ceiling and three painters sitting at separate tables by a window (Figure 7). The lack of written description is almost certainly due to the fact that the painters '... are considered as mere mechanics; as artisans, who manufacture their wares for the purpose of sale. Each of them keeps a shop, and is therefore a merchant, or trafficker; one of a class which is esteemed the least of all in this ...country' (Toogood Downing, 1838 p.109).

Much has been written in the west about export art. For the purposes of this thesis, it is proposed to examine personal contemporary accounts of this art, and to have recourse to

catalogues and similar works which deal with specific collections. Finally, more general accounts are considered.

3.2.1.2 Personal Accounts

John Barrow FRS, who had been Comptroller¹⁷⁵ to Lord Macartney on the disastrous Embassy to Peking in 1793, noted in his *Travels in China* that the Chinese were ‘no mean copyists’ (Barrow, 1808 p.236). By the time he was writing, he was able to record that the painting of natural history subjects had in the past been ‘frequently incorrect; that it is no unusual thing to meet with the flower of one plant set upon the stalk of another, and having the leaves of a third’ (Barrow, 1808 p. 236). However:

This may formerly have been the case, from their following imperfect patterns, or from supposing they could improve nature; but having found that the representations of natural objects are in more request among foreigners, they pay a stricter attention to the subject ... and we found them ... scrupulous copyists, as not only to draw the exact number of the petals, the stamina, and pistilla of a flower, but also the very number of leaves, with the thorns or spots on the foot-stalk that supported it. They will even count the number of scales on a fish, and mark them out ... and it is impossible to imitate the brilliant colours of nature more closely. I brought home several drawings of plants, birds, and insects, that have been greatly admired for their accuracy and close colouring; but they want that effect which the proper application of light and shade never fails to produce (Barrow, 1808 p.236).

The propensity to embellish upon nature, the lack of highlights and shading, and the slavish coping of the subject-matter, all features noted by Barrow, recur time and again in later western writing on export painting.

Extracts from a Private Journal published in *The Chinese Repository*, gave an account of pictures seen in Canton shops. The writer recorded that at that time there were thirty artists’ shops in the vicinity of the foreign Factories, and considered that ‘Their paintings of animals, fruits, and insects, etc are often well done’ (The Chinese Repository, 1835 p.291), but he was rather less impressed with a painting depicting the Battle of the Bogue in which ‘In the whole piece there was nothing like the scene intended to be described; the ‘barbarian ships’ having undergone such a transformation as to lose their identity entirely’ (The Chinese Repository, 1835 p.291).

Toogood Downing showed the same ambiguity towards the Chinese artists and their art as had Barrow:

¹⁷⁵ As comptroller, it was Barrow’s duty to oversee the safe transportation of all the embassy’s packages, including those containing scientific instruments and other gifts for the Emperor.

In China, a high degree of perfection has been attained in painting, but in a totally different style from that of other nations'. [But] ...of late years, they have had ample opportunities of improving themselves if they had been so willing, but national vanity has not permitted them to see any thing to admire in the works of those whom they please to style barbarians (Toogood Downing, 1838 p.88-89).

More particularly:

In the painting of flowers butterflies etc we do not look for the higher excellences of the art, but are content [that they] exhibit splendid colours and great minuteness of detail ... we find that these pieces are executed in a very superior manner... with regard to the colouring, the Chinese particularly excel, whether in regard to the permanence and brightness of the colours or the faithfulness of the tints of nature (Toogood Downing, 1838 p.103).

An example of nineteenth century export flower and insect painting of the type Toogood Downing was referring to is shown below (Figure 14).



Figure 14. A Chinese export flower and insect painting on pith (*Tetrapanax papyrifera*). (Author's own)

This authority provides the most detailed description of the mechanical processes involved in Chinese painting, which commenced with a wash of alum solution. This preparation, he concluded, 'rendered [the rice paper] more fit to receive colours'... [and] 'gives ...a degree of permanence to the colouring of the Chinese', the author concluding that the 'utility' of alum derived from the fact that 'It is well known that alum differs from most other salts, in having no disposition to attract moisture from the atmosphere' (Toogood Downing, 1838 p.103). Alum washes were applied several times during the painting process, so that 'By these frequent washings, thin layers of alum are interposed between the successive coats of paint, and thus protect them from moisture, which would otherwise, assisted by light, very quickly destroy their brilliancy' (Toogood Downing, 1838 p.103). This author also noted that during the washing

phases, 'The Chinese handle and expose the drawings in a much rougher manner than we feel inclined to do' (Toogood Downing, 1838 p.103).

After preparation of the paper, Toogood Downing advised that 'The next process is to trace the outline; and this is done quite mechanically' using 'a certain number of ...outlines, which are painted off and sold for the use of artists', but 'Whatever the subject may be...a boat, a bird, or a mandarin, – it is laid upon the table, and the rice paper is placed over it; and then, on account of the transparency of the latter, the figure is easily sketched upon it with black paint'(Toogood Downing, 1838 p.103). Colours, 'which are always opaque' were prepared 'by rubbing them down very finely with water, by means of a glass muller in a porcelain saucers, alum is added, and then a sufficient quantity of glue to make them adhesive' (Toogood Downing, 1838 p.103). The glue was kept warm in a small saucer placed over 'a neat little iron trivet...upon the table...[and] the Chinaman every now and then lights a morsel of charcoal as big as a bean, places it beneath the pan, renewing it when it is burnt out' (Toogood Downing, 1838 p.103).

The artist first laid down 'that which we call the dead colouring...drapery, furniture, etc...but where flesh is represented, the pigment is put on the reverse side of the paper ...to produce that beautiful effect of transparency...using ...brushes...consisting of a piece of small bamboo with the hairs fastened into one of the extremities' (Toogood Downing, 1838 pp. 97-100).

This author also wrote at some length about the way in which the artists manipulated their brushes, which may explain the way in which some of the finer brushwork on the Reeves pictures was achieved. He noted that two brushes were held at the same time:

The smaller is held perpendicularly between the fingers of the right hand ... while the larger is placed horizontally between the first and second fingers of the same hand. After the smaller brush has been dipped in the paint, a fine mark is made with it in the required direction. When this is done the brushes are immediately changed; the large one goes down to the paper while the small one supplies its place...with the Chinese [this] is done instantaneously, and without any assistance from the other hand. The larger brush is then applied, and, having no colour in it, by a little dextrous management the wet paint is dispersed into infinity of lines much finer than could be produced by any single pencil. By altering the motion of the hand in this secondly manipulation the threads can be made to cross and interlace with one another, and thus produce a resemblance to all the kinds of texture ... (Toogood Downing, 1838 p.100).

The lack of light and shade was mentioned, which he said was 'defended by the Chinese, who pretend that it is necessary to represent every-thing, not as it appeared to be but as it actually exists' (Toogood Downing, 1838 p.103). Interestingly, he attributed this to an attempt to imitate objects on paper in the same way as they would have been carved from wood or stone (Toogood

Downing, 1838 p.103), and went on to explain that ‘Gorgeous colouring being now the main object to be attained’ and that ‘every thing [*sic*] which makes the painting look dull is considered a defect [and that the Chinese] object to ... European pictures, as they look upon the shaded parts as so many portions smeared over and obscured with black paint’ (Toogood Downing, 1838 p.105).

He found two other deficiencies in Chinese trade painting. The first, he termed ‘designing and grouping’; that is, faults with design which he attributed to the Chinese notion of faithfulness to the object described above, and faulty grouping which was inexcusable in his view, because it led to a lack of foreshortening (Toogood Downing, 1838 p.106). The second ‘defect’ was ‘...their practice of sketching every object as if it stood directly in front of them. Their ships, birds etc. are painted in this manner with very little variation; so that you scarcely ever see a view of the head or stern of a junk, whatever number of them there may be in the picture’ (Toogood Downing, 1838 p.107).

A remarkably similar description of the painting process was published in French under the title *La Chine Ouverte* in 1845 by ‘Old Nick’, the pen-name of Paul-Émile Daurand Forgues, and illustrated by Borget. The wording of these two accounts is virtually identical in places, which suggests that latter should perhaps not be taken as an endorsement of the accuracy of the former. However, another useful work appeared in the French press in 1849; an article in *L’Artiste, Revue de Paris* gave an account of a visit to Lamqua’s studio by Monsieur C. La Vollée who accompanied a Mr. Baxton, an Englishman, who was due to have his portrait painted. This article usefully gives a description of Lamqua’s watercolour box which contained, apart from about twenty porcelain pots of prepared colours, phials of mineral pigment, sticks of Chinese ink, a small mortar and pestle and small pieces of gelatine. This would tend to indicate that the artist, or his apprentices, ground and prepared his own paints, which is consistent with Toogood Downing’s description. Also of interest, this author noted that Chinese colours were inferior to European ones, except for ‘le vermillon, le lazulite, le carmine de carthame et l’orpiment’ (La Vollée, 1849 p.65). According to La Vollée’s account, all the better Chinese painters, particularly portrait painters, bought their colours from the English, because ‘Les couleurs chinoises sont de beaucoup inférieures aux couleurs européennes’ (La Vollée, 1849 p.65). This may well account for the private trade in imported pigments, which will be discussed at greater length in the next chapter.

A detailed listing of the subject-matter of export paintings is given by the American writer, Osmond Tiffany, in 1849. Impressed by the Chinese artists, who were ‘...certainly much better than I expected to find’, he identifies pictures of ‘trades, occupations, life, ceremonies, religions’, as well as ‘landscapes, boats, birds, animals, fruit, flowers, fish and vegetables

[which] may be obtained for a very reasonable sum, in boxes, or bound up in books. They cost, for the usual class of excellence, from one to two dollars a dozen...' (Tiffany, 1849 pp.83-84).

Tillotson (1987) attributes western criticism of certain attributes of Chinese painting to a lack of understanding of stylistic conventions:

[Westerners] were no more able to grasp the values and conventions of Chinese art than the Chinese had been able to understand theirs. The artistic conventions of one's own culture seem too obvious to require explanation; they may not even strike us as being conventions. But for the foreigner they may prohibit understanding: his conventions ... may be very different... The Europeans in China around 1800 did not learn to read Chinese painting and they dismissed it with contempt. But they were satisfied with the work of Chinese defectors to the Western tradition because that seemed to them, though still liable to error, essentially correct (Tillotson, 1987 p.56).

This lack of sympathy with the methods and traditions of Chinese artistic endeavour is a recurring theme in western contemporary writing. Dr. Berncastle, for instance, deploring Chinese painting and sculpture, concluded simply that 'their minds appear to be to [*sic*] obtuse to be susceptible of fine impressions' (Berncastle, 1850 p.161), while John Francis Davis somewhat condescendingly noted that since drawing and painting were less important to the Chinese, 'they may be expected to have made less progress' (Davis, 1972 p.242).

3.2.1.3 Catalogues and Specific Collections

H. A Crosby Forbes' *Shopping in China: The Artisan Community at Canton, 1825-30* (Crosby Forbes, 1979), depicts and describes shop interiors, which in China, were open to the street. The paintings were executed for the export market in gouache on western papers and the dates attributed by reference to countermarks. The use of western papers was also discussed by Clunas in *Chinese Export Art and Design* (Clunas, 1987), a well-illustrated catalogue of the China Trade Collection at the V&A. According to this authority, Whatman paper was especially produced for the Asian climate as early as 1796 (Clunas, 1987 p.118). The earliest Whatman paper found in the Reeves Collection is countermarked '1794'; later papers in the Collection may have been of the type referred to by Clunas.

The Crosby Forbes catalogue is of particular interest because the pictures record the impact of western culture in terms of the commodities traded (hats, swords, pocket watches etc.) and in painting technique. This author notes the adoption of western perspective, which is particularly apparent in pictures incorporating details of tiled floors and staircases, but this is not universal; the wall panels and pictures hanging in the doctor's shop, for example, are entirely devoid of perspective. In some instances the perspective is symmetrical, i.e. the shop front has been

painted 'head on', while in other scenes a diagonal perspective was adopted. The latter was alien to traditional Chinese painting, as noted above (para. 3.2.1.1).

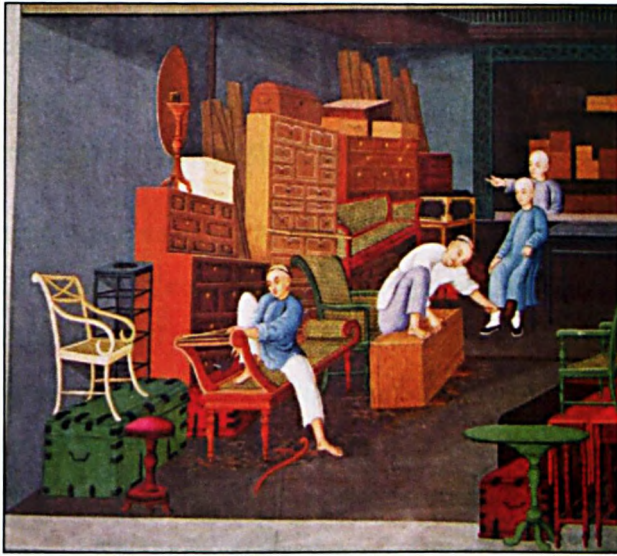


Figure 15. Interior of a furniture-making shop, *circa* 1830. (Crossman, 1972 p.142)

The curious results which sometimes arose from attempts to imitate western painting conventions are amply demonstrated by a painting of the interior of a furniture-making shop, in which the furniture rests at curious angles to the room and the seated figure appears to dangle in space (Figure 15). The adoption of *chiaroscuro* is also partially in evidence on some of the architectural details of the shops and many of the faces are painted without highlights or shading. Similarly, some of the figures cast no shadows, so that they appear to hover above ground.

The selective adoption of western painting conventions is also evident from a catalogue published by the De Cordova Museum, Lincoln Massachusetts in 1979 which accompanied an exhibition entitled '*The China Trade: Romance and Reality*' (Choi, 1979). This brought together a series of pictures, including portraits of *Hong* merchants and pictures relating to the tea trade. Choi was partly concerned to trace the origins of these paintings, but also considered the partially-successful adoption of western linear perspective in some of these pictures. While the introduction of the notion of fixed-point perspective into China has been attributed to Castiglione (1688-1766), Choi and others also attribute its adoption by the Canton artists to the importation of western engravings and drawings to be used as designs on porcelain and other trade artefacts (Choi, 1998 p.428).

The anonymity of Chinese export painters has already been noted (para. 2.2). *Late Qing China Trade Paintings* (Ting, 1985) was the third in a series of volumes produced by the Hong Kong Museum of Art to introduce its permanent collection of historical pictures. The emphasis of the

exhibition was very much on known masters of export art; Tinquá, Youquá, Sunquá, Lamquá¹⁷⁶ and Spoilum, but also included anonymous artists. The anonymity of many of the Canton painters is stressed and one of Ting's conclusions is that 'Since most of the export paintings were not signed, and there were [*sic*] very little information on them in Chinese sources, it is very difficult to identify the artists' (Ting, 1985 p.11). As has been suggested, the naming of Reeves' painters renders the Collection all the more exceptional.¹⁷⁷

Perhaps it is not surprising, since much of the export art collected by western visitors relates to botanical subjects, that a number of commentators have particularly turned their attention to export botanical art. Tillotson (1987) looked at *fan quai* (foreign devils) pictures in the collection of the Hongkong and Shanghai Banking Corporation; images of several categories of trade painting are examined, including pictures of the Factories, Chinese trades and shops. Referring to flora paintings, particularly those in the collection of Charles Elliot,¹⁷⁸ and those painted under the direction of Kerr, Tillotson points out that, unlike other subjects of export painting, for the flora pictures the Chinese were able to draw on a long tradition of flower painting, and further, that the truthful representation of blemishes is one of the characteristics inherited from that tradition (Tillotson, 1987).

Bo and Cheng (2001) edited a catalogue to accompany an exhibition of a collection of pith paintings donated to the City of Guangzhou which includes a reference to the Reeves Collection of animal and plant drawings on western papers at the British Museum (Natural History). The authors contend that this collection supports their view 'that Chinese plants and animals became a favourite subject of export paintings as a result of the rise of interest in natural history among western scholars and intellectuals' (Bo and Cheng, 2001 p.69). Whether this statement is entirely correct is debatable; much export art, including natural history subjects, found its way into western homes and was used for decorative purposes. Many of these paintings were fanciful (Figure 14). The botanical and zoological drawings held at the British Museum (Natural History) are Reeves' personal collections¹⁷⁹ and were commissioned work rather than export paintings. They were kept within the family and, as far as is known, they were not used for scholarly purposes. Despite membership of several learned societies, so far as is known, Reeves himself never claimed to be a scholar.

¹⁷⁶ Berry-Hill (1970 p.47) says that the prefix 'qua' equates to the English 'Mister', Sir' or 'Esquire' and indicates a status lower than that of Mandarin, but higher than a manual worker or 'coolie'.

¹⁷⁷ The point was made by Clunas who notes, however, that bamboo carving and the carving of seals were prestigious activities which attracted gentlemen-practitioners who enjoyed a higher status than mere artisans. He asserts that the naming of paintings went hand in hand with collecting, and therefore the commodification of the work of prominent painters (Clunas, 2004 p.63).

¹⁷⁸ Elliot worked for the East India Company and was based in India.

¹⁷⁹ This Collection was donated to the museum by John Reeves' daughter-in-law on the death of John Russell Reeves, his elder son.

Written in Chinese and English, *Souvenir from Canton-Chinese Export Paintings from the Victoria and Albert Museum* (Wilson and Liu, 2003) includes two essays particularly relevant to this research. In '*Bridging China and the West*', Ming Wilson identified three categories of botanical paintings made for westerners: 'the traditional, the botanically accurate and the decorative' (Wilson, 2003 p.11). According to Wilson, botanical pictures followed the established conventions of flora paintings during the period from 1750-1790, but from about 1790, in order to meet the requirements of western collectors, the Chinese painters aimed for botanical accuracy. The author states that many of these pictures were painted on western papers, with an average time-span between the date of countermark and the date of painting ranging from 2-12 years (see para. 2.12). The third category, which arose from the second and started in 1791, was also botanically accurate, but did not show dissected plant parts. Pictures in this third category were produced on western and Chinese papers.

In Chen Ying's '*Botanical Illustrations for the Western Market*' (Chen, 2003) the author identifies stylistic differences between traditional Chinese flower painting and Cantonese plant illustrations painted for western botanical study, many of which are readily seen within the Reeves Collection. These include:

1. The incorporation of dissected or enlarged plant parts-especially the inflorescence and fruits.
2. Realism, which can be traced back the traditional Academy style of painting, which placed emphasis upon *xiesheng*, or 'true to life' painting.
3. Plants were usually outlined in ink using the *shuanggou* (double stroke or bone) method.
4. Colour was applied in successive washes between the inked lines, or alternatively applied in the 'boneless' manner (without defined boundaries).
5. A wide range of colours was used. These were native vegetable in origin, such as indigo and gamboge, but *yanghong* or foreign red was imported.
6. A lack of 'artistic form' and 'graceful structure', which had been a requirement of Academy style.
7. Some paintings cover almost the entire paper-surface. This was a departure from traditional painting technique.
8. Lack of symbolic importance; the plants were painted as they appeared, and not for any inner meaning, so that 'a peony in export painting did not symbolize "affluence", and a chrysanthemum did not stand for "loftiness"'.
9. Many paintings were produced on thick western papers.

10. Pictures were sometimes 'imbued with a sense of fluidity and transparency' (Chen, 2003 pp. 64-68).

In Chen Ying's view, 'it is not an overstatement to claim that botanical illustrations are the most visually attractive genre among all the paintings made for the export market' (Chen, 2003 p.69).

3.2.1.4 General Works on Chinese Export Painting

One of the earlier works still commonly cited is *Chinese Export Art In The Eighteenth Century* (Jourdain and Jenyns, 1967). Tracing the history of export pictures from one of the very earliest references to 'Japan pictures' in 1695,¹⁸⁰ the authors assert that none of the early 'rice paper' pictures were ever signed because they were the work of artisans and that the subjects of the earliest of these pictures were confined to birds, flowers and insects. In their view, it was unlikely that figure paintings were made for export before 1800. This is to be expected if Clunas, Crossman, Tillotson and others are correct in their view that botanical subjects can be directly traced back to traditional forms of Chinese painting such as handscrolls and fans.

Incorporating a large number of plates of pictures from an album held at the British Museum, plate 11 (Jourdain and Jenyns, 1967 p.78) depicts a commercial painters' studio and shop. More modest than Tinquá's or Lamqua's studios referred to above, this again portrays artists sitting at individual tables, holding their brushes perpendicularly, with a brush holder and several small pots of paint. The equipment matches that previously described (para. 3.2.1.2).

According to Crossman, Clunas' *Chinese Export Watercolours*, published in 1984, 'is the definitive book on Chinese export watercolours' (Crossman, 1991 p.86). It is comprehensive in its treatment of the genre and deals, for example, with the history and classification of export and non-export art, workshops and techniques. He is one of the few writers to discuss the pigments, binders, brushes and paper, and to suggest that the adoption and subsequent abandonment of silverpoint for under-drawing may be used as a method of dating work. Methods of copying and mass-production are also considered. Clunas devotes one chapter to natural history watercolours. Noting the precise representation of botanical subjects in the 'academic' tradition of the Song dynasty and beyond, and the botanical illustration and writing to be found in herbals and pharmacopoeia, he argues: 'Of all the subject matters of Chinese export painting, flower and bird painting had the most solid background in the native pictorial tradition, and this gave it a continuing vitality' (Clunas, 1984 p.89). Perhaps with the Kerr, Bradby Blake, Reeves and similar collections in mind, the author contends that botanical and zoological watercolours were often executed under recorded circumstances, which meant that

¹⁸⁰ Letter to Thomas Coke (Jourdain and Jenyns, 1967 p. 30).

each picture was painted by an individual artist (as opposed to an assembly-line system discussed below).

Clunas identifies two further characteristics of Chinese flora painting; namely, that some botanical illustrations bear Chinese characters of plant names, and the propensity of Chinese artists to paint the undersides of leaves. He refers to Archer's distinctions between Indian and Chinese pictures. In 1962, she had written:

Like Indians, Chinese artists adopted British methods for depicting natural history subjects, but at the same time preserved certain Chinese idioms which differentiate their work from both Indian and British...as a rule there is a greater softness of texture in a Chinese painting, a more shiny surface and a less wiry line. Instead of curving vigorously across the page branches meander in a more hesitant rhythm. Shading is softer and less abrupt and twigs and branches are touched with silver grey. White flowers are usually given circular blue backgrounds and the sheet is often composed in a more elaborate and decorative manner (Archer, 1962 p.61).

Conner (1986) briefly outlines the making of collections botanical pictures by James Cunningham c. 1700 and John Bradby Blake between 1776 and 1772; the latter is of particular interest to this research because this collection passed into the hands of Sir Joseph Banks and therefore may have been seen by Reeves. According to Conner, they were certainly inspected by Jonas Drysander in 1789, who subsequently wrote that they were 'made at Canton by a Chinese, who had been instructed by the late Mr. Blake in the art of making botanical drawings'.¹⁸¹ One of the pictures, a lychee, is reproduced by Conner (1986 p.69) from which it is evident that the flowering parts of the plant and the fruits have been separately painted and that the artist has inscribed the picture with two characters giving the name of the plant. Reference to Reeves' work is also made, with one example from each of his plant, animal and crustacean collection as plates 89-91 (Conner, 1986 pp.69-70).

One of the most frequently cited works is Crossman's *The Decorative Arts of the China Trade* (1991). Several types of eighteenth century trade painting are described, including landscapes, Chinese customs, costumes and trades. These exhibit the same 'delicate washes and ... strong outline drawing' (Crossman, 1991 p.175) found on traditional scrolls but the influence of fixed point perspective is also evident. Nevertheless, the author notes 'a rather flat quality to the compositions' (Crossman, 1991 p.175), which was lost in pictures produced during the following century. According to this author, from 'the 1780's, the Chinese artists used western paper for most of their watercolours for the export trade' (Crossman, 1991 p.177), with Whatman and A. Cowan & Son, both of London, prevalent. The use of pith paper is also

¹⁸¹ *Transactions of the Linnean Society* 1791, p.172. The Linnean Society of London.

discussed. Many paintings were produced as sets; the silk industry, the tea trade (such as the set of pith paintings donated by John Reeves to RBG Kew, noted above), shop interiors etc., and in the author's view these provide a far better idea of trade items than any of the written descriptions. Crossman cites Clunas' observation that of all the different types of trade painting, botanical subjects were some of the very few to have grown out of traditional Chinese painting. In the light of later research undertaken by Choi (see below), this assertion may require reappraisal. Of natural history watercolours, Crossman says:

The late 18th century botanical watercolours ...are certainly among the finest paintings for the export market...Unfortunately, by the second quarter of the 19th century botanical representations had descended to the level of the strictly decorative. Very colourful and still well drawn, those flowers, trees and fruits painted on pith paper have little relationship to their predecessors either in accuracy or scientific importance (Crossman, 1991 p.183).

This may account for the necessity of close supervision which Reeves was said to have adopted (para. 2.5).

Encounters: The Meeting of Asia and Europe 1500 -1800 (Jackson & Jaffer, 2004) comprises a series of essays dealing with east-west trade, including the Indian subcontinent. Choi's essay entitled *Canton: Centre of Trade* (Choi, 2004 p.154) makes a useful point about the influence of trade. He points out that the early views of Canton, pre-1750, were in the traditional form of scrolls and the entire city and its environs were depicted. He asserts that the western desire for souvenirs started in the 1760s, which was then responsible for an emerging hybrid style in which the Factories were depicted rather than the city itself. Since the western presence rested solely upon trade, the pictures reflected this, and by the end of the eighteenth century Chinese export paintings had become so popular that they came to represent not only the trade but the whole of China. If he is correct in his view, then botanical painting was not the only type of export art to have its foundations in traditional painting.

This theme emerges again in Sargent's essay entitled *Asia in Europe: Chinese Painting in the West* (Sargent, 2004 p.274). Identifying that albums depicting methods of production of ceramics, silk and tea were some of the most popular themes in export art, in his view these can be traced back to the originals first published in the *Yuzhi Gengzhi Tu* (Pictures of Tilling and Weaving) commissioned by Emperor Qing Gangxi (1654-1722) in 1696. Similarly, in 1743 Emperor Qing Qianlong (1711-1799) commissioned the *Taoye Tushuo* (Illustrated Description of Ceramic Making) and in 1765 the *Yu Ti Mian Hua Tu* (Imperial Comments on Illustrations of Cotton Culture), which gave 16 illustrations of cotton growing and processing, was compiled and presented to the Emperor by Fang Kuan-ch'eng [Fang Kuan cheng] (Rudolph, 1966 p.115).

Citing as an example an advertisement in the 1693 *London Gazette* for the sale of paper hangings of ‘Indian and Japan figures’, and a description of wallpaper at a house in Essex in 1724 as ‘adorned with ‘China paper, the figures of men, women, birds, flowers’ (Sargent, 2004 p.276), it now seems clear that figures were painted for export well before 1800. Furthermore, albums depicting trades and occupations also had their origins in Chinese domestic painting.

3.2.1.5 Summary

The writings selected above are intended to draw out the key characteristics of export art. They serve to explain its nature and mode of production, some of its links with traditional Chinese painting and the influence of western drawing conventions. Western attitudes appear to have been highly ambivalent. Joseph Sabine’s article in the Horticultural Society’s *Transactions* for 1826 reflects this and would explain why the Society was anxious to receive drawings supervised by someone with botanical knowledge:

The only good evidence of the existence of ... varieties [of *Moutans* or Tree Peonies], must be derived from original Chinese drawings; but these are usually so inaccurately executed, and the artists who prepare them are so little to be trusted, that much caution must be used... In most instances, and especially in the collections of drawings sold to the traders and other visitors at Canton, the plants are imaginary.¹⁸²

Despite criticisms of lack of perspective, chiaroscuro and botanical inaccuracy, export pictures were keenly collected. Lamqua exhibited at the Royal Academy in 1835 and 1845 (Clunas, 1997 p.111, Warner, 1976 p.1), and pictures from the better-known Canton studios were sent directly to the London market, and became known as ‘trade paintings’.

3.2.2 Traditional Chinese Painting with Particular Reference to Botanical Subjects

3.2.2.1 Introduction

Western scholars’ requirements for accurate depictions of natural history subjects encouraged export painters to ‘tap a long Chinese tradition of meticulously accurate natural history painting dating back to the ‘academic’ tradition of the Song dynasty and beyond,’ which was ‘transmitted through...paintings and...woodblock printing...’(Clunas, 1984 p.84). Reeves’ artists would have been exposed to this tradition through their studios. Export art was, after all, an adaptation of traditional art (Clunas, 1984 p.10). They may well also have seen traditional paintings which were certainly in Canton at that time (para. 3.2.1.1), as well as woodblock prints taken from *The Ten Bamboo Collection of Calligraphy and Painting* and *The Mustard*

¹⁸² Sabine, J (1826) *Transactions of the Horticultural Society of London* 1826, Vol.6, p.483. The Royal Horticultural Society.

Seed Garden Manual of Painting which were sold for export (Jourdain and Jenyns, 1967 p.32). It is suggested that, consciously or otherwise, Reeves' artists would have painted according to their own cultural and artistic conventions, which would have seemed 'too obvious to require explanation' (Tillotson, 1987 p.56), albeit modified to meet the requirements of their patron. It is therefore considered appropriate to review briefly some of the literature which elucidates certain of these underlying conventions and modes of Chinese thought. Attention is particularly given to the paintings of *Prunus mume* in Figure 26 and *Nelubium speciosum* in Figure 8 in the Collection and their points of connection with traditional painting.

Tsao (1987) says that Chinese art evolved over five thousand years and a perusal of any book dealing with the subject, such as Clunas' *Art in China* (Clunas, 1997), certainly leaves the reader in no doubt that the history of this subject is long and complex. For a general summary of Chinese painting history, Professor Sullivan's *Chinese Art in the Twentieth Century* (Sullivan, 1959) has been used. A more comprehensive general account is given by Sirén (1978).

Hackney notes that bird and flower painting did not 'exist as a separate art until the middle of the T'ang [Tang] period' (Hackney, 1927 p.136), and provides the names of some of the most noted painters of the genre. Da-Wei, using a histogram in Appendix III to demonstrate the relative dominance of subject-matter in painting, shows that flower painting, as a discrete category, started about 600 AD and continued past 1900 (Da-Wei, 1981 no pagination). Although the history of Chinese bird and flower painting is not within the scope of this work, it is clear that by Reeves' time the Chinese already had a long tradition of aesthetic flora painting.

Printed art books, using woodblock for the text and woodblock and hand-colouring for the illustrations, proliferated in the late Ming period; *Gao Song Huapu* (Gao Song's Painting Collection), published in the mid-1500s, was followed by *Gu Huapu* (Mr. Gu's Painting Collection), the *Su Yuan Shipu* (Plain Garden Rock Manual) and similar works by *literati* painters (von Spee, 2010). The perfection of true colour-woodblock colour printing was achieved in the early seventeenth-century and one of the first publications to benefit from the new technology was the *Shizhuzhai Shuhua Pu* (Ten Bamboo Studio Collection of Calligraphy and Painting), the first completed printed edition appearing in 1643 (Vedlich, 1979). The 186 illustrations are set out according to subject, orchids, fruits, rocks etc., and its purpose appears to have been as a manual for amateur painters. Painting styles vary, but there are commonalities such as lack of foreshortening and shading, the use of tonal differences and the importance of line (Vedlich, 1979). Von Spee points out that 'A stunning innovation of *The Ten Bamboo Collection of Calligraphy and Painting* was in carving the block to represent broad brush strokes (often called 'boneless' brushwork)... [which] could be applied with a gradation of the

ink...[to] capture a painter's modulation in the pressure he applied to his brush' (von Spee, 2010 p.28).

The *Jieziyuan Huazhuan* (The Mustard Seed Garden Painting Manual)¹⁸³ is 'perhaps the most influential art book ever published in China' (von Spee, 2010 p.32). Originally written as thirteen 'books', by three members of the same family, Wang Gai, Wang Nie and Wang Shi, it was arranged in three parts between 1679 and 1701. Like the *Ten Bamboo Collection of Calligraphy and Painting*, it was essentially a practical treatise aimed at amateurs who were given instruction in how to prepare and mix colours and hold the brush. Pages of line drawings were supplied for copying and completed 'paintings' were demonstrated. This work is sufficiently detailed to enable the reader to replicate the preparation and mixing of many traditional Chinese colours. *The Ten Bamboo Collection of Calligraphy and Painting* and *The Mustard Seed Garden Painting Manual* are described at some length by Hulton and Smith (1979).

Both *The Ten Bamboo Collection of Calligraphy and Painting* (Vedlich, 1979 p.76-77) and *The Mustard Seed Garden Painting Manual* (Wang, Wang and Wang, 1977 p.428-9) portray the painting of the plum tree, which was said to symbolize 'good appearance and unshakeable independence' (Vedlich, 1979 p.76). The latter advises that 'structural integration ... is obtained by drawing branches intersecting according to their positions and by adding blossoms in various positions, tilted, facing upward and down, combining to give a brilliant, harmonious effect' (Wang, Wang and Wang, 1977 p.420). The plum branch in the Reeves Collection in Figure 26 is similarly drawn, a point noted by Fan, who says that this picture displays 'typical aesthetic devices of that genre' (Fan, 2004 Figure 7, no pagination).

Similarly, the Reeves drawing of the lotus (Figure 88) may be compared with that shown in the *Ten Bamboo Collection of Calligraphy and Painting* (Vedlich, 1979 p.90-91), which states that the three periods in the life of the lotus, 'bud, bloom and faded flower' symbolize the 'passage of time' (Vedlich, 1979 p.90). In *The Mustard Seed Garden Painting Manual* the leaf is shown 'not yet open', 'unfolding' and 'turned back, showing the back' (Wang, Wang and Wang, 1977 pp. 504-505). Figure 88 shows the lotus leaves unopened and curled along the edge to show the back.

Wang's *Chinese Free-hand Flower Painting* (Wang, 1936), considered by Van Gulik to be 'original and well worth careful study' (Van Gulik, 1958 no pagination), is a treatise on *hsieh-I* [xie yi] (free-hand painting) as opposed to detailed painting (which he calls 'meticulous type')

¹⁸³ Also translated as *The Mustard Seed Garden Manual of Painting*.

(Wang, 1936 p.i),¹⁸⁴ and includes information on the preparation of Chinese colours which may be cross-referenced with *The Mustard Seed Garden Painting Manual* and Yu's *Chinese Painting Colors* (1988).

Fragrant Space (Yang and Capon, 2000) explains the symbolism behind decorative Chinese flower painting. So, for instance, bamboo which sways in the wind but does not break, was seen as a symbol of nobility and tenacious strength, and the peony was identified with the Emperor's favourite woman. Such symbolism explains why certain plants were depicted in a particular way, such as the plum tree and lotus discussed above.

Some Technical Terms of Chinese Painting (March, 1953) is, in essence, a condensed encyclopaedia which lists materials, giving the Chinese characters and transliteration together with descriptions of products and modes of manufacture. In most cases, colours are given by reference to Maerz and Paul's *Dictionary of Colour* (Maerz and Paul, 1930). Names and descriptions of painting techniques, types of brushwork and composition, the Chinese classification of subject-matter and painting formats (scrolls etc.) are all provided. In its comprehensive listing and description of Chinese terms, the work appears unequalled.

3.2.2.2 Philosophical Principles

Da-Wei identifies Daoism, Confucianism and Buddhism as 'major influences' (Da-Wei, 1981 p.53) on the Chinese, and seeks to summarize each set of beliefs and account for their impact on Chinese thinking and traditional art.

According to his analysis, the founder of Daoism, Lao Zi, (born *circa* 571 B.C.), viewed all natural things as possessing vital life forces or *ch'i* [qi]. The positive and negative forces of *yin* and *yang* were responsible for the creation of the heavens, man and all natural things, and *ch'i* [qi] harmonized these two complementary forces. All things, pine trees or willows, for example, possessed their own unique characteristics (Da-Wei, 1981 p.53-54). The concept of void, or *wu*, was important, and Da-Wei quotes from the *Tao Te Ching* [Dao De Jing], 'Vessels may be made of clay; it is the space inside that makes them useful' (Lao Zi cited in Da-Wei, 1981 p.54). He states that 'Lao Tze [Zi] stressed simplicity... Consequently, simplification becomes a standard of art. An artist is content with simple themes; he strives for the simple approach, economy of line and colour' (Da-Wei, 1981 p.54). This simplicity is apparent in the portrayal of the small, probably wild, plants on the Chinese papers in the Collection. That shown in Figure 33 is a case in point.

¹⁸⁴ The author distinguishes *hsieh-i* [xie yi] from *po miao* [bo miao] (drawing with contour) and *mu ku* [mu gu] (boneless painting).

According to Da-Wei, Confucius (551- 479 B.C.) ‘... placed his emphasis on high ethical standards and therefore the arts were used to illustrate the need for order and harmony in life (Da-Wei, 1981 p.55). This may explain the restrained use of colour in the more traditional pictures on the Chinese papers in the Collection and the visual balance achieved in the larger pictures on western papers, demonstrated in Figure 24, for example.

The third notable influence was that of *Ch’an Tsung* [Chan Zong], a Chinese form of Buddhism, which, according to Da-Wei, laid emphasis on enlightenment through meditation. He states:

The Ch’an [Chan] school of art is marked by the following features (a) Black is the predominant color used. (b) Extremely simple strokes are employed. (c) The expression of the work, whether it be a landscape or still-life, lies beyond the mere rendering of the form; in other words, it should be contemplative rather than decorative in order to reflect the intuitive facility. The widely reproduced Six Persimmons by the monk Mu His of the early 13th century, is a good example of Ch’an [Chan] art (Da-Wei, 1981 p.56).

Rowley quotes Ch’eng-lo [Cheng-lo] as saying “western painting is painting of the eye; Chinese painting is painting the idea” (Ch’eng-lo [Cheng-lo] quoted in Rowley, 1959 p.29). Largely disregarding any possible influence of Buddhism, Rowley (1959) emphasizes the importance of Daoism and Confucianism to traditional Chinese painting. He says that ‘...in China the two indigenous doctrines of living, Taoism (Daoism) and Confucianism, determined the cultural climate in which Chinese painting would flourish’ and that both ‘sought a fusion of opposites’ (Rowley, 1959 p.4). It is his thesis that whereas western minds think in terms of ‘antagonistic dualisms’ (Rowley, 1959 p.4), the Chinese looked for harmony or a middle way. He identifies a list of opposing principles, such as ‘divine and human’, ‘idealism and naturalism’ and ‘spirit and matter’ and seeks to demonstrate the way in which the Chinese artist attempted to reconcile the two extremes. Under the ‘divine-human’ dichotomy, for instance, Rowley states that for Confucians the greatness of a painter was dependent upon high moral character, and he quotes Chang Yen-Yuan who wrote, “From ancient times, those who left excellent paintings were all high officials, noblemen, great scholars, or men of high moral character” (Chang Yen-Yuan quoted in Rowley, 1959 p.12). This may explain the basis of the distinction between the traditional scholar-painter or *literatus*, whose works were sought by indigenous collectors, as noted by Toogood Downing (para. 3.2.1.1) and the work of professional artists and, later, export painters such as Reeves’ artists, who painted solely or primarily for monetary gain.

The traditional Chinese painter aimed to capture the spirit or *ch’i* [qi] of his subject, so that ‘Flowers must be growing or seem to be growing; fruits and vegetables, while inert, must possess an inner living quality...’ (Rowley, 1959 p.6). Closely allied to this notion, ‘The natural and the ideal were fused together in the ideational’ (Rowley, 1959 p.29); in other words, an

artist might express himself in idealized forms, yet the laws of nature were to be obeyed. So, for example, 'The Chinese refused to combine objects except according to their natural habit ...Plants were linked with their appropriate birds, for example quails with millet ...Even the great Wang was criticized for ... having painted a banana plant in the snow' (Rowley, 1959 p.29). It should be noted here, however, that in his introduction to *Chinese Painting Style: Media, Methods, and Principles of Form*, Silbergeld criticized Rowley's work as being 'dated' and 'in some ways problematical' (Silbergeld, 1983 p.3).

The application of principles to practice in Chinese art was also the concern of Binyon (1972). He describes the Daoist view that flowers, due to their 'sensitiveness and vigour alike, the singleness of purpose in their expansion to the light, their bountiful exhalation of their sweetness, their sacrifice, their beauty,' (Binyon, 1972 p.25) led an ideal existence. Buddhists, on the other hand, were inspired by the transitory nature of the natural world, to which he attributes the lack of shadow in Chinese painting (para. 3.2.2.7). In Hulton and Smith's view Daoism, Confucianism and the Buddhist religion all 'saw the human race as part of nature and in harmony with it' and it followed that artists 'sought to understand their subjects, not to analyse them, nor, at least until a much later date, to prettify them (Hulton and Smith, 1979 p.3). This may account for the Chinese artists' preference for representing plants as they appeared in nature, complete with withered, yellowing and insect-damaged leaves. Reeves' artists consistently portrayed these defects, as in Figure 24 and Figure 30 for example.

In every case, it was the artist's duty to closely observe his subject. Binyon quotes Kuo Hsi [Guo Xi] as saying that, "Those who study flower painting take a single stalk and put it into a deep hole, and then examine it from above, thus seeing it from all points of view" (Kuo Hsi [Guo Xi] quoted in Binyon, 1972 p.48). The same quotation appears in Hackney, who completes Kuo Hsi's [Guo Xi's] lines, "Those who study bamboo painting take a stalk of bamboo, and on a moonlit night project its shadow on a piece of white silk on a wall; the true form of the bamboo is thus brought out" (Kuo Hsi [Guo Xi] quoted in Hackney, 1927 p.137). The purpose of such close scrutiny was not to enable the artist to record his subject with slavish accuracy, but rather to enable him to avoid this 'fault' and to capture elusive qualities, such as purity and vitality. Bush and Shih quote from T'ang Hou [Tang Hou], a connoisseur of the Yuan period, 'Painting plum-blossoms is called sketching plum blossoms; and painting orchids is called sketching orchids'. Why? Because painters should use ideas to sketch flowers of utter purity and not rely on formal likeness' (T'ang Hou [Tang Hou] quoted in Bush and Shih, 1985 p.261).

Having said this, Benjamin March is of the view that while drawing from nature may originally have been extensively practised, Chinese art is essentially studio art and that sketching in the

countryside became the exception rather than the rule sometime after the end of the Tang Dynasty (618-907 AD) (March, 1931 p.135).

Reeves' painters must have similarly scrutinized their plant specimens to produce anatomically accurate representations. They were not required to capture the essence of the living plant, but rather to record what they saw in a way which would have been regarded as a 'fault' by T'ang Hou [Tang hou]. For this reason, they would have had no difficulty with the notion of portraying cut stems on the drawing of *Nelubium speciosum* (Figure 8) or the detached flower parts and dissected fruit of *Syzygium aqueum* (Figure 24).

The observation made by March is also of interest in the context of Reeves' artists. Although they would have been studio-based (para. 2.5), it is clear from Reeves' notebooks that his artists worked from living, or at least, very fresh material, to produce the commissioned work on the western papers. The purchased drawings on Chinese papers similarly appear to have been undertaken from live specimens (para. 2.8.2).

Relatively little was written about the mundane practicalities of the painting process, and particularly the preparation and application of colour. Editors and translators Silbergeld and McNair (Yu, 1988) attribute this to prejudice on the part of the *literati*, in turn based upon Confucian distaste for intermediate colour (as opposed to the five pure colours) and the Daoist view that 'The five colours make man's eyes blind' (Lau, 1963 p.68).

3.2.2.3 The Importance of Line

Silbergeld notes that from an early date Chinese painters were concerned to portray objects in clearly defined outlines, usually on an unpainted background, with little attention given to surface treatment. Thus, black ink lines emanating from the artist's brush were all-important, and in this respect the connection between painting with the higher art of calligraphy is clear (Silbergeld, 1982 p.16).

Line has been used as a way of describing and categorizing Chinese painting. Da-Wei (Da-Wei, 1981) and others identify two categories of painting techniques. The orthodox '*kung pi*' [gong bi] meaning 'fine style' or detailed (Wang's 'meticulous type') was largely adopted by the court painters and became associated with '*Yuan Hwa Pai*' [Yuan Hua Bai] or Academic Style. March translates this as 'painting very carefully and precisely' (March, 1935 p.18). The second, '*hsieh yi*' [xie yi] which literally translated means 'write idea' or free-style (Da-Wei, 1981 p.100 and 103) became associated with '*Wen-Jen Hwa*' [Wen Ren Hua] or Literary Style, practised by the '*Wen Jen*' [Wen Ren] or scholar-painters. The author says that 'The objective of *hsieh yi* [xie yi] is to depict as much as possible in the fewest number of bold strokes' (Da-Wei, 1981

p.103), and of *Wen-Jen Hwa* [Wen Ren Hua] that, 'This style of painting is simplified and free; a vital expression is much more important than the mere rendering of form' (Da-Wei, 1981 p.108). March translates '*hsieh i*' [xie yi] as 'free sketch, spontaneous expression' (March, 1935 p.18), and Wang, as 'the sketching of one's ideas' (Wang, 1996 p.183).



Figure 16. Lotus painted by Yun Shouping (1633-1690) demonstrating boneless brushwork and the use of pastel colours on a handscroll. Ink and colour on silk. (Christie's, 1993 p.43)

Cassettari (1992), March (1955) and Van Gulik (1981) distinguish between painting '*mo-ku*' [mo gu] or '*mu-ku*' [mu gu] 'without bone' i.e. paintings, usually in colour, without an outline (Figure 16), and '*pa - ku*' [ba gu] or 'with bone' i.e. paintings with an outline (Figure 17).



Figure 17. Lotus *Nelumbo nucifera* painted according to the bone method by an anonymous 13th Century Chinese artist on a hanging scroll using ink and colour on silk. (Hulton and Smith, 1979 facing p. 6)

The importance of line was also taken up by Cahill, '...the line drawn by a brush remains the central fact of Chinese painting throughout its long history' (Cahill, 1995 p.4).

In dealing with bird, flower and animal painting, Cahill identifies several characteristics which, in varying degrees, feature in the Reeves drawings. These include neat drawing, a certain aloofness of the painter from his subject and attention to fine detail. The importance of line in

the Reeves drawings is apparent from a comparison of the three images of the lotus plant: the Reeves drawing in Figure 8 is more readily comparable with the lotus produced by the bone method demonstrated in Figure 17, than that portrayed 'without bone' in Figure 16.

3.2.2.4 Early Chinese Colour Theory and the Application of Colour

For completeness, it is considered useful to briefly outline here Chinese notions of colour and their application to traditional paintings.

In traditional Chinese painting there were five colours, namely, blue, yellow, red, white and black. Each colour was associated with the points of the compass and the earth. Blue, which, according to Binyon, was not distinguished from green (Binyon, 1972 p.69), was identified with the east and the coming of spring, yellow with the earth, red with the warmth from the south, white with the west 'because autumn comes with the winds of that quarter, heralded by white frosts' (Binyon, 1972 p.69) and black with the cold north. Silbergeld notes that the Chinese kingdom, symbolized by a yellow dragon, was believed to be at the centre of world, with heaven above represented by black. In his view, 'This categorical approach says much about the typical Chinese use of color in painting, which was to particularize it, isolate it against a neutral background, identify each object with its characteristic color, and severely limit the number of colors in use' (Silbergeld, 1982 p.26).

Sze further shows the association of the five colours to the five elements; wood, earth etc., five animals; dragon, phoenix etc., five planets and five numbers (Sze, 1957 p.68). This author and translator maintains that Chinese attitudes to colour were the outcome of their belief in *yang* (lightness) representing heaven or spirit and *yin* (darkness) representing earth or physical matter (Sze, 1957). According to this understanding, *yang* and *yin* preceded the five elements and determined their rotation and since the five colours were based on the five elements, they assumed less importance than ink and brush, which were *yin* and *yang* respectively (Figure 18). Of the five colours, according to Sze, black and red were the most important (Sze, 1957 p.68) and, further, since colours were related to alchemy and the Tao [Dao] (both of which were believed to promote longevity and immortality), this in turn meant that painting and alchemy shared common ground (Sze, 1957 p.71). In practice, Sze notes that colours were used 'simply to add a tint' of the natural colour to the subject, and as such were regarded as 'mere decoration' (Sze, 1957 p.74), while Silbergeld considers that colour washes 'help to consolidate these [outlined] areas visually (Silbergeld, 1981 p.25).

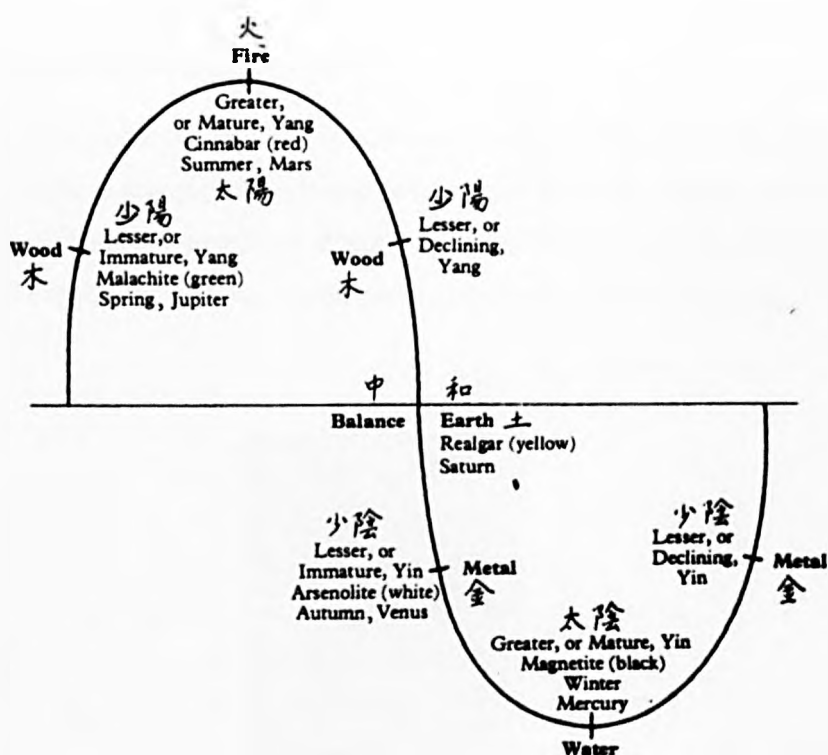


Figure 18. The cycle of the five elements, five colours and the yin and yang. (Needham, 1974 V (2) p.226)

They were regarded as less important than ink. On the application of colours, Sze notes that:

The manner of applying colors reveals that they are considered an aspect of appearance and so only of the surface. They are used as tints, applied thinly and flat in light washes or filling out-lined forms...colors, when they are used, should be unobtrusive, in strong contrast to the boldness and movement of the ink line and the eloquence of ink tones (Sze, 1957 p.66).

This is reminiscent of the way in which Reeves' painters applied colour to the small drawings of wild plants in Figure 11 and Figure 34, for example.

Colour harmony was the concern of painter Tsou I-kuei (Chou I' kwei) [Zhou yi kui] (1686-1772), who considered that, "Blue and indigo do not go well together, nor can white and yellow follow one another. Brilliant red and purple can be used once or twice, but the results will be unusual if you combine deep and light shades of green" (Tsou I-kuei [Zhou yi kui] quoted in Wang, 1996 p.61). The Chinese did not avoid contrasting colours. Taking as an example a picture of three chrysanthemums, white, red and purple, painted by Yun Shou-p'ing [Yun Shouping] in the Ching dynasty, Wang says:

Here, the red of the flowering peony is boldly juxtaposed with green foliage. The goal of contrasting colours is to awaken the eye without creating dissonance. The method depends on the suitability of colour combinations, but it is also important to recognize the fine and delicate nature of Chinese

pigments and the painter's habit of incorporating unpainted areas into his or her composition (Wang, 1996 p.67).

The suitability of colour was one of the concerns of Hsieh Ho [Xie He].¹⁸⁵ His fourth canon, translated by Ferguson and quoted by Wang, is translated as "The coloring should be suitable to the varied forms" (Ferguson quoted by Wang, 1936 p.114). Wang reiterates this dictum as meaning that the application of colour must be in accordance with kind (Wang, 1996 p.58).



Figure 19. Flower painting by Qian Du (1763-1844); ink and colour on a paper handscroll. (Christie's, 1993 p.32)

'Kind', in this author's view, refers to 'the subject's general category or class-that which is unchanging' (Wang, 1996 p.58). He takes, as an example, the painting of a picture of a red vase which in western tradition would be rendered in a variety of reds to indicate solidity of form and shape, with perhaps white highlight to represent the reflection of light from the surface of the vessel. By contrast, the Chinese painter, with his empirical knowledge of the uniform colour of the surface, would paint the picture of the vase with one red pigment (Wang, 1996 p.58) and the same would hold true for flowers (Figure 19).

It seems surprising, therefore, that in painting white petals, Chinese painters frequently adopted the convention of applying a pale blue or grey wash around the outer edges. An example of this appeared in the illustration of *Two Peonies* in the *Mustard Seed Garden Painting Manual* (von Spee, 2010 p.34) (Figure 20). It is a feature of some of the Reeves pictures, the drawing of *Plumeria acutifolia* in Chinese Drawings of Plants Small Volume IV at page 121, for example.

¹⁸⁵ The Six Principles or Canons of Hsieh Ho [Xie He] were laid down in about 500 AD.



Figure 20. ‘Two Peonies’ reproduced from Part III of the *Mustard Seed Garden Painting Manual*, 1701 Chinese edition. (von Spee, 2010 p.34)

Binyon states that, ‘It is to be noted that the Chinese have an aversion from mixed tones, from anything approaching muddiness’ (Binyon, 1972 p.70). It is clear from the *Mustard Seed Garden Painting Manual* and elsewhere that Chinese painters mixed colours, but that they mixed them carefully and often in accordance with fixed proportions. Varying tones of the same colour were used to produce contrast. In examining one painting in particular, entitled *Cat and Peonies*, Silbergeld points out that the artist used the darker shades of malachite for the upper parts of the leaves and paler tones for the undersides. The point he makes here is that the artist achieved this effect, not by mixing colours, but by the judicious use of differing shades of the same pigment which were produced as a result of the method of manufacture (Silbergeld, 1982 p.27). This is amply demonstrated in Figure 17. This same point had been made by Binyon some ten years earlier and is relevant to the way in which leaves are portrayed in most of the Reeves pictures, the lotus in Figure 8, for example.

3.2.2.5 Spatial Composition

Silbergeld notes that ‘One of the most striking features of Chinese painting is its integration of large tracts of unpainted silk or paper into the overall composition’ (Silbergeld, 1982 p.27), which, together with the subtle use of the colour of the ground allowed the artist to produce tonality in the work.

3.2.2.6 Chiaroscuro, Shadows and Reflections

Binyon states that Chinese and Japanese painters were concerned with the ‘relation of tones to each other, the scale of dark and light in a picture, what the Japanese call ‘*notan*’ was an object of sedulous study’ (Binyon, 1972 p.47). Furthermore, what is important ‘... is not the light and shade of nature, copied by the painter, but the proportion of light tones to dark in his pictorial scheme’ (Binyon, 1972 p.67). Davis noted that the Chinese ‘positively object to the introduction of shadows in painting’ and quoted John Barrow’s 1806 account of the Macartney Embassy’s presentation of oil portraits for the Emperor:

...the mandarins observing the variety of tints occasioned by the light and shade, asked whether the originals had the right and left sides of the figure of different colours. They considered the shadow of the nose as a great imperfection in the figure, and some supposed it to have been placed there *by accident* (Barrow quoted in Davis, 1972 p.246).

Binyon states that the ‘resolute abstinence from cast shadows, as a method of giving relief, is partly to be explained by the desire not to be seduced into mere imitative resemblance; partly also by a respect for the inherent qualities of the water-colour medium’ (Binyon, 1972 p.47) (Figure 21). Sullivan points out that the painting of reflections is similarly a western tradition (Sullivan, 1973 p.68). Wang describes this as ‘a fluid interplay between light and dark (*yin* and *yang*), with no single source of illumination’ (Wang, 1996 p.59). This is most apparent in the painting of night scenes, in which a Chinese painter depends upon visual clues within the picture itself to convey the idea of evening. Such signifiers include the moon, candles and lanterns (Wang, 1996 p.59).

3.2.2.7 Picture Parts of Equal Importance

Cassettari (1992) draws attention to another concept in Chinese painting, namely that each element of the subject should be treated as equally important. In his view, it follows that the leaves and branches of a plant are to be portrayed with as much attention to detail as the petals and buds. To date, this is the only specific reference found to this idea, but perusal of examples of Chinese painting in the V&A, British Library and elsewhere lends credibility to the statement. This concept is also supported by the coloured illustrations in the *Mustard Seed Garden Manual of Painting* and the *Ten Bamboo Studio Collection of Calligraphy and Painting*.

3.2.2.8 Aloofness of the Artist

In writing about the bird, flower and animal painters of the Song Dynasty, Cahill says ‘It was the genius of the early Chinese painter that he could, when he wished, avoid giving any

impression of intruding upon his subjects, portraying animals absorbed in their private activities and unaware of being observed (Cahill, 1995 p.68). At other times, later painters such as Ts'ui Po [Cui Bo] of the Northern Sung period, 'penetrates with sympathetic understanding into the lives of his subjects' (Cahill, 1995 p.68). Swann holds that whatever method of painting was adopted, 'natural vision' was the basis of this art and that Chinese painters of flowers, birds and animals 'have a deep love of all life' and 'Chinese painting of these subjects is touched with a genuine wonder' (Swann, 1958 p.78).

3.2.2.9 Linear Perspective, Diagonal Recession and Foreshortening

Early western viewers of Chinese art criticised it for lack of linear perspective, a problem considered at some length by March (1931), and which is particularly noticeable in landscapes and domestic scenes, such as that painted on a handscroll by Chiu Ying (c. 1510-1551) (Cahill, 1977 p.145) (Figure 21). Allied to this drawing convention is that of foreshortening, which has a bearing on the way in which plants were portrayed. March refers to work by Bushell (1906) who attributed both the lack of a correct vanishing point and foreshortening to the fact that the Chinese had not grasped the rules for achieving these effects.

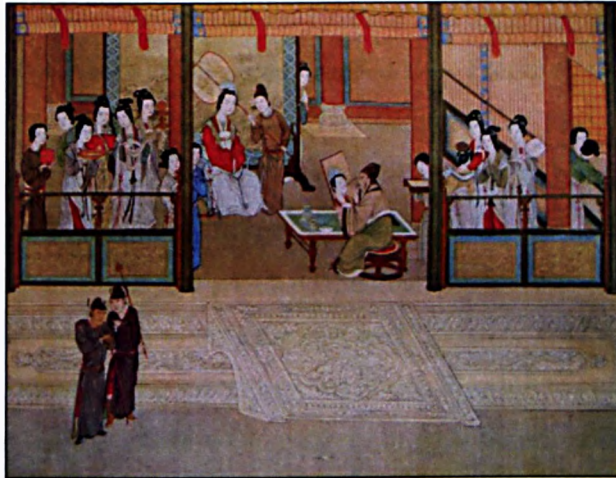


Figure 21. 'Spring Morning in the Han Palace'; ink and colours on silk on a section of a handscroll painted by Chiu Ying (c 1510-1551). (Cahill, 1977 p.145)

March himself declared that the Chinese 'had no taste for the mathematical theorizing necessary to produce a single exact geometrical formula for the universal solution of a general problem...' (March, 1931 p.139) and Silbergeld appears to agree with this view:

Once mastered, the techniques of overlapping parts, diagonal recession, and foreshortening all became a standard part of the Chinese painters' vocabulary, although they were practiced empirically with none of the mathematical accuracy found in Western studies of foreshortening (Silbergeld, 1982 p.33).

Sullivan (1972) identified early Chinese experimentation with perspective by the court artists who had come into contact with European missionaries during the 17th and 18th centuries. Clunas (1997) similarly notes the adoption of fixed point perspective and shading by some Chinese elite painters as early as the 17th century, and attributes the integration of western conventions of representation into Chinese painting practice to the work of professional commercial artists. At first taken up by ceramic artists and print-makers who copied imported western prints, he argues that by the 18th century Cantonese artisans were producing export art which accorded with western representational conventions. Crosby Forbes similarly identifies western conventions adopted in the depiction of shop-front pictures held at the Museum of the American China Trade, Massachusetts, noting that, 'one may observe the use of Western perspective and the attempted, but often less successful use of light and shadow' (Crosby Forbes, 1979 no pagination) (Figure 15). Apart from experimentation with the western, mathematical method by court painters, this 'westernization' of Chinese painting practice was limited to pictures, wallpapers and other commodities made for trade. Sullivan points out that this influence had no impact upon fine art, that is, art made by Chinese artists for Chinese connoisseurs and collectors (Sullivan, 1973 p.86).

It is accepted by many western writers that the Chinese had their own notion of perspective, and indeed Hseih Ho's [Xie He's] fifth canon, translated by Ferguson as 'The perspective should be correctly conceived' (Ferguson quoted in Wang, 1937 p.114), confirms this. Sullivan notes that the Chinese artist was adept at continuous (as opposed to fixed-point) perspective which was 'required by the hand-scroll format' (Sullivan, 1973 p.68). The same principle would apply to hanging scrolls, on which 'the artists painted not one [object] behind another but one above another the planes in recession from the spectator' (March, 1931 p.115). In addition to continuous perspective in which the spectator must notionally shift his own position in relation to the picture, it is clear that the Chinese had mastery of what March calls 'atmospheric perspective' (March, 1931 p.119) in which colours and clarity of detail were adjusted by the artist to suggest distance. March makes a further point of particular interest in connection with the Reeves drawings; namely, that while a Chinese artist may have adopted an approximation to linear perspective in landscapes, he always adopted isometrical perspective when representing the parts of an object (March, 1931 p.115).

3.2.2.10 Format

Paintings were made on scrolls, contained within albums, and appeared on fans, folding screens, murals and banners (March, 1935 p.12). Within a hand scroll, which was unrolled horizontally, the painting was placed near the centre with an inscription panel and title sheet on either side. A roller was fixed at one end, and on the other, a wrapper and wooden stave with a tape provided

the means to protect and secure the scroll. As the scroll was unrolled, the painting was 'read' from right to left (Rowley, 1959 p.61). Hanging scrolls were hung from walls vertically, and were intended to be appreciated for a few days or weeks, before being re-rolled and tied. Albums were often produced within wooden boards, with the pages folded in a concertina fashion. The double-leaf album contained pictures which extended across both pages, while the paired single leaf album displayed two separate pictures on either side. Folding fans were usually painted on both sides, as were the single sheet screen fans which were often oval in shape. Paintings also appeared on folding room screens. Fisher, writing of Chinese flower paintings, says that 'Unusual colour effects were obtained by over-washing since the water-soluble colour pigments used by Chinese artists to allow drawings to be folded – as for instance on screens– could not be mixed together (Fisher, 1982 p.155). It is suggested that while this statement contains inaccuracies, the underlying point made by the writer may be a valid one. Paintings on scrolls were intended to be rolled and un-rolled, and those decorating folding fans were similarly subjected to repeated surface stress. This can be appreciated from the following quotation from Wen Zhenheng's *Treatise on Superfluous Things*, written circa 1615-20:

Storing paintings: Paintings should be stored in caskets of fir wood, with absolutely no use of lacquer or glued paper linings internally, lest they seep out and stain the picture. In the fourth or fifth month, you should unroll every piece and give them a brief sight of the sun, then return them to their boxes at a distance of ten or so feet from ground level, to prevent foxing. Generally, when displaying pictures, they should be changed every three to five days to prevent fatiguing to the eye and damage by dust. When taking them down, first whisk the dust off both sides of a scroll, so that the surface will remain undamaged (Wen Zhenheng quoted in Clunas, 2004 p.42).

Chao Hsi-ku [Zhao Xi gu] (active c. 1195-c. 1242) had similarly advised, '...you should not hang more than three or four [scrolls] in a room. After enjoying them for a few days you should exchange them for others' (Chao Hsi-ku [Zhao Xi gu] quoted in Bush and Shih, 1985 p.238). Many examples of these art forms survive, and it may be surmised that traditional Chinese artists adopted techniques of pigment and paper preparation, and painting, which could accommodate repeated movement. The efficacy of these is demonstrated in the Reeves Collection. The paintings on Chinese papers, using traditional painting techniques, show none of the pigment loss readily apparent on the larger western sheets.

3.2.2.11 Copying and Modular Production

In John Davis' account of Chinese education, he says that, 'Writing is taught by tracing the characters, with their hair pencil, on transparent paper placed over the copy, and they commence with very large characters in the first instance (Davis, 1972 p.276). Since calligraphy and

painting were seen as related occupations, it is perhaps not surprising that drawing and painting were taught in the same manner.

The free-hand copying of the works of great masters was an accepted method for training artists and even comparatively recently Yutang was advising students to ‘copy one artist, then branch out to copy others’ (Yutang, 1967 p.198). The *Mustard Seed Garden Manual of Painting* itself was intended to be used as a series of templates to be copied by amateur painters. Having said this, Emperor Hui-tsung [Hui zong] (ruled 1101-1125 AD), a distinguished bird and flower painter, issued a proclamation that ‘Painters are not to imitate their predecessors, but are to depict objects as they exist, true to form and color’ (Hui-tsung [Hui zong] quoted in Cahill, 1995 p.74).

Van Gulick’s 1958 work, *Chinese Pictorial Art as Viewed by the Connoisseur* (Van Gulick, 1958) records the art of mounting scrolls in China and Japan, and is frequently referred to in conservation literature dealing with Asian art. The value of Van Gulick’s research for the purposes of this project lies in his text on methods of copying. The two main methods were *mu* (tracing), and *lin* (free-hand copying). March says that *mu fang* means an exact copy and that, ‘Usually *mu* indicates a copy made by tracing and transfer, but when *mu* or *mu fang* is used in a colophon it means a faithful copy by any method’ (March, 1935 p.20). ‘*Fên lin*’ [fen lin] (calquing) or ‘*fên t’a*’ [fen ta], is, according to March:

Copying by tracing and transferring. The painting is traced in outline, then the tracing paper is reversed and the outline retraced in white. The paper is placed white side down on a new piece of silk or paper and rubbed with a damp cloth, transferring the white outline to the new ground. The term also indicates an exact copy, whether made by this process or not (March, 1935 p.20).

Shuang-kao [shuang gao] was a combination of tracing and freehand, and *hsiang-t’a* [xiang ta] was tracing with a light source. Cahill describes a further method of copying known as *fen-pen* (pouncing), which he translates as ‘powder copy’, ‘in which pricks are made in the original at many points on the lines that make up the design, and a powder bag is patted onto the surface; the powder goes through the holes onto the paper beneath to make a dotted outline which serves as a guide to the copyist (Cahill, 1994 p.91).¹⁸⁶ These methods were adopted for pedagogical purposes and for the production of legitimate copies of works by acknowledged masters. According to Ng (1993 p.5) the making of copies was seen as an important method of preserving important art works.

¹⁸⁶ Ledderose notes that pricked-out papers have been found at the Dunhuang and that they appear to have been used to paint the ‘Thousand Buddhas’ on the ceilings of the caves. Furthermore, he states that Buddhist painters especially, required the means to replicate a large number of images since this ‘engendered merit for both the living and the dead’ (Ledderose, 2000 p.175).

It would seem that the application of these techniques to the production of export art was another instance of traditional practice being adapted to meet the demands of a growing trade. Toogood Downing (1838) notes tracing as part of the process of picture-production in Lamqua's studio (para. 3.2.1.2) and also records that free-hand copying was also carried out:

A great many prints from Europe are among the number [of paintings], and by their side are placed the copies which the Chinese have taken of them in oil and watercolours....It is astonishing with what correctness the Chinese will follow their original, and finish their copy with great beauty (Toogood Downing 1838 p.95).

John Barrow had made a similar observation, thirty years earlier, but was rather less complimentary:

The coloured prints of Europe that are carried out to Canton are copied there with wonderful fidelity. But in doing this, they exercise no judgement of their own. Every defect and blemish, original or accidental, they are sure to copy, being mere servile imitators, and not in the least feeling the force or the beauty of any specimen of the arts that may come before them; for the same person who is one day employed in copying a beautiful European print, will sit down the next to a Chinese drawing replete with absurdity (Barrow, 1806 p.237).

Alternative methods of taking copies, outlined by Clunas, were either by woodblock printing, or striking copies from an inked sheet (Clunas, 1984 p.76). Methods of producing copies of work are of interest because the Reeves pictures were produced at least in duplicate, and a further set may also have been made for Thomas Beale (para. 2.7).

Another aspect worthy of consideration is that which Ledderose (2000) terms 'modular systems of production', that is, several painters working in succession on each picture, each adding his own element. The author traces the history of this method from the making of the terracotta army using standardized components, through to porcelain decoration and painting. The accounts of visitors to the Canton painters' studios, confirm that this method was adopted to mass-produce export paintings. At Lamqua's studio, for example, La Vollée, was led into a room containing consignments of pictures for the English, French and the American markets, and concluded that:

This is no more art, it is a veritable industry in which the division of labour is perfectly understood. The same painter will spend all his life on trees; another figures; this one, the feet and the hands; that one, houses. Each in his way acquires in his kind a certain perfection, particularly in the finish of the details; but none would be capable of undertaking the whole of a picture (La Vollée, 1849 p.66).

Both Conner (1986) and Fan (2004) consider that Reeves' artists did not adopt this practice, and cite payments to individual painters recorded in the two notebooks as evidence in support. Tillotson is also of the view that the earlier botanical paintings, such as those directed by Kerr in the early 1800s, were the work of individual artists (Tillotson, 1987 p.64)

3.2.3 Western Botanical / Scientific Illustration

3.2.3.1 Introduction

This section is concerned with the conventions of Western botanical illustration, particularly drawing and painting, as they were understood in the latter part of the 18th century and early part of the 19th century, i.e. post-Linnaeus and pre-Darwin. The aim is not to produce a history of botanical illustration, but rather to concentrate on the conventions of the art with a view to identifying those which are in evidence in the Reeves Collection.

Prior to Linnaeus' taxonomy, several systems of plant classification were current. According to Buchanan (1979) the most commonly adopted method was that of Tournefort, which was based upon the shape of the corolla. In 1735 Linnaeus published his seminal 11-page *Systema Naturae* setting out the framework for the re-classification all plants and animals. This work was followed by the *Genera Plantarum* in 1737, and the *Species Plantarum*, the first edition of which appeared in 1753. The latter contained the Linnaean names for more than 6000 plants¹⁸⁷ and described his new plant taxonomy based upon the sexual characteristics of each plant (Buchanan, 1979). Briefly, Linnaeus classified plants into 24 groups according to the number of stamens exhibited, and each group was further sub-divided according to the number of styles. In order to identify a plant, either as a known type or as a hitherto unknown specimen, botanists were henceforth required to pay careful attention to the minute details of the flowering parts of each plant, and by implication, the same degree of diligence was required from botanical artists. It is implicit that the value of any botanical drawing lies in its accuracy.

Knight (1985) observes that Linnaean classification was based upon the external features of organisms, and that natural history itself is a descriptive science. As such, 'the visual language is a subtle one' (Knight, 1985 p.107), and what he terms 'theory loading' is less apparent in natural history illustration than, for example, the diagrams of apparatus used to demonstrate astronomical theories. In both cases, however, the drawings, a 'concise visual language' are accompanied by text (Knight, 1985 p.107) (Figure 22) which can only be understood by those who have learned its conventions. These conventions change with the passage of time, so that

¹⁸⁷ The letter 'L' appears after the Linnaean name for these plants.

those which obtained in earlier centuries are unlikely to be of assistance in the ‘reading’ of later work.



Figure 22. Christmas Rose (*Helleborus niger* L.) and Winter Aconite (*Eranthis hyemalis* L.) with Peacock butterfly (*Inachis io* L.) drawn by G. D. Erhet (1708-1770). (Calmann, 1977 facing page 145)

By way of example, by the late 18th century it was not unusual for several related species of plants to appear on one plate, in part due to the need to produce prints economically, but also to aid identification by showing distinguishing differences. As in China, related animals, often insects, were sometimes drawn on or near the illustrated plants (Figure 22). These were not always convincing. Kaden (1982) reproduces a selection of engravings of ‘Hexandrian’ plants as Plates 74-78. These were drawn in the 1830s by Mrs. Edward Bury in which the butterflies and a dragonfly appear to have been separately painted and affixed to the picture almost as an afterthought. Information about habitat might also be included by painting in a backdrop (Calmann, 1977) (Figure 22). In this way, as Knight points out, ‘theory, systematic or ecological, will necessarily begin to creep in’ (Knight, 1985 p.110).

Nissen (1951) takes this a step further by classifying botanical illustrations as ‘vegetation pictures’ in which plant populations are depicted in their natural surroundings; ‘habit pictures’ which demonstrate the characteristics of the whole plant for the purpose of aiding identification; ‘diagrammatic sketches and plans of plants’, which are reproduced in textbooks to elucidate information included in the text; and ‘documentary plant illustration defined for learned research, which will take the place of the plant itself for the co-investigator distant in time or place’ (Nissen, 1951 pp.4-5). By this analysis, the Reeves pictures fall squarely within the final category.

3.2.3.2 Conventions of Botanical Illustration

In order to locate features of western influence within the Reeves paintings, it is considered helpful to set out some of the contemporary conventions of botanical illustration. The following list is not exhaustive, but is intended to describe some of the more important attributes of nineteenth century western plant illustration.

3.2.3.2.1 The Textual Component

Knight (1985 p.106) says that a defining feature of all scientific illustrations is that they are intended to be read in conjunction with an accompanying text. Botanical illustrations are no exception. Although Knight does not define what he means by the word, if 'text' is taken to mean any written (or printed) material, either on the face of or accompanying the illustration, then this would include the vulgar and Linnaean name of the plant, the artist's name or signature (which usually appeared), the engraver's, printer's or publisher's details, numbered or lettered plant parts (with or without a key), and any additional wording which is intended to be read in conjunction with the picture (Figure 22). In other words, a depicted plant does not sit in isolation; in order to be of value to botanists, horticulturalists, ecologists and others, another, non-pictorial, element must be present. This was equally true in the nineteenth century.

Botanical illustrators, many of whom were women, usually worked to commission in tandem with the authors who supplied the text; Francis Bauer for Aiton's *Delineations of Exotic Plants* (1796), W. H Fitch for Sir Joseph and William Hooker, Ferdinand Bauer for John Sibthorp's *Flora Graeca* (1806-1840) and Clara Maria Pope who illustrated Samuel Curtis' *Beauties of Flora* and *Monograph on the genus Camellia* (1819), by way of example. Hulton and Smith observe, '...we think of the later eighteenth and early nineteenth centuries as the golden age of botanical illustration...' (Hulton and Smith, 1979 p.143); it might equally be said that this was a golden age of botanical and horticultural publications. Blunt (1971) gives a short account of the reasons for this:

Botany... had become a popular recreation; flower painting, now accorded a place among the elegant accomplishments of every young lady of fashion, created a demand for manuals of instruction; and the cult of the language of flowers provided a ready market for sentimental flower books. Floricultural periodicals sprang up on all sides, and though some were deservedly ephemeral, many had a long and useful existence. New flowers from all parts of the world – heaths and pelargoniums from South Africa; rhododendrons, chrysanthemums, viburnums, jasmine, *Anemone japonica*, *Kerria japonica* and many others from China; and dahlias from Mexico stimulated gardeners and artists alike (Blunt, 1971 p.209-210).

3.2.3.2.2 Inflorescence

Since Linnaean classification depended upon arithmetic accuracy in portraying the stamens and styles of each plant, the inflorescence had to be clearly visible. This sometimes resulted in the drawing of flower heads at an unnatural angle. Also, as Nissen notes (1951 p.7), it was desirable that the plant should be drawn to a reasonable scale, so that it should neither be too small nor concealed, as had been the practice in older works. In order to elucidate the details of the flower head, the constituent parts were frequently dissected out and drawn separately on the same sheet. In this, the botanist and illustrator were aided by the microscope.

Walter Hood Fitch, who wrote eight articles on botanical drawing which appeared in *The Gardeners' Chronicle and Agricultural Gazette* during 1869 and which are reproduced by Blunt (Blunt, 1971), was unequivocal in his advice on 'Analyses' :

In some earlier works on botany, the dissections are often represented of even less than natural size, and are placed, perhaps judiciously, so as almost to escape observation...If analyses are intended to be useful, they should be large enough to be sufficiently explanatory even in respect to their hairs, glands etc (Hood Fitch quoted in Blunt, 1971 p.278).

3.2.3.2.3 Plant types

Specimen selection was crucial; the botanist and illustrator aimed to portray the 'plant type', that is, an idealized form in which the drawn plant was often the result of an amalgamation of several specimens. The final product showed no sign of adverse climatic conditions, variation instigated by habitat (e.g. stunted growth due to poor soil), or damage caused by pests and diseases.

3.2.3.2.4 Composition

The purpose of all botanical illustration is to 'convey knowledge old or new' (Knight, 1985 p.106). This resulted in the removal of extraneous stems and leaves which might conceal important information and the laying out of the plant on the sheet in an unnatural arrangement; the latter to allow optimum visibility of important characteristics of the plant and to permit the addition of painted seed heads, fruits etc., at a later date (Nissen, 1951 p. 6). Similarly, leaves were often turned to convey the details of venation and cut stems indicated a ligneous plant. Most commonly, plants were placed centrally and occupied most of the sheet, although it was not unknown for the subject plant to disappear off the edge of the page (King, 1978 p.17).

3.2.3.2.5 Drawing Technique

The use of the drawing pen, pencil or other tools to produce parallel lines, hatching or massed areas of light and shade within the delineated areas became characteristic of western illustration. This tonal style of drawing permitted the artist to convey the shape and surface texture of the plant, thereby producing the illusion of a 3-dimensional object in a 2-dimensional format. Similarly, shadows were often drawn on the plant, for example, on a length of stem below a leaf. The incorporation of shadowing surrounding the plant enabled the artist to produce pictures of plant material which appeared to be placed on a concrete surface, rather than floating in space. This is particularly noticeable in fruit drawings, such as Ehret's rendering of a Jargonelle Pear (Calmann, 1977 p.100) (Figure 23).

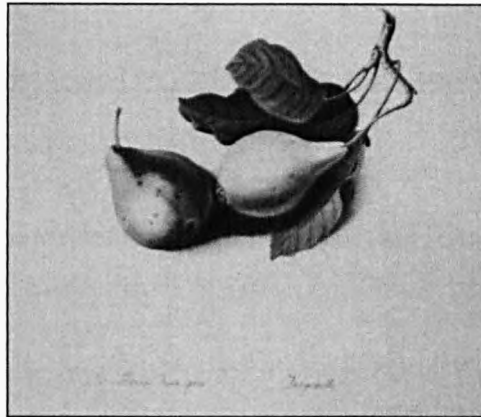


Figure 23. Jargonelle Pear 'Le Messire Jean gris' (*Pyrus communis* L.) painted on vellum by G. D. Ehret, 1758. (Calmann, 1977 facing p.100)

In order to complete the illusion of naturalism, the western artist frequently applied the rules of perspective and foreshortening to flora paintings. So, for example, the foremost leaves, petals and fruit were drawn slightly larger, but foreshortened, than those furthest away from the viewer. The same technique was applied to stems, drawn with tapering lines so that they appear to be bending backwards away from the point of view (Figure 23).

3.2.3.2.6 Media and Materials

Bridson observes that 'Natural History has always favoured the linear mode of representation because its delimitation of the edges of structures and shapes emphasizes clarity of form' (Bridson, 1989 p.121). By the nineteenth century the reed pen, quill and fine brush had been largely replaced by the metal drawing pen with which the artist could still achieve variation in the widths of his lines. Iron gall, sepia and 'Indian' (Chinese) inks were all available to the artist-illustrator, who was also aided by the invention of the graphite pencil in varying degrees

of hardness by a French manufacturer in the previous century.¹⁸⁸ Metalpoint, charcoal, chalk and grisaille were all also in use at this time.

The application of colour was achieved either by watercolour or ink washes, although, as Bridson says, the range of readily available pigments was limited in quality and stability (Bridson, 1989 p.122). Transparent watercolour could either be applied directly to the sheet, or mixed with white (usually lead white, prior to the introduction of Chinese white)¹⁸⁹ to create gouache. In each case, it was necessary to ensure that the paint did not obscure the underlying clarity of the drawing. Gum arabic was often applied as a final layer, especially in leaf areas, to reproduce the shininess of the original plant. The substrate was usually western paper. By the beginning of the nineteenth century, firms such as Whatman were producing paper particularly suited to watercolour. Vellum also continued to be used, especially by botanical artists.

3.3 The Reeves Drawings Described by Reference to the Contextual Framework

3.3.1 Introduction

In this section, the pictures on western and Chinese papers are separately described and are considered in relation to the characteristics of export art, Chinese flora painting and western botanical illustration.

3.3.2 Drawings on Western Papers

The immediate impression given by these drawings is one of size, variety of subject-matter, richness of colour, superb draughtsmanship and assuredness in the brushwork. Their accuracy was considered beyond reproach. Writing in 1824 of the 50 varieties of drawn chrysanthemums, Joseph Sabine commented that, 'Of the correctness of the representations in these drawings I have little doubt, because the resemblances of other plants figured by the same artist, which have blossomed here, are perfect.'¹⁹⁰ Again, two years later, he wrote that 'The drawings executed in China, for the Horticultural Society, under the direction of Mr. Reeves, are to be depended upon for their accuracy.'¹⁹¹ This was in sharp contrast to his views on earlier Chinese drawings (para. 3.2.1.4).

¹⁸⁸ According to Bridson (1989), the graphite pencil was available in the sixteenth century but was not widely used until the beginning of the nineteenth. In the 1790s a French manufacturer devised a method of grinding the graphite with baked clay to produce pencils of varying hardness, which accommodated the artists' need for variation in tone and line thickness (para. 4.4.1.1).

¹⁸⁹ Chinese white was a zinc oxide-based white introduced by Winsor and Newton in 1834.

¹⁹⁰ Sabine, J (1824) *Transactions of the Horticultural Society of London*. Vol.5, p.412. The Royal Horticultural Society.

¹⁹¹ Sabine, J (1826) *Transactions of the Horticultural Society of London*. Vol.6, p.484. The Royal Horticultural Society.

3.3.2.1 Drawing Style and Media

In every case, only the top surface of the wove paper has been used for painting and the (usually large) drawing placed more or less centrally. The majority of pictures are in portrait, although many are in landscape. In a very few instances, and making allowance for previous trimming, the painting disappears from the edge of the page. The picture of *Epidendrum paniculatum* is a case in point.¹⁹² The pictures are varied. Most depict flowering plants; some depict seeds and fruits including a melon (*Cucurbita maxima*),¹⁹³ guava (*Archidendron lucida*),¹⁹⁴ pineapple (*Ananas comosus*),¹⁹⁵ and banana (*Musa x paradisiaca*).¹⁹⁶ Some drawings simultaneously demonstrate plants in bud, in flower and in fruit, which suggests that the painting was carried out in stages, with the fruit added later, as was the practice in western botanical illustration (Figure 24).



Figure 24. Drawing of *Syzygium aqueum*. Chinese Drawings of Plants Small Volume I, p.78. (The Royal Horticultural Society)

Root systems are rarely shown. The drawing of *Eleocharis dulcis* exceptionally demonstrates stems, corms and a root system (Figure 25).

¹⁹² Chinese Drawings of Plants Small Volume V, p.38. The Royal Horticultural Society.

¹⁹³ Chinese Drawings of Plants Small Volume III, p.35. The Royal Horticultural Society.

¹⁹⁴ Chinese Drawings of Plants Small Volume I, p.81. The Royal Horticultural Society.

¹⁹⁵ Chinese Drawings of Plants Small Volume V, p.61. The Royal Horticultural Society.

¹⁹⁶ Chinese Drawings of Plants Small Volume V, p.19. The Royal Horticultural Society.



Figure 25. Drawing of *Eleocharis dulcis*. Chinese Drawings of Plants Small Volume V, p.69. (The Royal Horticultural Society)

In one instance, an illustration of *Prunus mume* (Chinese Drawings of Plants Small Volume II, p.25), a grafting and pruning method appears to be demonstrated (Figure 26).



Figure 26. Drawing of *Prunus mume*. Chinese Drawings of Plants Small Volume II, p.25. (The Royal Horticultural Society)

This picture is also of interest for the way in which the branches and blossom have been displayed across the page, suggestive of the way in which Chinese artists traditionally portrayed plum blossom. In Chinese Drawings of Plants Small Volume IV there are two unusual pictures demonstrating bonsai topiary, including a topiary animal (possibly a deer) in which graphite

lines have been superimposed, presumably to indicate grafts or points of attachment of strings in order to achieve the desired shape.¹⁹⁷



Figure 27. Drawing of *Didymoplexis pallens* in a wooden container. Chinese Drawings of Plants Small Volume IV, p.144. (The Royal Horticultural Society)

In the same Chinese Drawings of Plants Small Volume, at page 144, two plants are shown growing in a wooden container (Figure 27). Apart from the unusual subject-matter, this painting amply demonstrates the Chinese painter's difficulties with perspective and foreshortening referred to above (para. 3.2.2.9). In almost every instance, the same degree of attention to detail has been given to each part of the picture.

All the drawings appear to have been made with graphite pencil over which watercolour and gouache were applied. None of the outlines have been executed in Chinese ink, but the style is consistent with the detailed 'bone method' referred to previously (para. 3.2.2.3). In Chinese Drawings of Plants Small Volume II at page 82, the outline of a parrot drawn in graphite on the verso is further confirmation of the method.¹⁹⁸ Graphite was not used in traditional painting and would have been imported from the west.¹⁹⁹

¹⁹⁷ Chinese Drawings of Plants Small Volume IV, p.137. The Royal Horticultural Society.

¹⁹⁸ The Reeves Collection at the British Museum (Natural History) includes pictures of birds. The outline referred to in the text provides further confirmation that Reeves used the same artists for the bird, fish and plant drawings.

¹⁹⁹ Writing of his journey to China in 1816, the botanist Clarke Abel wrote 'The inhabitants were very liberal in their gifts ... Presents in return were always acceptable, and sometimes expected; and of these, black-lead pencils, and common English writing paper, were much valued'. (Abel, 1818 pp.122-123)

It is usual to find a white (lead white) base layer put down beneath the more solid structures in the picture-usually the woody stems and fruits. This is apparent along the edges where the colour falls short of the base layer, and is reminiscent of the Chinese method of ensuring that colours stood out, particularly on silk paintings, by painting the shape in white on the reverse (Figure 28).

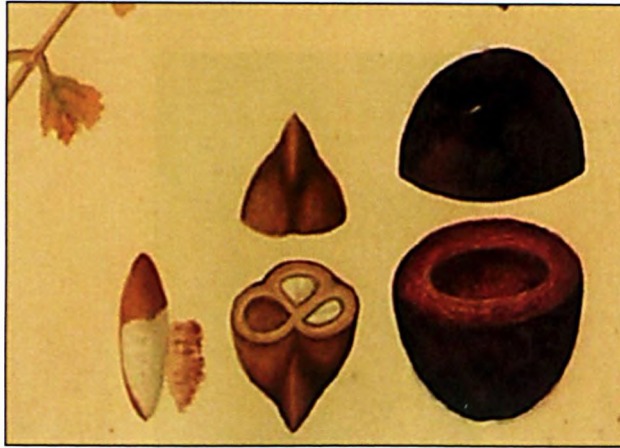


Figure 28. Enlarged part of drawing of *Canarium commune*. Chinese Drawings of Plants Small Volume II, p.92. (The Royal Horticultural Society)

The authors of *The Mustard Seed Garden Manual of Painting* advised ‘On the back of pictures of flowers painted in colours mixed with white, a coat of white will enhance the results’ (Wang, Wang and Wang, 1992 p.583).

In many instances stems are shown with cut ends and growth rings (Figure 8 and Figure 29), a convention which runs contrary to the Chinese principle of painting plants to appear as though living. Sometimes grey-white or brown-white highlights were applied to ligneous stems (Figure 26), and there are instances of superfluous stems being removed, both indicative of western influence. In one instance, shadows have been reproduced (Figure 29).



Figure 29. Part of a drawing of *Jatropha ?gossypifolia* (*Ricinis communis*). Chinese Drawings of Plants Small Volume IV, p.130. (The Royal Horticultural Society)

Corrigan (2004 p.98), commenting on a Chinese painting of *Paonia moutan* dated *circa* 1823 in the Farquar²⁰⁰ albums, notes that the green stems on the painting of a peony had been outlined in red, and attributes this to traditional Chinese painting. This technique is also apparent in many of the Reeves pictures. Given the nature of the Collection, there is a huge variety of painted leaf forms. The Chinese propensity to show the undersides of leaves and to include areas of disease and insect damage is consistently demonstrated (Figure 24 and Figure 30).



Figure 30. Part of a drawing of *Ixora chinensis*. Chinese Drawings of Plants Small Volume III, p.73. (The Royal Horticultural Society)

In a few instances, gum arabic or a similar substance appears to have been applied to the surfaces of dark leaves, thereby conveying a sense of glossiness of the leaf and enhancing the three-dimensional effect.

A similar variety is shown in the painting of flowering parts. In some instances the painter adopted the Chinese method of painting a blue-grey wash around white petals. This technique has been identified on several of the Reeves pictures, and is particularly noticeable on the picture of *Plumeria acutifolia*.²⁰¹ While this may have been necessary on very white Chinese papers, it was not strictly required on the cream background of the western sheets. The reproductive parts of the flower are clearly delineated and there are very many instances these being separately drawn to aid identification. The page holding a drawing of *Hemerocalis fulva*²⁰² is unusual in comprising two pictures; the plant is drawn on western paper, taking up most of the page, but a separate drawing on a Chinese paper of the partially dissected flower-head has been adhered (Figure 31). The influence of the Linnaean system of plant classification is clear.

²⁰⁰ Sir Robert Townsend Farquar was appointed Governor of Mauritius in 1810.

²⁰¹ Chinese Drawings of Plants Small Volume IV, p.121. The Royal Horticultural Society.

²⁰² Chinese Drawings of Plants Small Volume V, p.8. The Royal Horticultural Society.

There is an absence of lines and hatching to indicate solid shapes, and shadows on plant areas are rarely found.²⁰³ The prevalent method of indicating form and shape was either by applying highlights to stems areas, or by the judicious application of varying shades of the same ground pigment, notably malachite on the leaf areas. Where this was not possible, in areas where gamboge or other organic pigments were used, the subject can appear somewhat flat.



Figure 31. Drawing of *Hemerocalis fulva*. Chinese Drawings of Plants Small Volume V, p.8 (The Royal Horticultural Society)

There are no pictures depicting the angle of light source, shadow or a background; equally, there are no instances of insects being portrayed as was commonly found in export art.

Foreshortening is frequently absent.

It is clear from the Horticultural Society's Minutes that more than one copy of some of the pictures was sent back from China, and Reeves' own collection at the British Museum (Natural History) substantially duplicates the Royal Horticultural Society's Collection. As part of this research, a digital photograph of *Wisteria sinensis* in Chinese Drawings of Plants Small Volume II at page 64 in the Lindley Library has been superimposed on the duplicate picture held at the British Museum (Natural History). This exercise confirmed that a free-hand copy was made of this drawing. Visual comparisons made between digital photographs of the Collection and transparencies made of the Reeves Collection at the British Museum (Natural History) also confirm that there are minor variations which would be consistent with free-hand copying rather than tracing.

²⁰³ An exception to this is the painting of *Sagittaria sagitiifolia* in Chinese Drawings of Plants Small Volume, V at page 56 in which dark lines have been painted to one side of both stems where they lie across underlying leaf parts.

There is nothing in the pictures to suggest that any one of them was painted by more than one hand, except perhaps the woody stems, which often appear crude in comparison to the painting of the leaves and inflorescence. This may be accounted for by the Chinese artists' lack of familiarity with the technique of painting highlights. As Fan suggests, the notebooks at the British Museum (Natural History) indicate separate payments made to individual artists for completed pictures (Fan, 2004 p. 52); there is nothing on the face of the pictures in the Collection, or in Reeves' notebooks, which would indicate a contrary view.

3.3.2.2 Inscriptions

Typically each drawing is inscribed with Chinese characters in Chinese ink [*mo*] giving the Chinese plant name (Figure 32). On many pages an early form of transliteration appears alongside in dark brown western ink, giving the sounds for the characters in Cantonese (Figure 32). The drawing in Figure 32 is unusual in that additional information had been added, which almost certainly would have originated with Reeves: 'The Chinese name signifies Flower which opens in the Day and shuts in the Evening.'

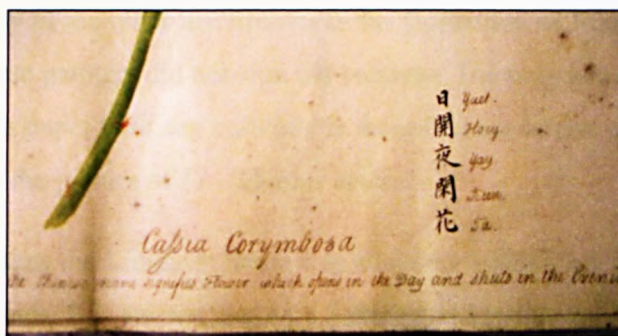


Figure 32. Part of a drawing of *Senna auriculata* (formerly *Cassia corymbosa*). Chinese Drawings of Plants Small Volume II, p.76. (The Royal Horticultural Society)

This script does not match any of the known examples of Reeves' handwriting, but is distinctive and matches the handwriting found in the Horticultural Society's Minutes of Council for 1830 and March 1839. It has already been suggested that these inscriptions were added by a clerk at the Horticultural Society (para. 2.10). It is known from John Lindley's reports that Reeves sent back the transliteration for the Cantonese sounds for some of the plant names; evidence for this is found in one of Lindley's reports published in 1826 in which he says 'It [*Prunus pseudo-cerasus*] has also been sent to the Society from China by Mr. Reeves, under the name of *Yung To*'.²⁰⁴ The other possibility is that on his return to England Reeves dictated the sounds of each character to a member of the Horticultural Society's staff, who then inserted them. A native Cantonese speaker has confirmed that the sounds represented in the transliteration match the

²⁰⁴ Lindley, J (1826) *Transactions of the Horticultural Society of London*, 6, p.90. The Royal Horticultural Society.

sounds of the characters in Cantonese.²⁰⁵ Translations of the Chinese names for some of the plants were certainly provided by Reeves. Writing in the 1824 *Transactions of the Horticultural Society of London*, Sabine confirmed:

My friend Mr. Reeves has supplied me with the translation of most of the appellations by which the kinds of which the Horticultural Society possesses drawings are known in China; many of these are curious and fanciful....The following will serve as specimens of the Chinese names,' the Purple Lily', 'the White Waves of Autumn,' 'the Yellow Gold Thread', 'the Purple Butterfly,' 'the Purple Pheasant's Feather,' 'the Yellow Tiger's Claw,' 'the Chrystal [*sic*]White'.²⁰⁶

There are a few graphite pencil inscriptions on the verso which are of interest. In Chinese Drawings of Plants Small Volume IV at pages 28 and 31 there are references to 'Fruit at Casa Garden', which suggest that these pictures were painted at Macao. There is also a graphite pencil inscription which reads 'Ackona'²⁰⁷ on the verso of Chinese Drawings of Plants Small Volume II, page 82, and similarly 'Ack' appears on the verso of the picture of *Cannarium brunneum* (Chinese Drawings of Plants Small Volume II, page 93). The writing is distinctive, but does not match any of the other inscriptions in the Collection or John Reeves' writing in his notebooks. The Chinese painters did not sign the pictures. The only name that can be matched to a picture on western paper with any certainty is that of Akam whose name appears in graphite pencil on the verso of the picture of *Phyllanthus emblica*.²⁰⁸

At the foot of some pages the Linnaean name was added in western ink and this appears to be the work of several hands. It is known that both Sabine and Lindley used these pictures for research purposes and as the basis for their articles in *Transactions of the Horticultural Society of London*. It seems most likely that these inscriptions were added at the Horticultural Society. Some pages bear an 'HS' black ink collector's stamp at the bottom right hand corner; this has been discussed at para. 2.8.1. Finally, it should be noted that there are instances of pictures on smaller western papers adhered to 1837 Whatman papers. In most instances the 'HS' collector's stamp is not present.

²⁰⁵ This has been confirmed by Xuhua Zhan MA Conservation, Camberwell College of Arts (2007). Pers. Comm. May 29th.

²⁰⁶ Sabine, J (1824) *Transactions of the Horticultural Society of London*, 5, p.426. The Royal Horticultural Society.

²⁰⁷ Research into this word has not revealed any connection with the name of a plant, bird or place. Since the first letter is an 'A' it may be the name of a fifth painter, although the handwriting bears no similarity to known examples of Reeves' script.

²⁰⁸ Chinese Drawings of Plants Small Volume IV, p.117. The Royal Horticultural Society.

3.3.3 Drawings on Chinese Papers

The drawings on the Chinese papers are appreciably different from those described above. In almost every case, the Chinese papers have been adhered to 1837 cream Whatman paper; in most instances, three or four to the page. There is no evidence of previous mounting or binding. The only exception to this is contained on an inset in Chinese Drawings of Plants Small Volume III at page 115 on which small pictures have been adhered to a folded sheet of purple-brown sugar paper, which is not bound into the volume. The drawings shown in Figure 33 are both on fine Chinese papers.



Figure 33. Two adhered drawings on Chinese papers.²⁰⁹ Chinese Drawings of Plants Small Volume III, insert at p.115. (The Royal Horticultural Society)

Paper sizes vary; the adhered pictures on page 115 are 125 mm x 185 mm, and this size is the most commonly found, which may suggest that these were originally pages from an album. Papers measuring 130mm x 197 mm²¹⁰, and 270 mm x 480 mm²¹¹, 286 mm x 430 mm²¹² and an assortment of similar sizes have also been identified. All the Chinese papers may be described as fine, white (almost transparent), laid papers. It follows from the paper sizes that these drawings are considerably smaller than the ones produced on the western papers.

²⁰⁹ These two drawings have not been listed on the typed sheet headed 'REEVES, John' held by The Royal Horticultural Society.

²¹⁰ Chinese Drawings of Plants Small Volume V, p.22. The Royal Horticultural Society.

²¹¹ Chinese Drawings of Plants Small Volume III, p.66. The Royal Horticultural Society.

²¹² Chinese Drawings of Plants Small Volume V, p.6. The Royal Horticultural Society.

3.3.3.1. Drawing Style and Media

In common with the drawings described above, the plants have been drawn centrally on each sheet with cut stems according to western convention, but also frequently show the undersides of leaves and damaged areas in common with Chinese flower painting (Figure 35). Most depict the plant in flower; none have the reproductive parts painted out separately, although there are pictures of dissected fruit.²¹³ Under-drawing is not visible except in a few instances where pale Chinese ink (*mo*) was used to outline the plant. This picture shown in Figure 34 is unique in this Collection; it is unfinished and demonstrates the way in which the painter worked by completing a section of the picture at a time, rather than applying each colour in turn to the drawing as a whole.



Figure 34. Drawing of *Cotula anthemoides* on Chinese paper. Chinese Drawings of Plants Small Volume III, p.114. (The Royal Horticultural Society)

There is no foreshortening, no painting of shadows or highlights and rather fewer graduated tones than found on the larger pictures, which tend to give the images a somewhat 'flat' appearance. There appear to be no base layers of lead-white and no heavily-applied layers of gouache. Surface glue, gum arabic, or similar has not been applied to leaf surfaces. In certain pictures, a grey wash has been added to the edges of white petals in the Chinese manner (Figure 35).

²¹³ Chinese Drawings of Plants Small Volume IV, p.28, for example, which shows fruit from The Casa Garden. The Royal Horticultural Society.



Figure 35. Drawing of *Hosta plantaginea*. Chinese Drawings of Plants Small Volume V, p.7. (The Royal Horticultural Society)

The painting on the Chinese papers is characterized by its fine detail, delicacy and transparency.

3.3.3.2 Inscriptions

These pictures do not have an 'HS' collector's stamp and the Chinese names for the plants are not given. This is consistent with these drawings having been purchased and sent on approval to the Horticultural Society as 'Miscellaneous Drawings' (para. 2.9). Some of these smaller pictures bear graphite and ink inscriptions which match Reeves' handwriting. Of importance are the names of three of the Chinese painters: 'Achew' and 'Akut' which appear on the picture of *Altingia chinensis*,²¹⁴ with a note of the date as '18' or '13' 'Aug'; 'Akut' appears again on a picture of *Bulbophyllum bicolor*²¹⁵ with the date '6 May 27', and the name 'Akam' is visible on the painting of *Glochidion rubrum*²¹⁶. Some other pictures also have date references, but give no indication as to the painter. From the information provided, it may be deduced that these pictures were painted during the summer months, almost certainly in Macao.

3.4 Conclusions

Although there is little direct evidence for the working arrangements of Reeves' artists, it may be supposed that they worked in a studio with a source of good natural light, and that their equipment was not dissimilar to that contained in the descriptions of Cantonese painters' studios. Elaborate tools and materials were not required and these would have been readily

²¹⁴ Chinese Drawings of Plants Small Volume IV, p.145. The Royal Horticultural Society.

²¹⁵ Chinese Drawings of Plants Small Volume V, p.22. The Royal Horticultural Society.

²¹⁶ Chinese Drawings of Plants Small Volume IV, p.118. The Royal Horticultural Society.

portable between Canton and Macao. It appears that most of the painting must have been completed at Macao, where Reeves may have installed them in his house, in effect, as domestic servants.

For commissioned work, the artists were supplied with Company papers and graphite pencils, probably by Reeves. It is argued that the pictures on western papers, (and similar botanically accurate pictures commissioned by Kerr, Bradby Blake and others), are not examples of 'export art' within the definition provided by Clunas, but neither are they traditional Chinese flora paintings. Although manifesting similarities with western botanical art, clearly they are not examples of this genre either.

It is suggested that these paintings are *sui generis*, displaying characteristics from both traditions, but belonging entirely to neither. A comparison between the lotus plants painted in the Reeves Collection (Figure 8) with pictures of the same plant painted with boneless brushwork (Figure 16) and the bone method (Figure 17) demonstrates the way in which Reeves' artists adapted Chinese traditional methods to produce pictures which could be used for western botanical purposes. In common with the tea trade, of which they are an associated product, the Reeves Collection may properly be viewed as an extra-ordinary creation of east-west collaboration arising from what Fan refers to as 'a Chinese *entrepot*' (Fan, 2004 p.11).

The pictures on the Chinese papers appear to have more in common with traditional Chinese painting, and the influence of western conventions is less evident. There is no way of determining for certain whether these were painted for sale on the open market, or whether they were commissioned by Reeves. Several factors indicate that they were painted by Reeves' artists, as individual art works or, more probably, albums intended for the export market. The painters' names were inscribed by Reeves on three pictures, which indicate that he was aware of the identity of the artist in each case. Dates were also recorded in his handwriting. On the other hand, the use of small Chinese papers, the absence of graphite pencil outline and layers of gouache suggest that the painters were adhering to more traditional techniques, and were not painted to Reeves' order. This is supported by the lack of Chinese characters giving the plant names. These pictures are not stylized and appear to have been drawn from live specimens. This would have made them an attractive purchase for Reeves, who would have been in a position to compare them with the original plants to satisfy himself as to their accuracy. The colours are rather 'quieter' than the brilliant colours which are a feature of export art and none of the pictures include images of insects or other animals. Furthermore, relative to the larger drawings, many of these plants appear small. It is suggested that these are probably drawings of wild flowers and that they were the ones which Reeves directed that Robert Fortune should concentrate on when he wrote to Lindley '...I should say then look at the Drawings I sent home

to the Society...more particularly those upon the smaller sized papers-and see how many of the plants growing then near me at Macao & Canton are yet unknown at home.'²¹⁷

In this chapter, information about the drawings has been ascertained from visual inspection of the pictures within the contexts of export art, Chinese flower painting and western botanical illustration. In the next chapter, the pictures are considered in terms of their material components; media, binders and fixatives, gums, resins and sizes, as well as paper fibres.

²¹⁷ Reeves, J (n.d.) Letter to Lindley. The Royal Horticultural Society.

CHAPTER 4

MATERIALS: PIGMENTS, PAPERS, GUMS AND RESINS, ADHESIVES AND BINDERS, FIXATIVES AND SIZES

4.1 Introduction

In the previous chapter, the Reeves pictures were examined for their aesthetic and scientific qualities by comparison with related forms of pictorial representation. The purpose of this chapter is to consider the material composition of the drawings; the pigments, papers, gums and resins, adhesives and binders, fixatives and sizes.

Pigment and paper-fibre identification has been undertaken using polarized light microscopy (PLM). Where known, the chemical formulae as well as the likely sources and methods of preparation of pigments are given. The prevalence of certain pigments in the Collection, notably malachite and lead white, has implications for the current condition and conservation treatment of these drawings, which is considered in the next chapter.

The discolouration of lead white is discussed with reference to a traditional Chinese method for its reversal, found in *The Mustard Seed Garden Manual of Painting* (Wang, Wang and Wang, 1977 p.49). No reference to this has been discovered in western conservation literature, and therefore it was considered of interest to discover whether the method might yield a satisfactory result. The results of tests carried out on darkened painted-out samples of lead white are discussed in this chapter, while the more orthodox western method of reversal is discussed in relation to conservation treatments in the next chapter.

References to Prussian blue in conservation literature are scanty in the context of nineteenth-century Chinese works of art, with no reliably dated example reported. Research into the records of imports and exports of the East India Company's Canton Factory, and among contemporary published accounts of its use by the Chinese as a tea contaminant, prompted the search for this pigment within the Collection using PLM coupled with chemical testing. The outcome of this part of the research is given here and the implications discussed. Limited testing has also been carried out to ascertain the sizes and binders. The use of alum or an alum/gelatine mix as a size by the Chinese is well-documented. The Chinese are also known to have used both terrestrial animals and fish as sources of glues and binders (Winter, 2008 p.81), as well as plant products such as seaweed (Winter, 2008 p.89).

4.2 An Outline of the Literature

The discovery of useful properties of certain pigments, notably cinnabar/vermilion, malachite, orpiment, gold and silver has been attributed to the work of early Chinese alchemists, who, like

their western counterparts, hunted for the means to immortality. According to Pas (2006), relying on information provided by Needham (1974), this dated from at least as early as the Han Emperor Wu (r. 140-87 BC). Needham (1974 and 1980) has been used to gain some insight into the theoretical background of Chinese alchemy. Reference has been made to Table 95 of Volume V, Part 2 (Needham 1974 p.164 *et seq.*) for the nomenclature of mineral pigments. Chikashige (1936 p.29) notes that so many names were given for 'medicines of the immortals', which changed over time, that there is difficulty in identifying them, and Sze is similarly of the view that 'The relationship of colours to alchemy, and ... of painting and alchemy, is a vast subject of undeniable fascination, difficult to understand without knowledge of the background of alchemy and its symbolic language, which was purposely veiled in elaborate allusion' (Sze, 1959 p.80).

A frequently-cited work on this subject is Li's *Chemical Arts of Old China* (Li, 1948). The author relates how the Chinese attributed chemical reactions to the theory of *yin* (negative element) and *yang* (positive element). Phenomena which could not be explained away by this theory were ascribed to supernatural powers. Li provides descriptions of pigment preparation from the raw materials with small line drawings.

Descriptions of pigments in early use in Japan are given by Uyemura (1931). Despite the title, it is clear from his text that Chinese and Japanese painters used many shared pigments, which is perhaps unsurprising given the close trading links between the two nations over many centuries. Uyemura was used as a source by March in his own reference work, *Some Technical Terms of Chinese Painting* (March, 1935). Another frequently-quoted Japanese author is Chikashige whose work *Alchemy and Other Chemical Achievements of the Ancient Orient*, particularly Part 3 entitled 'The Medicines of the Immortals' has been referred to particularly for additional information on orpiment (Chikashige, 1936).

The seminal work on Chinese pigments is Yu Feian's *Chinese Painting Colors: Studies of their Preparation and Application in Traditional and Modern Times* (Yu, 1988), originally written in Chinese in 1955, but translated with additional footnotes by Silbergild and McNair in 1988. This provides an account of modern and historic methods of paint preparation and use, written from a painter's perspective, and makes accessible relevant parts of earlier Chinese texts on painting. The footnotes include references to the unpublished MA thesis on Chinese pigments by Ippolito (1985). A copy of the latter work has been supplied by the author and has been of particular assistance in listing the many names frequently attributed to each pigment and for identifying sources of confusion over pigment names. Acker's two-volume work *Some Tang and Pre-Tang Texts on Chinese Painting* (Acker, 1954 and 1974), published twenty years apart, has similarly been used to access early Chinese written material. For practical details as to the

preparation and use of pigments, the *Mustard Seed Garden Manual of Painting* proved invaluable.

For a modern source of factual information on pigments, reference has been made to several chapters in *Artists' Pigments: A Handbook of their History and Characteristics* (Feller and Fitzhugh, 1986-1997), supplemented by additional general works, including those by Gettens and Stout (1942) and Harley (1970 and 2001). A valuable recent contribution, written by a conservation scientist, is John Winter's *East Asian Paintings* (Winter, 2008). This combines historical and scientific detail about the material components of East Asian pictures, including papers, pigments, dyes, sizes, gums and resins as well as binders. *The Pigment Compendium* (Easthaugh *et al*, 2004) and *A Pigment Microscopist's Notebook* (Mactaggart, P and Mactaggart, A, 1998) have been used as an aid to the identification of pigments using PLM.

Conservation literature dealing with Chinese paper artefacts such as paintings, fans, scrolls and wallpaper, for example, by Grantham (2006), Webber and Huxtable (1988), Wise and Wise (1997), Rickman (1988) and others have tended to lay emphasis upon traditional Chinese pigments. However, research carried out during this project indicates that prior to the Treaty of Nanking (1842) some western pigments, particularly carmine and Prussian blue, were certainly in use in Canton during the first half of the nineteenth century. The use of carmine in 1582 is noted by Clunas (1997 p. 187), and reference has already been made to the fact that, according to one source, Cantonese portrait painters bought colours from the English (para. 3.2.1.2).

Clunas also says that ready-prepared colours were available for purchase, presumably from artists' shops, from the mid-eighteenth century onwards (Clunas, 1997 p.71) and Reeves may have been referring to these in correspondence with his sisters (para. 1.5.4). It is clear from part of Toogood Downing's description of Lamqua's shop that the ground floor of the premises was allocated for the sale of pictures and other commodities connected with the trade (para. 2.5). It is likely that Reeves' painters obtained brushes and pigments from such an artists' shop.

One of the most useful primary sources are the East India Company's Canton Diaries of Transactions and Consultations which detail the names and volume of pigments carried by the Company ships between Britain and Canton, and the 'Country Trade' with India. This was supplemented by the writing of travellers such as James Gray (1974), Dr. Clarke Abel (1818), and the work of European residents in China such as Sampson (1882) who recorded the presence of a Prussian blue factory outside the northern gate of Canton. Von Bibra (1995),²¹⁸ who seems to have been in correspondence with Reeves, colourfully relates the story of the way in which the Chinese may have acquired this knowledge. This part of the research dovetails

²¹⁸ Baron Ernst von Bibra (1806-78) travelled extensively and studied psychoactive plants, including tea.

with work previously undertaken by Smith (2005) into the availability and use of Prussian blue in Japan.

Reference has also been made to lists of traded articles, including pigments with their Chinese names, found in Morrison's *Commercial Guide* published in Canton in 1848 (Morrison, 1848) and Milburn's *Oriental Commerce or the East India Trader's Complete Guide* of 1825 (Milburn, 1825). A similar, but later, book published in Shanghai is *The Principal Articles of Commerce* (Watson, 1930) which, although dated a century after Reeves left China, nevertheless gives comprehensive descriptions of products such as paints, dyes, gums and resins, many of which had long been in use in China. In 1864 the Daily Press in Hong Kong published *The Tourists Guide and Merchants Manual. Being an English-Chinese Vocabulary of Articles of Commerce and of Domestic use also, all the Known Names Connected with the Sciences* (1864). This was consulted to confirm the Chinese names of some of the pigments, but it also gives an idea of the commodities still being traded a short time after Reeves had left China; vermilion, alum and asses glue, for example. These published works are discussed in conjunction with lists of imports and exports contained in the records of the Canton Factory.

English and Chinese papers are considered in relation to paper fibres, methods of manufacture and paper-makers. Reference has been made to Balston (1957 and 1999), Coleman (1958), Hills (1988) and Shorter (1993) for background detail on English papermaking in the nineteenth century. For Chinese papers, the principal source of reference has been Needham and Tsien (1985), the plant monographs produced by Collings and Milner (1978, 1979 and 1982), supplemented by Mullock's article on Xuan paper (Mullock, 1995).

4.3 The East India Company Trade

4.3.1 Introduction

The Factory records for 1811/12²¹⁹ to 1830/31²²⁰ were checked for references to Reeves. However, it became apparent that the value of these documents for the purposes of this research lay equally in the lists of transported commodities, from which it may be concluded that there was a small but regular and significant trade in pigments and papers. These records were supplemented by Milburn's *Oriental Commerce or the East India Trader's Complete Guide* (Milburn, 1825), Phipps' *A Practical Treatise on the China and Eastern Trade* (Phipps, 1836), and Morrison's *A Chinese Commercial Guide* (Morrison, 1848).

²¹⁹ The East India Company Diary and Consultations for 1811-1812. IOR G/12/176. British Library.

²²⁰ The East India Company Diary and Consultations for 1830-1831. IOR G/12/ 245. British Library.

Phipps' work provides useful background information. According to an entry dated July 1828, a regulation was issued by the Chinese authorities listing staple imports and exports which were to be traded solely through the *Hong* merchants, including vermilion, quicksilver, alum, Prussian blue, cochineal and gamboge. Less important goods could be bought and sold through 'shopmen' (Phipps, 1836 p.148). Despite the edict, trade appears to have continued unimpeded, 'It need hardly be said, that the trade with shopmen or outside merchants was carried on with freedom, before this regulation was passed... The trade in the above articles [headed 'imports confined to *Hong* merchants'] is not, in practice, confined to the *Hong* merchants' [my italics] (Phipps, 1836 p.148). The regulation nevertheless indicates of the importance attached by the Chinese to the listed commodities.

4.3.2 Imports

The pigments imported into Canton during the period under consideration, include Prussian blue from England (para.4.4.18). Other imported commodities which may have been used to manufacture paints, dyes and binders include quicksilver, red lead, lead, cochineal,²²¹ saffron, gold dust, gums (para. 4.6), unspecified blue dye (Phipps, 1836 p.157), cudbear²²² (Phipps, 1836 p.326) and betel-nut, noted by Phipps for its use as a dye in China (Phipps, 1836 p.319). 'Smalts'²²³ is listed in the East India Company records of imports, although its use is unclear; the pigment may have been adopted by Cantonese painters or it may have been destined purely for the ceramics industry.

4.3.3 Exports

Commodities exported included the following pigments and paints: vermilion, white paint, gamboge, Indian ink,²²⁴ cochineal, white lead which is listed as 'lead white' by Morrison (Morrison, 1848 p.176), orpiment and red lead, the export of which is declared by Morrison to be 'utterly insignificant' (Morrison, 1848 p.176). Various related articles were also exported, including writing paper, coloured paper, allum [*sic*], dragon's blood, glue (ox-hide, cowhide and fish) and 'India paper-piths' (Phipps, 1836 p.159).

4.4 Pigments

The basis upon which pigments have been selected for discussion are firstly, those which are known from the literature to have been commonly in use in Canton in the nineteenth century

²²¹ Curiously, both cochineal and red lead are listed as imports and exports. One possible explanation is that the Chinese imported these products intermittently when their usual sources dried up.

²²² A powder produced from lichen *Lecanora tartarea* which was used for dyeing violet or crimson.

²²³ Crushed glass containing cobalt oxide (Winter, 2008 p.31).

²²⁴ In fact, Chinese ink and referred to as such by Milburn (1825 p.489).

and therefore likely to be found in the Collection and secondly, those for which preliminary identification has been made in the Reeves Collection.

For ease of reference, each pigment, or group of pigments, will be considered under a separate sub- heading.

4.4.1 Carbon-based Media

‘Carbon-based black pigments comprise any pigments that contain some form of elemental carbon as either the sole or the chief ingredient’ (Winter and Fitzhugh, 2007 p.1). For practical purposes, Winter and Fitzhugh classify artists’ carbon-based pigments as follows:

1. Graphite pigments, which are discussed below.
2. Soot and smokes. Included here are the carbon blacks and lampblacks, which are discussed below.
3. Pigments of vegetable origin, such as charcoal (made from burnt wood).
4. Pigments of animal origin, such as ivory black and bone black produced from collagen, fats and other organic compounds.
5. Coals and related materials, for which no reference has been found after the seventeenth century (Winter and Fitzhugh, 2007 pp.19-20).

The pigments based on carbon, which vary in colour according to source and chemical composition, are very stable and are unaffected by light or air. All forms are insoluble in water, acids and alkalis.

4.4.1.1 Graphite

As already noted, many Reeves drawings executed on the western papers have been under-drawn in graphite (para. 3.3.2.1), which is a stable form of carbon. Graphite, which is crystalline, occurs as a mineral, and was mined in Cumberland until the first half of the nineteenth century by which time the mineral had been mined out (Petroski 1989 p140). A less crystalline form was also manufactured (Winter and Fitzhugh, 2007 p.1 and 18). According to Petroski, pencils made from wood encasing a length of cut mineral graphite were available in the seventeenth century, and by the end of the following century pencils made from the Conté process were in use (Petroski, 1989). These were produced from finely divided graphite mixed with clay which was dried and fired, although inferior articles were also manufactured from graphite dust mixed with clay, sulphur and other materials (Petroski, 1989 p.127).

The rarity of graphite pencils in China may be appreciated from the account of his travels given by Dr. Clarke Abel in 1818, who gave his Chinese plant donors presents of ‘black-lead pencils,

and common English writing-paper' which were 'much valued' (Abel, 1818 p.123). They do not feature in any of the lists of imports and for this reason it is suggested that Reeves may have issued pencils (and papers) to his artists for the commissioned work. Given the size of its enterprise, it seems likely that the East India Company would have invited tenders for bulk consignments of lead pencils, inks, and other items of stationery in the same manner as it was known to have done for papers (Balston, 1954 p.63).

The presence of graphite on the English papers in the Collection is indicated by visual inspection of all the pages in all the Reeves volumes and by stereo-microscopic examination of several drawings clearly exhibiting a characteristic grey outline with a metallic lustre (Figure 36). In the path of an infra-red light source, the outlines appear very black, a further indication of this pigment. No traces of graphite pigment particles were found in the gutters of dis-bound Chinese Drawings of Plants Small Volume II.

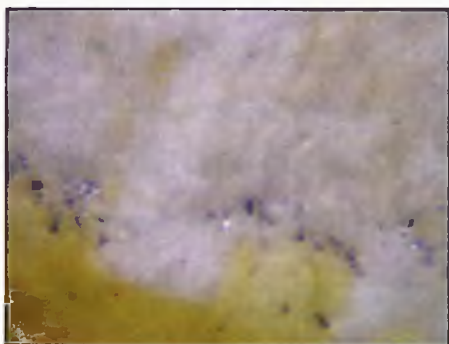


Figure 36.

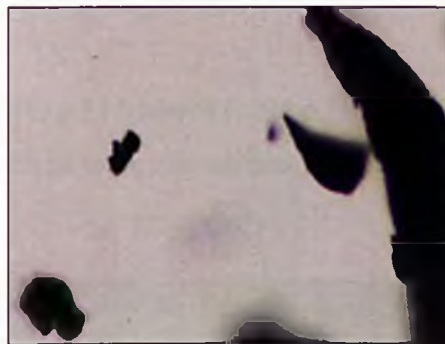


Figure 37.

Figure 36. (Left) Traces of graphite pencil outline on a Drawing of *Senna occidentalis*. Chinese Drawings of Plants Small Volume II, p.75 viewed through a stereo-microscope. (The Royal Horticultural Society)

Figure 37. (Right) Sample of Graphite (X 400 Magnification). (Camberwell College of Arts)

The particle sizes of graphite are highly variable (Figure 37). Identification of the pigment in dispersion using PLM is suggested by Winter and FitzHugh (2007 p.22); however, the removal of particles for examination from the surface of the paper in the Reeves Collection was considered unacceptably invasive.

4.4.1.2 Chinese ink

The main constituent of this product (sometimes incorrectly named 'Indian ink') is carbon black or lampblack produced from flame carbon (soot) to which a binder (animal glue) was added, together with secondary ingredients such as perfume. Impurities such as tars, coke or char particles may also be present (Winter and Fitzhugh, 2007 p.19).

Chinese ink, which is characterized by very fine, black particles when viewed through a microscope (Figure 38), was one of the 'Four Treasures' of the Chinese artists' studio (Winter, 2008 p.45). It is clear from Yu (Yu, 1988 pp.36-37) that at least from the Han Dynasty onwards, there were many methods of manufacture, although Winter says that with the passage of time, 'Ink making in China settled down to essentially the same basic recipe with variations' (Winter, 2008 p.46). The soot was obtained from three sources; pinewood, oil and lacquer, as follows:

Pine soot was produced from pine wood burnt in kilns, either vertical kilns with a series of stacked, perforated jars in place of a chimney, in which the soot was deposited (the crudest soot filling the lower jar, the finer quality soots progressively filling the upper jars), or horizontal kilns with long exiting flues leading to small closed cells where the soot gathered on paper-lined walls. Oil soot was produced by burning small, cup-sized earthenware lamps of tung or other oils, a small number of them placed in a larger water-filled bowl and each of them partially covered by rounded, inverted, polished lids in which the soot collected; the lamps were lit with grass or vegetable-fiber wicks (Yu, 1988 p.36).

Lacquer soot was made from spoiled lacquer (Yu, 1988 p.37). March (1935 p.5) gives *sung yen mo* (pine soot ink) as the Chinese name for this, which he says, was the best for painting, while ink made from oil was known as *yu mo* (oily ink).

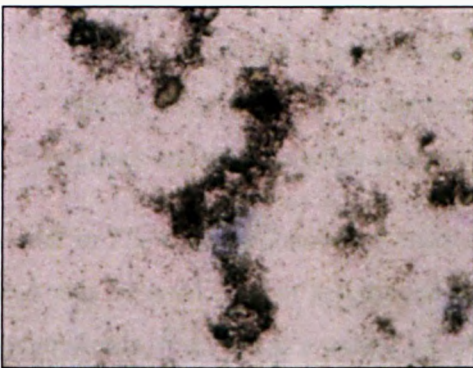


Figure 38.

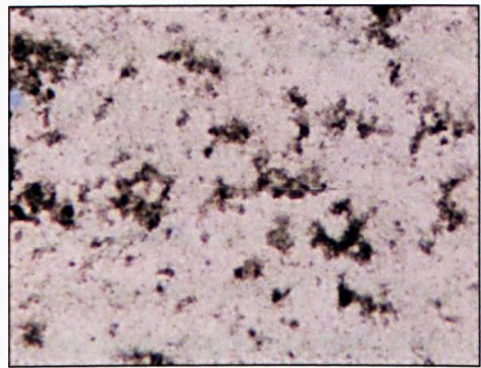


Figure 39.

Figure 38. (Left) Sample of Chinese ink made from an old ink stick ground with water (X 200 Magnification). (Author's own)

Figure 39. (Right) Sample of Chinese ink made from an old ink stick ground with water (X 400 Magnification). (Author's own)

Glue binders for inks were derived from a variety of animals, but donkey-hide and ox-hide are particularly named (Yu, 1988 p.37). Citing Franke, Needham and Tsien, and Kecskes, Winter states that three types of raw material were used to produce glues in ink; fish-skins, deer antlers and the hides of large animals including oxen, buffaloes, pigs, donkeys, camels, horses and mules (Franke, 1962; Needham and Tsien, 1985 and Kecskes, 1986 cited in Winter, 2008 p.49).

March gives *o chiao* [o jiao] (glue or gum) as the name given to glue 'made by boiling donkey skins in the water of a special spring or well in Tung-o Hsien [Dong o Xian] in Shantung' (March, 1935 p.5).

Milburn describes the ink sold at Canton:

Indian Ink or China Ink is an artificial preparation, in small quadrangular cakes, generally marked with Chinese characters, and sometimes handsomely painted; it is said to be prepared from lamp black, ox galls, and fish glue. It should be chosen to appear glossy; when broken, of a bright black, not brown, and dull; when wetted and rubbed on the nail, it should feel smooth, free from sand and other impurities, and have a perfumed agreeable smell. It should readily become diffused in water by rubbing... (Milburn, 1825 pp.489-490).

The importance of ink (*mo*) to Chinese calligraphers and painters is perhaps demonstrated by the fact that a method of manufacture was recorded in writing as early as the 6th century AD by Jia Sixie in his work *Qi min yao shu* (*Important Arts for the People's Welfare*), and by subsequent works dedicated to this commodity (Yu, 1988 pp.37 and 91).

Yu lists several useful characteristics of Chinese ink:

1. In painting and calligraphy, flexibility of brush movements is maintained 'without sticking or other hindrance'.
2. Whichever ground is used, paper, silk, wood etc., the ink does not deteriorate with age; neither does it fade, even when exposed to sunlight or heat.
3. It does not migrate when subjected to water (Yu, 1988 p.35)

A writer in *The Chinese Traveller* noted a fourth: 'It is of great use in designing, because the colour may be weakened or heightened at pleasure' (*The Chinese Traveller*, 1773 Vol.II p.91). In other words, it served as a pencil, as well as ink, as has been observed on some Reeves pictures (para. 3.3.3.1). The ink inscriptions of plant-names in Chinese characters on the western papers in the Collection, and the outlines in *mo* visible on some Chinese papers, notably the incomplete picture at Chinese Drawings Small Volume III, Page 114 (Figure 33), testify to the well-recognised permanence and stability of this ink (Winter, 2008 p.14). The same author notes its compatibility with all other pigments (Winter, 2008 p.14), so that it could be mixed with coloured pigments to produce darker shades (Wang, Wang and Wang, 1977 p.44; Yu, 1988 p.68). Ink may have been used to produce very dark green leaves on the Reeves drawings.

On the dis-binding of Chinese Drawings of Plants Small Volume II, deposits of what appeared to be variably-sized carbon particles were found in significant quantity in the gutters using a stereo-microscope and PLM. This was not easily explained, given that there had been no

obviously visible loss of black pigment from the sheets. It was concluded that these may have been attributable to soot damage caused by the fire in the library at Dyffryn while the Chinese Drawings of Plants Small Volumes were in private ownership. It was considered inadvisable to attempt to lift any of the ink from the sheets, as again being unacceptably invasive and likely to yield little useful information.

4.4.2 Azurite

The first of the colours to be described in the *Mustard Seed Garden Manual of Painting*, (Wang, Wang and Wang, 1977) is the copper-based mineral, azurite, known to the Chinese as *shih ch'ing* [shi qing] (mineral blue). Needham cites several other early names for this pigment (Needham, 1974 p.166). According to Winter the molecular formula is $\text{Cu}(\text{OH})_2 \cdot 2\text{CuCO}_3$ (Winter, 2008 p.28). Gettens and Stout note that 'there are extensive copper deposits in the provinces of Kwei-chou [Guizhou] and Yunnan' (Gettens and Stout, 1942 p.96). Wang Kai, the author the first part of the *Mustard Seed Garden Manual of Painting*, describes the preparation of this pigment as follows:

Take the mineral blue and put it in a bowl: add a little water, drop by drop, and crush it into a fine mixture. Do not grind too hard or there will be too much powder (*ch'ing fen*) [qing fen]... Immediately after grinding, pour the mixture into a porcelain bowl; add a little more clear water and stir. Let this stand a while and powder of a very light blue tone will rise to the surface. Skim off this top layer. This blue is called *yu tzu* [you zi] (oily residue) and is used for painting garments in pictures. The layer of color underneath, the middle layer in the bowl, is a good blue for painting blue-and-green landscapes (*ch'ing lu shan shui*) [qing lu shan shui]. The ... color at the bottom of the bowl is of a very dark tone (Wang, Wang and Wang, 1977 p.37).

There were three shades of mineral blue: *t'ou ch'ing* [tou qing] (first blue), *êrh ch'ing* [er qing] (second blue), and third blue *san ch'ing* [san qing] (third blue) (Wang, Wang and Wang, 1977 p.37). Reference is also made in the *Mustard Seed Garden Manual of Painting* to 'pale blue' (Wang, Wang and Wang, 1977 p. 218), which may be the blue which Ippolito identifies as *baiqing* and which is translated as 'light or clear blue' (Ippolito, 1985 p.8). Ippolito lists other grades of azurite as *sijing* (fourth blue), *kongqing* (hollow blue), *bianqing* (flat blue), *cengqing* (layered blue), *shaqing* (granulated blue) and *saqing* (great blue) (Ippolito, 1985 p.8).

Using PLM, particles of azurite have been identified from the debris collected from the gutters of the dis-bound Reeves volume. They appear flat, blue, translucent and irregularly shaped and sized particles which exhibit pleochroism (Figure 40) and high birefringence. The presence of violet crystals is indicative of this mineral (Mactaggart and Mactaggart, 1998), which is distinguishable from cobalt with a Chelsea filter; the latter, but not the former, appearing red.

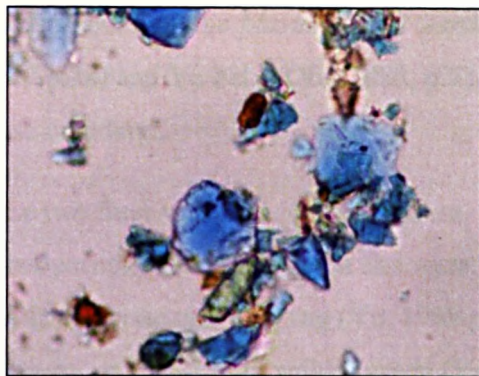


Figure 40. Azurite (X 400 Magnification). Chinese Drawings of Plants Small Volume II. (The Royal Horticultural Society)

In the Collection, the base layer of paint used for some of the leaves appears to be a mixture of malachite and azurite, producing a blue-green (Figure 94).

4.4.3 Malachite

Malachite is a green copper carbonate, known as *shih lu* [shi lu] (mineral green) (Wang, Wang and Wang, 1977 p.38) and appears to be the predominant pigment in the Reeves Collection.

Needham gives an early name of *lū chhing* [lu qing] (Needham, 1974 p.176); Winter states the molecular formula to be $\text{Cu}_2 \text{CO}_3 \cdot \text{Cu}(\text{OH})_2$ (Winter, 2008 p.26). According to the *Mustard Seed Garden Manual of Painting* the preparation of this pigment involved similar processes to that of azurite (i.e. pulverizing, followed by washing, sieving and elutriation) and that there are three shades proceeding from dark to light-*t'ou lu* [tou lu] or first green, *êrh lu* [er lu] or second green and *san lu*, third green (Wang, Wang and Wang, 1977 p.38). The *Mustard Seed Garden Manual of Painting* advocates that the lightest green should be used for the backs of leaves, the mid green for backgrounds of leaves or the tops of leaves together with grass green (*ts'ao lu*) [zao lu] and that the darkest green should be applied only in touches on backgrounds of leaves or grasses (Wang, Wang and Wang, 1977 p.580). The authors continue:

In general, when mineral green is used, grass green should be used in outlining. When a dark tone of green is used, the grass green should have more blue in it. And with a light tone of mineral green, grass green should have a touch of yellow in it (Wang, Wang and Wang, 1977 p.580).

There is great variety in the leaf-painting techniques in the Collection, and in almost all instances, the backs of leaves have been shown in a paler green than the top surfaces (Figure 34). In a few pictures, the outer edges of the leaves and veins appear to have been over-painted, but in most instances, the leaf form and veins have been suggested by judicious use of varying shades of green (Figure 30 and Figure 34) (see 3.2.2.4). The darkest greens may have been achieved by mixing malachite with ink. As with azurite, prior to use the powdered pigment was

mixed with heated glue and water, but both the *Mustard Seed Garden Manual of Painting* (Wang, Wang and Wang, 1977 p.38) and Yu Feian (Yu, 1988, p.73) advise that excess glue should be removed prior to use or storage.

Yu Feian states that there were two finer variations of the pigment, 'green flower' and 'branch green' both of which have finer particles than third green and were referred to in the *Ten Bamboo Studio Collection of Calligraphy and Painting* (Yu, 1988 pp.56 and 58); this malachite was mixed with sophora yellow to produce a light yellow-green (Yu, 1988 p.21). Malachite was also over-painted with a wash of grass green (Yu, 1988 p.64).

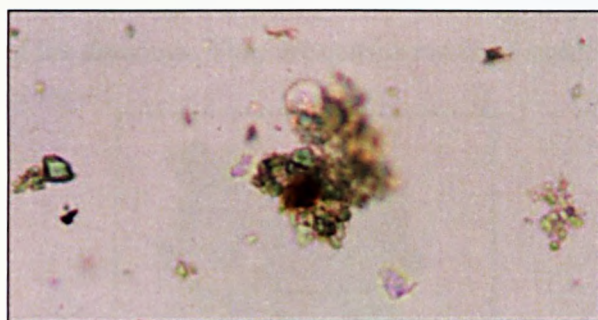


Figure 41. Malachite (with organic brown pigment) (X 400 Magnification). Chinese Drawings of Plants Small Volume II. (The Royal Horticultural Society)

Using PLM, two types of malachite have been identified on the Reeves drawings; translucent, large green and small, clear particles which are irregular in shape and size, as would be expected from a pigment which had been pulverized and fibrous masses of yellow-brownish green pigment, which appears to be malachite mixed with an organic pigment. The problems associated with this pigment will be discussed in the next chapter.



Figure 42. Malachite crystal (X 400 Magnification). Chinese Drawings of Plants Small Volume II. (The Royal Horticultural Society)

4.4.4 The Earth Pigments: Brown, Red and Yellow Ochres and Umber

The earth pigments are iron-based ores which Watson notes 'vary in colour from light red to brown', are 'extremely permanent' with good covering ability, and 'mix well with other pigments' (Watson, 1930 p.206-207). The common constituents are silica and clay (Gettens and

Stout, 1942 p.134); brown ochre is predominantly limonite, with the 'composition usually in the range of $\text{FeO}(\text{OH}) \cdot n\text{H}_2\text{O}$ to $\text{Fe}_2\text{O}_3 \cdot n\text{H}_2\text{O}$ ' (Winter, 2008 p.17); the colour of red ochre is attributable to the presence of anhydrous iron oxide Fe_2O_3 (Gettens and Stout, 1942 p.134), and yellow ochre is characterized by the presence of goethite (Uyemura, 1931 p.56) with the formula $\text{Fe}_2\text{O}_3 \cdot \text{H}_2\text{O}$ (Gettens and Stout, 1942 p.134) or HFeO_2 (Winter, 2008 p.17).

Gettens and Stout note that umber contains goethite and is similar to the ochres but with the addition of manganese dioxide (Gettens and Stout, 1942 p.167). Sienna, (Figure 43), yellow ochre (Figure 44) and umber (Figure 45) have been identified by PLM from the pigments collected from Chinese Drawings of Plants Small Volume II, and are likely to predominate in the stem and leaf areas of the drawings. They are considered to be stable (Winter, 2008 p.18).

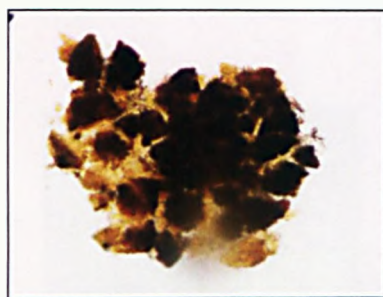


Figure 43. Sienna (X 400 Magnification). Chinese Drawings of Plants Small Volume II. (The Royal Horticultural Society)

The Chinese names for these colours are listed as *zheshi* (red ochre), *tuhuang* (yellow ochre) and *heizhishi* (manganese ochre or umber) (Ippolito, 1985 p.45), although yellow ochre appears as *chē huang* [zhe huang] in the *Mustard Seed Garden Manual of Painting* (Wang, Wang and Wang, 1977 p.43).

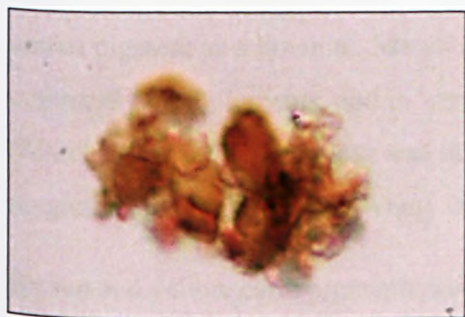


Figure 44.

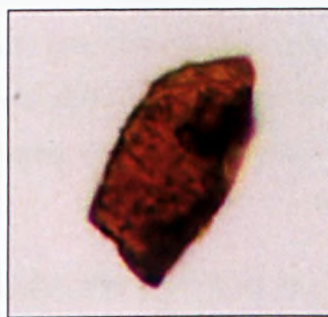


Figure 45.

Figure 44. (Left) Yellow ochre (X 400 Magnification). Chinese Drawings of Plants Small Volume II. (The Royal Horticultural Society)

Figure 45. (Right) Goethite plate (X 400 Magnification). Chinese Drawings of Plants Small Volume II. (The Royal Horticultural Society)

Chikashige lists *ch'ih shih chih* [chi shi zhi] (red stone fat) which is stated to be a mixture of red ochre and clay (Chikashige, 1936 p.46), while Needham gives red ochre the same early name (Needham, 1974 pp.178), but no Chinese names are given for the other ochres or umber. Apart from red ochre, which was made by heating yellow ochre, these pigments were manufactured by grinding and levigating the ore (Watson, 1930 p.206).

To prepare umber for painting, the authors of the *Mustard Seed Garden Manual of Painting* advise:

Use a small earthenware bowl in which to grind the color, with a little water, to the consistency of mud. Then add a lot of clear glue and water and stir well. Skim off the upper layer for use. Drain the bottom layer, which is coarse and dull in color, and throw it out (Wang, Wang and Wang, 1977 p.43).

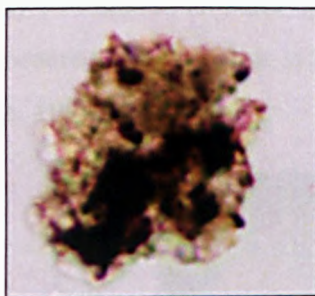


Figure 46. UMBER shown with plates of iron hydroxides (X 400 Magnification). Chinese Drawings of Plants Small Volume II. (The Royal Horticultural Society)

No separate information is given either in the *Mustard Seed Garden Manual of Painting* or by Yu Feian (1988) as to the preparation of ochres, but it may be surmised that the method was not dissimilar to that used for umber. Making reference to Uyemura (1931 p.56) who identified umber pigment as a limonite, March says *chê shih* [che shi] (umber) is one of the most commonly used pigments, and is 'very extensively employed in flower and landscape painting' (March, 1935 p.8). The colour was used 'in painting old branches, dried leaves, and the buds of magnolia (Wang, Wang and Wang, 1977 p.585).

Brown and yellow earth pigments have been identified by PLM from the pigment fragments collected from the gutters of Chinese Drawings of Plants Small Volume II.

4.4.5 Orpiment and Realgar

Fitzhugh (1997 p. 47) gives the molecular formula As_2S_3 for orpiment (a yellow arsenic sulphide), and AsS or As_4S_4 for realgar (red arsenic sulphide). Harley (1970 pp.87 and 114) and Winter (2008 p.23) concur. However, Winter quotes Giacci and Winter who found that, 'a

number of crystallographic species having a colour similar to realgar are known' (Giacci and Winter quoted in Winter, 2008 p.23). This has sometimes made identification problematic, the difficulty perhaps compounded by flexibility in the use of terminology. For example, according to Ippolito, Yu Feian (Yu, 1988) lists four yellows as arsenic trisulphide with the molecular formula As_2S_3 , but as Ippolito points out, only one of the substances listed is in fact orpiment (Ippolito, 1985 p.3).²²⁵ Similarly, March suggests that (*shih huang*) [shi huang] (mineral yellow) is orpiment, (March, 1935 p.7). In Ippolito's view, the term 'mineral yellow' seems to apply to both arsenic sulphides; she maintains that *cihuang* (hen yellow) is orpiment and *xionghuang* (cock yellow) is realgar (Ippolito, 1985 p.38). Needham gives several early names for both orpiment and realgar (Needham, 1974 p.165).

Part of the confusion in nomenclature may arise because the two minerals often occur together in ore veins, orpiment being an alteration product of realgar and similar arsenic minerals (Fitzhugh, 1997 p.54). Orpiment may be found as an outer layer, surrounding a core of realgar (Yu, 1988 p.6). Furthermore, on exposure to light, realgar is reported to have changed to orpiment or to pararealgar (Fitzhugh, 1997 p.54).



Figure 47.



Figure 48

Figure 47. (Left) Orpiment (X 200 Magnification). Chinese Drawings of Plants Small Volume II. (The Royal Horticultural Society)

Figure 48. (Right) The same field under crossed polars (X 200 Magnification). Chinese Drawings of Plants Small Volume II. (The Royal Horticultural Society)

Winter describes the colour of orpiment as 'a bright yellow colour' and realgar as 'orange or orange-yellow' (Winter, 2008 p.24). In comparison with yellow ochre, Ippolito says that orpiment and realgar are less opaque, but that realgar is not as translucent as rattan yellow (gamboge) (Ippolito, 1985 p. 39). The authors of the *Mustard Seed Garden Manual of Painting* describe *hsiung huang* [xiong huang] (cock yellow) as 'An orange, perhaps the "masculine yellow" of the alchemical works, derived from orpiment (arsenic sulphide)' (Wang, Wang and

²²⁵ I would take issue with this statement. Although Yu Feian seems to suggest that yellow ochre is related to mineral yellow, orpiment and realgar (which he suggests are three different pigments), he clearly states that realgar has a molecular formula of As_4S_4 .

Wang, 1977 p.39), and state that it was prepared in the same way as *chu sha* [zhu sha] (vermilion).

According to Fitzhugh, 'In China, both orpiment and realgar were known at an early date... There are no references to their use as pigments, but they were important in Chinese medicine and metallurgy...Neither orpiment nor has realgar been reported as a pigment on paintings...' (Fitzhugh, 1997 p.48). However, Winter says 'twentieth-century authors have listed them [orpiment and realgar] as standard painting pigments for both China and Japan' (Uyemura, 1931; March, 1935 and Oguchi, 1969 cited in Winter, 2008 p.23). Ippolito cites Schafer as authority for saying that orpiment has been found on silk paintings in the caves at Dunhuang (Schafer, 1963 cited in Ippolito, 1985 p.41). These authorities, together with the fact that there are references to *hsiung huang* [xiong huang] (cock yellow) in the *Mustard Seed Garden Manual of Painting* (Wang, Wang and Wang, 1992 pp.39 and 581), that La Vollée refers to orpiment by name as being one of the indigenous pigments used by the Canton painters in the mid-nineteenth century (La Vollée, 1849), and that Morrison (1848) lists orpiment, all suggest that its use in China was both long-standing and ubiquitous.

According to Morrison, orpiment was a much-traded pigment which could be found in China, Burma, Hungary and Turkey (Morrison, 1848 p.175). He provides a description of the pigment in its raw state:

Native orpiment is composed of thin plates of a lively gold colour intermixed with pieces of vermilion red, of a shattery foliaceous texture, flexible, soft like talc and sparkling when broken" when burned, it throws off much sulphureous smoke. It is all sent to India; 612 peculs went in 1836, at \$14 per pecul (Morrison, 1848 p.175).

The authors of the *Mustard Seed Garden Manual of Painting* quote from the *Ni Ku Lu* (Notes on Ancient Household Arts for Maidservants)²²⁶ for the method for the preparation of *shih huang* [shi huang] (mineral yellow):

... put a little water in a bowl and cover with a piece of old matting. Place the bowl on a charcoal fire until the water simmers. Wait until the yellow is as red as the fire, then take it out and place it covered on the ground. When it has cooled, it is ready for grinding and preparing for use (Chen Ji Ru quoted in Wang, Wang and Wang, 1977 p.40).

For the Chinese painter, orpiment and realgar were to be treated with care. Although used as an ingredient for elixirs, arsenic sulphide pigments are toxic (Fitzhugh, 1997 p.52). Van Gulik's

²²⁶ Attributed to Ch'ên Chi-ju [Chen Ji Ru] of the late Ming period (Sze, 1992 p.40).

research shows that this property was exploited by the Chinese who used these pigments as a form of pest control to protect their pictures (Van Gulik, 1958 cited in Fitzhugh, 1997 p.52; Van Gulik, 1958 cited in Winter, 2008 p.24).

The use of these pigments in painting was limited due to their sulphur content. The authors of the *Mustard Seed Garden Manual of Painting* advised that 'If used on gold-leaf, the paper will in a few months look burned and the color vile' (Wang, Wang and Wang, 1992 p.40). Yu says that they 'should not be used together with lead-based pigments', but in a footnote, the translators make reference to Ippolito's thesis and add the following information:

Orpiment...and realgar may darken the color of lead white; yellow ochre... can be used safely with lead-based pigments. Realgar and orpiment...should not be combined with cinnabar because of its mercury base, nor with the copper-based pigments, azurite and malachite, nor with the iron oxides, yellow ochre and red ochre (Yu, 1988 p.6).

Winter notes that neither orpiment nor realgar is very permanent and that both fade to white (Winter, 2008 p.24). This was reiterated by Ippolito who adds that 'The sample of realgar that I prepared darkened noticeably after about four months time' (Ippolito, 1985 p.42).²²⁷

Orpiment has been identified by PLM (Figure 47) and (Figure 48). The vivid yellow on the petals of *Plumeria acutifolia* in Small Volume IV, page 121 indicates that it may have been used on this drawing, but visual examination suggests its use is not extensive in the Collection.

4.4.6 Cinnabar and vermilion

Winter gives the chemical formula for cinnabar and vermilion (both a red form of mercuric sulphide) as α -HgS (Winter, 2008 p.15). Cinnabar held a special significance for the early alchemists; in Daoism, it was the highest-ranking substance in the medicines of the Immortals and therefore found its way into many, theoretically at least, life-extending elixirs (Sze, 1957 p.72).

Milburn is the only contemporary source located during this research who records cinnabar as obtainable from Canton (Milburn, 1825 p.481) and he says of vermilion that:

[It] is prepared from cinnabar, and is imported from China in the form of powder, which should be chosen of a deep cochineal red, approaching to the

²²⁷ It should be noted that the author did not provide information to substantiate the identification or purity of her sample, the preparation undertaken nor the conditions under which the sample was kept.

greyish hue on steel, and leaving a most beautiful red on white paper (Milburn, 1825 p.509).

March states that *chu sha* [zhu sha] (vermilion) is 'made from a kind of cinnabar', with stones shaped like arrow-heads preferable for its manufacture (March, 1935 p.8). Further, *chu sha* [zhu sha] (vermilion) that is collected from the bottom of the vessel is used to colour the leaves of maple trees, and for temples, palaces and railings, while the top layer to be skimmed off is known as *chu piao* [zhu biao] (Satsuma red) and is used for painting garments (March, 1935 p.8). *The Mustard Seed Garden Manual of Painting* also gives *chu sha* [zhu sha] as vermilion, and includes a footnote quoting Li who distinguishes between vermilion prepared from cinnabar ore, in 'ancient times' called *tan sha* [dan sha], from vermilion produced by combining mercury with sulphur called *chu sha* [zhu sha] (Li, 1948 quoted in Wang, Wang and Wang, 1992 p.38). Acker similarly translates *sha* as 'sand', and *tān shā* [dan sha] as (literally) 'cinnabar sand' or finely ground cinnabar (Acker, 1954 p.187). Needham gives the name *tan sha* [dan sha] for cinnabar and six alternative early names for the pigment, although it is not clear whether these relate to the manufactured pigment (Needham, 1974 p.177). The pigment was produced from cinnabar ore by pulverizing it with an iron roller, stirring the finely ground pigment into water and leaving it for 3 days and nights, and finally decanting the powder from the surface to produce second-grade paint, while the best pigment was collected from the bottom of the vessel (Li, 1948 p.134).

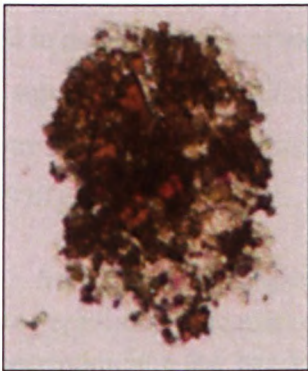


Figure 49.

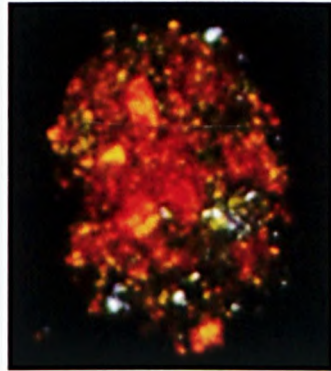


Figure 50.

Figure 49. (Left) Ground cinnabar with white carbonate particles (X 400 Magnification). Chinese Drawings of Plants Small Volume II. (The Royal Horticultural Society)

Figure 50. (Right) The same field under crossed polars showing the highly birefringent carbonate particles (X 400 Magnification). Chinese Drawings of Plants Small Volume II. (The Royal Horticultural Society)

The stages in the manufacture of vermilion from mercury are recorded in 10 Chinese drawings bound into an un-dated volume originally held at the India Office Library, and now held by the

British Library. Each coloured drawing is inscribed and ‘rough translations’ are provided by Archer:

Drawing number 1: ‘Putting in mercury’

Drawing number 2: ‘Seal the mouth of the pot with clay’

Drawing number 3: ‘Put in the furnace’

Drawing number 4: ‘The firing begins’

Drawing number 5: ‘Pour out the small lumps and pound them fine’

Drawing number 6: ‘Grind the vermilion’

Drawing number 7: ‘Washing the vermilion’

Drawing number 8: ‘Baking the vermilion’

Drawing number 9: ‘Sifting the vermilion’

Drawing number 10: ‘Wrapping the vermilion’ (Archer, 1972 p.265).

No mention is made here of sulphur, but Li says that the ‘old method’ of making vermilion involved heating one part sulphur to melting point and mixing this with four parts mercury, and placing the mixture into an inner vessel, sealed within an outer vessel, before being placed over a fire (Li, 1948 p.134).

Morrison lists vermilion ‘made of quicksilver by oxidation’ as an export item and notes that ‘It is also used in painting on porcelain, and in making red ink’ (Morrison, 1848 p.181). According to Harley, superior Dutch and Chinese vermilion was brought to Britain because the English pigment was frequently adulterated, thereby ensuring that it suffered a poor reputation abroad (Harley, 1970 p.116). Quicksilver, on the other hand, was imported to China:

‘... from Europe and America in iron flasks. A great part of it is converted into vermilion... The market value of quicksilver is very fluctuating, the importation of a few hundred flasks causing a decline, and a re-exportation causing an immediate rise. Several years ago, the Chinese consumed large quantities of this metal, but the advanced price in Europe has compelled them to work their own mines...’ (Morrison, 1848 p.159).

The Mustard Seed Garden Manual of Painting gives the method of preparing the *chu sha* [zhu sha] (vermilion) for painting:

To prepare vermilion: Put a little in a bowl and grind it to fine powder. Mix in a little clear glue. Add a little boiling water and pour into another bowl. Stir. In a little while skim off the top layer, which will be an orange color called *chu piao* (red banner), used in the painting of men’s garments. The

layer of colour underneath is very fine and is the best vermilion. Skim this off and put aside for the painting of red leaves, terraces, pagodas, and temples. The bottom layer is very deep vermilion. It is used in figure painting but never in landscape (Wang, Wang and Wang, 1977 p.39).

Uyemura says that both cinnabar-based red and artificial vermilion darken on exposure to sunlight, the latter more so than the former (Uyemura, 1931 p.48). This may have implications for the display of the Reeves pictures.

In the Collection, there are few pure examples of this bright orange-red identifiable by the naked eye. The pigment may have been used for the petals of *Lilium concolor* shown in Figure 89. It was possibly mixed with other colours, Prussian blue or indigo, for example, to produce a range of purples.

4.4.7 Lead white

Lead white is abundant in the Collection. In areas of large white petals, the paintings of camellias for example, the darkened pigment is apparent without the aid of magnification. Under a stereo-microscope, areas of lead white under-painting are seen where the top player of paint falls short of the white base coat (Figure 28): using PLM lead white particles show good relief (Figure 51) with high birefringence.

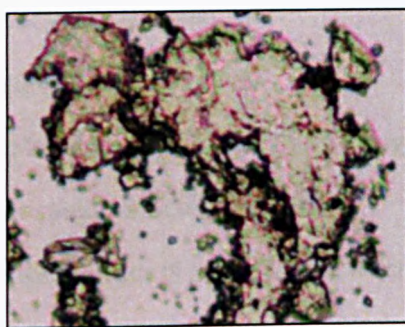


Figure 51. Lead white (X 200 Magnification). Chinese Drawings of Plants Small Volume II, p.92. (The Royal Horticultural Society)

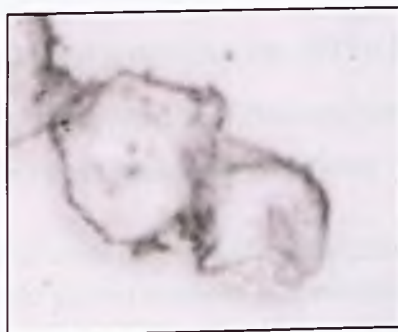


Figure 52. Hexagonal crystals of lead white (X 400 Magnification). Chinese Drawings of Plants Small Volume II. (The Royal Horticultural Society)

Lead white is a basic carbonate having the molecular formula $\text{Pb}(\text{OH})_2 \cdot 2\text{PbCO}_3$ (Winter, 2008 p.34). Needham gives several early names including *shui fên* [shui fen], *hu fên* [hu fen], *fên hsi* [fen xi] and *shao fên* [shao fen] (Needham, 1974 p. 175), while the authors of the *Mustard Seed Garden Manual of Painting* simply refer to it as *ch'ien fên* [qian fen] (lead white) (Wang, Wang and Wang, 1977 p.41). Li describes the process of manufacture as follows:

One hundred catties of metallic lead was melted and after cooling cut into thin sheets which later were rolled into small cylinders. They were put into a wooden vat at the bottom and in the middle of which a bottle of vinegar was placed. The seams of the vat outside were daubed closely with salted mud and then papered. The air in the vat was kept warm for one week. When opened, some frost-like powder was found on the surface of the lead and might be scraped into a small jar. Those cylinders on which no frost had been produced might be left in the vat in order to undergo a further reaction and scraped again after another week. The process was repeated until the whole material was nearly exhausted (Li, 1948 p.135).

The method of manufacture seems to accord with the process depicted in an album of drawings produced by a Cantonese artist circa 1820, and labelled 'White Lead Manufacture'. The texts accompanying each picture have been translated by Archer, as follows:

Drawing number 1: 'Putting in the materials'

Drawing number 2: 'Use vinegar to moisten lead'

Drawing number 3: 'Soaking of lead completed'

Drawing number 4: 'Put material in cauldron and add vinegar'

Drawing number 5: 'Heat in cauldron until it is ready'

Drawing number 6: 'When the powder is formed, take it out of the cauldron'

Drawing number 7: 'Soak powder in water'

Drawing number 8: 'Workmen washing the powder'

Drawing number 9: 'Heat powder on range'

Drawing number 10: 'Heat until it is dry' (Archer, 1972 p.264).

According to the *Mustard Seed Garden Manual of Painting*, the method of preparation for painting with *ch'ien fên* [qian fen] (lead white) was as follows:

Preparation of this kind of white begins with rubbing the lead powder with the finger, dipping it into clear glue in a saucer, and continuing to rub until the white is dry. It must then again be dipped in glue, and the process repeated ten times. When the glue and powder have been thoroughly blended, it is then pinched into a flat cake, which is put aside in a saucer to dry in the sun. Just before using this white, it should be boiled in water and a few drops of glue

added. Skim off and use the top layer; the lower layer is of no use (Wang, Wang and Wang, 1977 p. 41).

Morrison notes that 'White lead is manufactured by the Chinese to a large extent for various purposes in the arts; it is purchased by the captains of ships for painting' (Morrison, 1848 p.176); 'white paint' is listed as an export for 1811-1812 in an East India Company Diary.²²⁸ Recipes for the manufacture of the pigment in England are traceable to the medieval period, but by the nineteenth century the importation of lead white from China may be attributable to concerns about the industrial diseases suffered by British workers in the industry (Harley, 1970 p.158).

As noted above, the pigment darkens due to the formation of black lead sulphide (Harley, 1970 p.159; Gettens and Stout, 1942 p.175; Winter, 2008 p.145). The chemistry of this reaction is dealt with in paragraph 5.4. It is noticeable in the Reeves Collection that discolouration is most visible on areas of white closest to the edges of the pages where airborne pollutants are most likely to penetrate (Figure 53). The conservation proposal for treatment is at paragraph 5.6.9.



Figure 53. Drawing of *Gordonia axillaries*. Chinese Drawings of Plants Small Volume II, p. 108. (The Royal Horticultural Society)

4.4.8 Red lead

The molecular formula is given by Winter as Pb_3O_4 (Winter, 2008 p.20). Watson states that the Chinese term is *hung-tan* [hong tan] (deep red) (Watson, 1930 p.199), but this may be incorrect. Ippolito says 'The literal translation of *huangdan* is yellow red (or yellow cinnabar), and since litharge is yellowish in hue, could it be that *huangdan* is litharge and massicot (lead monoxide) rather than true red lead (lead tetroxide)?' (Ippolito, 1985 p.62). Red lead is also known as *hongqian* and *qiandan* (Ippolito, 1985 p.59). Needham lists a number of early names including

²²⁸ The East India Company Diary for 1811-1812. IOR G/12/176. British Library.

huang tan and *chang tan* (Needham, 1974 p.175). According to Li, the residues left from the manufacture of lead white were used to make red lead with the addition of nitre (KNO_3) and alum (Li, 1948 p.136). Alternatively, red lead could be made from scratch by adding vinegar to molten lead, and adding sulphur and then nitre (KNO_3) (potassium nitrate); this process being repeated until the red lead powder was obtained (Li, 1948 p.136) Archer gives translations for a series of ten drawings by a Canton artist dated circa 1820, bound into an album labelled 'Manufacture of Red Lead', which give an alternative method of production:

Drawing number 1: 'Putting in lead, sulphur and mercury'

Drawing number 2: 'Heat the powder the first time'

Drawing number 3: 'Heat the second time; begin to turn red'

Drawing number 4: 'Pounding the powder for the first time'

Drawing number 5: 'Heating of powder completed'

Drawing number 6: 'Pounding of powder completed'

Drawing number 7: 'Tossing of powder; mixing with yellow powder'

Drawing number 8: 'Heat powder until it becomes red'

Drawing number 9: 'When it has turned red, take red powder out'

Drawing number 10: 'Sift powder-whole process completed' (Archer, 1972 p.264).

Watson says this is 'Much used as a pigment ... and as an adulterant or substitute for vermilion' (Watson, 1930 p.199). Red lead has been identified in the Collection from the loose pigments collected during the dis-binding of Small Volume II (Figures 54 and 55). The 'colour is more orange than red' (Winter, 2008 p.22) and is likely to be present on the drawings depicting orange-red inflorescence, autumn leaves or fruits such as those of the *Cucurbita* family.

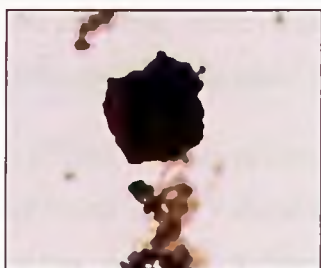


Figure 54.

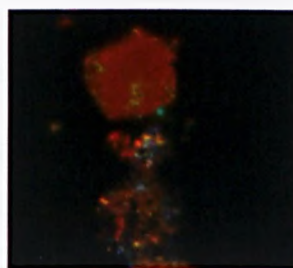


Figure 55.

Figure 54. (Left) Red lead (X 400 Magnification). Chinese Drawings of Plants Small Volume II. (The Royal Horticultural Society)

Figure 55. (Right) Red lead under crossed polars exhibiting characteristic anomalous colours (X 400 Magnification). Chinese Drawings of Plants Small Volume II. (The Royal Horticultural Society)

4.4.9 Calcite: Shell White and White Chalk

Both forms of calcite have the same chemical formula: CaCO_3 (Winter, 2008 p.36). The authors of the *Mustard Seed Garden Manual of Painting* say that ‘The ancients used white made by pulverizing oyster or clam shells’ which was known as *fu fên* [fu fen] (oyster/clam white), but that ‘Painters today use lead white’ (Wang, Wang and Wang, 1977 p.41).

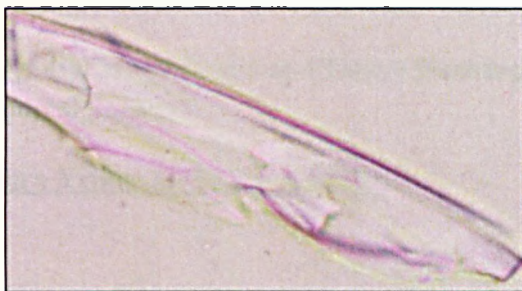


Figure 56. Shell white (X 400 Magnification). Chinese Drawings of Plants Small Volume II. (The Royal Horticultural Society)

This suggests that by the date of first publication of Part 1 of the *Mustard Seed Garden Manual of Painting* (1679), shell white had fallen into disuse. March gives the name for this pigment as *k'o fên* [ke fen] (shell white) (March, 1935 p.9) and Winter gives the name *ha fen* for shell white and *bai e* for calcium carbonate whites (Winter, 2008 p.36). Needham gives a number of alternative early names for calcite, including *fang chieh* [fang jie], *han shui shih*, [han shui shi], *shu shih hui* [shu shi hui], and *hsiao shih hui* [xiao shi hui] (Needham, 1974 p.167). Yu Feian outlines the same method of preparation as Wang, Wang and Wang (1977) and notes that this pigment ‘becomes whiter and increasingly opaque with the passage of time’; however, unlike lead white, this pigment does not change colour’ (Yu, 1988 pp.9-10).

The two forms of this pigment are distinguishable using PLM. Shell white displays characteristic striations, while chalk white is identified by a stationary cross on some particles, which is particularly visible under crossed polarized lenses.

Two forms of shell white have been detected among the pigment fragments from Chinese Drawings of Plants Small Volume II (Figure 56) and (Figure 57). Winter says that ‘there appear to be few, if any, problems of chemical stability’ (Winter, 2008 p.37).

The literature suggests that chalk white is unlikely to be found on the Reeves drawings. It was not identified from the pigment samples obtained from the dis-bound volume.



Figure 57. Shell white (X 400 Magnification). Chinese Drawings of Plants Small Volume II. (The Royal Horticultural Society)

4.4.10 Gamboge, Sophora Yellow and Yellow Lake

4.4.10.1 Gamboge

Gamboge (Figure 58) is included here as a pigment, although its classification is also as a gum-resin, with gambogic acid ($C_{38}H_{44}O_8$) its principal constituent (Figure 59) (Winter, 2008 pp.24-26).



Figure 58.

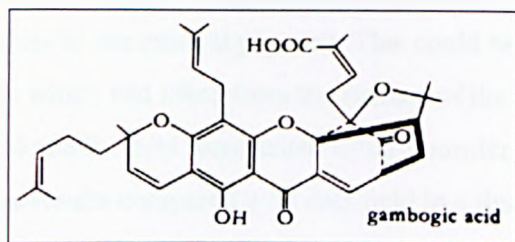


Figure 59.

Figure 58. (Left) Sample of gamboge, also shown painted out. (Sourced from Man Luen Choon of 2/F, Harvest Bldg, 29 Wing Kut St, Central, Hong Kong)

Figure 59. (Right) The structural formula for gambogic acid. (Mills and White, 2003 p.143)

Morrison gives the following description of gamboge, from which it is clear that it was widely traded, and this is evidenced by the frequency with which appears listed in the East India Company records:

This is so named from the Country Camoja [Cambodia], which produces the tree [*Garcinia cambogia*]; it is also found in China and Siam, in which latter country the tree is wounded to obtain the gum-resin. It is bought from Ban Kok [*sic*] to China in junks, and also from Cochinchina [*sic*]. The juice is inspissated in the sun, and made into rolls, which have a brownish-yellow colour and a smooth surface. If when rubbed upon the wet nail the colour be bright lemon, and no grittiness be felt, it is good: when burned the flame is white, and the residuum a grayish ash; it breaks vitreous, has no taste, and

very little smell. The large, gritty and dark coloured pieces are of an inferior quality. Gamboge is used as a pigment and as a medicine (Morrison, 1848 p.174-175).

This pigment was known by the Chinese as *t'êng huang* [teng huang] (rattan yellow) (Yu, 1988 p.13); its toxicity was noted (Wang, Wang and Wang, 1977 p.42). It could be mixed with indigo in varying proportions to produce *shên lu* [shen lu] (deep green) used particularly for camellia leaves, cassia and orange plants, *nêng lu* [neng lu] (intense green) used for painting dark leaves and *nun lu* (fresh green) for young leaves on wood stems, leaves and stems of herbaceous plants and the undersides of leaves on which the upper surfaces had been painted with malachite. The authors of *The Mustard Seed Garden Manual of Painting* advise that 'Rattan yellow should be used pure for the tender shoots of new leaves, with outlines in red; and the painting should be backed by a wash of green mixed with white' (Wang, Wang and Wang, 1977 p.585). The presence of a pale blue-green base coat to many leaf areas in the Reeves pictures and the red outlining have been noted (para. 3.3.2.1). Gamboge was used for painting pale yellow flowers (Wang, Wang and Wang, 1977 p.584) and may be the yellow used for the plant in Figure 33.

It is apparent on many sheets in the Collection that where the leaves painted with malachite have a yellowish tinge, there is significantly less loss of the mineral pigment. This could be due to the presence of gamboge. Samples of malachite which had lifted from the surface of the drawing on Chinese Drawings of Plants Small Volume II, p.94 were tested using Fournier Transform Infra-Red Spectrometry (FTIR) and the results compared with data held in a discrete spectral library held at Camberwell College of Arts. The closest correlation obtained was 57.57 with known examples of gamboge. There was no match with known animal binders or glues. This result was confirmed by a Hydroxyproline Test on malachite samples which had lifted from the same drawing. This suggests that gamboge was used as a binder, as well as a colourant. Sophora yellow may also have been used to the same effect (para. 4.4.12.2 below).

4.4.10.2 Sophora Yellow and Yellow Lake

Sophora yellow, given the name *huai-mi* (*Sophora japonica*-dissolved) by Watson (1930 p.192), was obtained from the flowers of *Sophora japonica*, a leguminous tree occurring abundantly in China (Watson, 1930 p.192) and also known as the locust or Chinese scholar-tree (Yu, 1988 p.13). According to Yu Feian, the flowers were scalded with boiling water and formed into cakes. These were re-moistened and squeezed to produce the liquid for painting; its use as a wash over malachite is noted as a method of improving the adherence of the latter to the paper surface (Yu, 1988 p.13). PLM has revealed the presence of at least one yellow lake in the Collection, but it is not possible to identify the pigment more precisely, using the methods available.

4.4.11 Carmine and Lac (Indian Lake)

4.4.11.1 Carmine

Carminic acid, a lake pigment, was prepared principally from the cochineal insect (*Dactylopius coccus*), a native of Mexico where it lives off *Opuntia coccinellifera*, or prickly pear (Mills and White, 1994 p.144). It could also be found in the West Indies (Harley, 1970 p.125). The colouring constituent of cochineal is carminic acid, $C_{22}H_{20}O_{13}$ (Schweppe and Roosen-Runge, 1986; Mills and White, 1994).²²⁹ The structural formula for carminic acid is given (Figure 60).

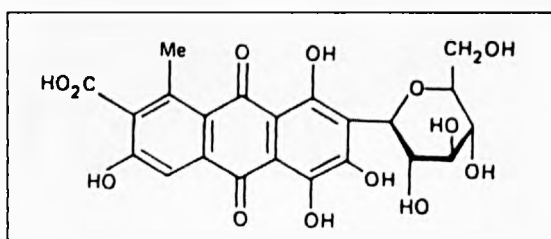


Figure 60. The structural formula for carminic acid. (Mills and White, 2003 p.145)

Schweppe and Roosen-Runge give the method of preparation: ‘The most common carmine pigment is prepared by precipitating a hot aqueous extract of cochineal with alum that is free from iron’ (Schweppe and Roosen-Runge, 1986 p.256). The regular consignments of imported cochineal, as opposed to prepared carmine, and the ready availability of alum, might suggest that the Chinese prepared the pigment themselves. Its name in Chinese is given by Ippolito as *yanghong* or ‘western red’ (Ippolito, 1985 p.95) while Watson’s Chinese term for this pigment is *ya-lan-sê* [ya lan se] (Watson, 1930 p.187). Yu Feian states that ‘ “Western red”, properly translated as foreign red, ‘or carmine was used from 1582’ and that ‘In traditional flower-and-plant painting, because Western [i.e.foreign] red was so highly refined it has been very widely used down to the present time’ (Yu, 1988 p.30) ; furthermore, prior to use, glue was added and the pigment ‘ground up fine’ with the fingers (Yu, 1988 p.70).

Clunas also quotes 1582 as being the first attested date for the use of this pigment in China (Clunas, 1997 p.187). It is recorded as being available in Canton and Macao in the early part of the nineteenth century by Harriett.Lowe. Her diary entry for Friday 15th April 1831 records:

Before Mrs. D. went we had some carmine from Canton, to colour stockings (mind ye). We thought we would see how it would look on the cheeks, so I painted Mrs. D and Aunt. Really we were quite bewitched with ourselves. It was such a splendid colour (Hodges & Hummel, 2002 p.218).

²²⁹ Cochineal was also prepared from the insect *Kermes vermilio*, a native of the Mediterranean, where it lives off an oak, *Quercus coccifera*, but according to Mills and White its use was largely superseded by the cochineal insect with the discovery of the Americas (Mills and White, 1994 p.144).

Morrison lists cochineal among articles of import, and gives its use as ‘dyeing silk goods [and] crapes’ [*sic*] (Morrison, 1848 p.148). It is listed among the imports in the East India Company’s Diaries of Transactions and Consultations.²³⁰ La Vollée’ recorded the colour as ‘le carmine de carthame’ which, he states, was bought from the English (para. 3.2.1.2).²³¹ Pure carmine is notoriously fugitive and fades readily in light (Schweppe and Roosen-Runge 1986 p.255; Winter 2008 p.19). No positive identification of this dye has been made in the Collection.

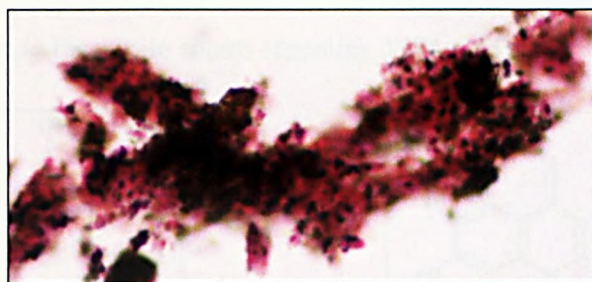


Figure 61. An organic red, possibly carmine adulterated with a ground pigment, or seed lac (X 400 Magnification). Chinese Drawings of Plants Small Volume II. (The Royal Horticultural Society)

4.4.11.2 Lac (Indian Lake)

Milburn records that ‘[Lake] is ... made in China for painters’ use. It is brought to Europe in pots, and has ... the appearance of raspberry jam, but very bitter to the taste. It should be ... a bright crimson colour, clean and free from grittiness’ (Milburn, 1825 p.491). These observations suggest that Milburn may have been referring to seed lac. This dye may be present in the Collection (Figure 61), although its presence cannot be confirmed using PLM alone.

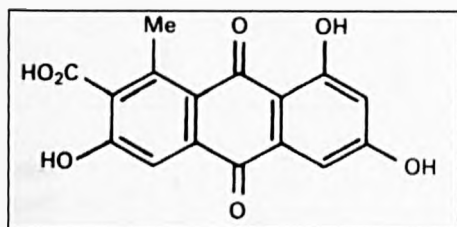
Lac is an organic pigment derived from the insect *Laccifer laccae* L (Winter, 2008 p.144), previously known as *Coccus lacca*, and yielding the colouring agent laccaic acid, $C_{20}H_{14}O_{11}$ (Gettens and Stout, 1942 p.123). The structural formulae are reproduced in Figures 62 and 63. The word ‘lac’ is a derivation of the Persian ‘lak’ or Hindi ‘lakh’, which means ‘100,000’-an indication of the number of insects needed to produce the dye (Ippolito, 1985 p.93). Yu Feian says that this substance was called ‘purple ore’, ‘purple stem’ or ‘purple shoots’, but wrongly identifies it as a natural tree resin (Yu, 1988 p.12). The editors provide an explanatory footnote:

²³⁰ For Example, The East India Company Diaries and Consultations IOR G/12/192 (1814-1815), IOR G/12/199 (1815-1816) and IOR G/12/230 (1823-1824). British Library.

²²⁴ He may have been confounding two pigments. Carmine has no connection with ‘carthamus red’ which is listed in the index to Maerz and Paul’s *A Dictionary of Colour* (1930), as having been discovered in 1548, of vegetable origin, with an alternative name of ‘Chinese rouge’. Under the heading of ‘carthamus’ in the index, Maerz and Paul also list ‘Safflower red’ with 1583 as the date of origin. Carthamin dye, which is basis of *yen chih* [yan zhi] (rouge) is clearly of plant origin.

The *Laccifer lacca* females produce both a resin (lac) and a mixture of red anthraquinone compounds (lac dye). The crude product incorporating both of these still coating the twigs of trees, which are broken off and dried to kill the insects inside, is called stick lac; this is probably what is referred to as 'purple shoots' and 'purple stem' lac. Granulation of stick lac and extraction of most of the dye components with water leaves seed lac; further purification provides the shellac used industrially (Yu, 1988 p.12).

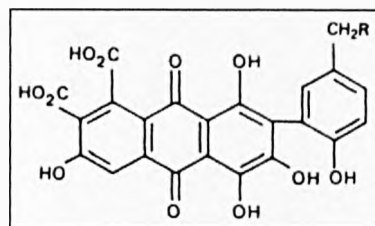
Ippolito gives the following names for lac: *yigong* for ant ore, *zigong* for purple ore, *zigeng* for purple stem and *zicaorong* for purple shoots (Ippolito, 1985 p.95).



laccaic acid D

(=flavokermesic acid

= xanthokermesic acid)



laccaic acids

A, R=CH₂NHCOCH₃

B, R=CH₂OH

NH₂

C, R=CHCOOH

E, R=CH₂NH₂

Figure 62.

Figure 63.

Figure 62. (Left) The structural formula for laccaic acid D. (Mills and White, 2003 p.145)

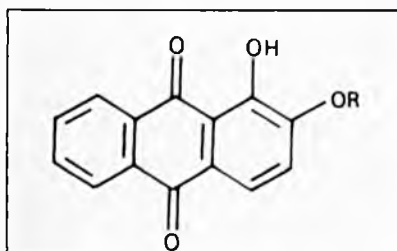
Figure 63. (Right) The structural formulae for laccaic acids A, B, C and E. (Mills and White, 2003 p.145)

4.4.12 Rouge and Organic Reds

March (1935 p.10), the authors of the *Mustard Seed Garden Manual of Painting* (Wang, Wang and Wang, 1977 p.41) and Li (1948 p.151) all give the Chinese name *yen chih* [yan zhi] for rouge: Ippolito also gives *yanzhi* as rouge, with *qiancao* for madder and *honghua* for safflower (Ippolito, 1985 p.78). Rouge may properly be regarded as a colour,²³² rather than a pigment, since it may be made from safflower (*Carthamus tinctorius*), madder and purple ore lac (Yu, 1988 pp.12-13, 27). Lac is considered above (para. 4.4.13.2). Madder is extracted from the root of *Rubia tinctorum* and other species; the main colouring components of the dye include alizarin

²³² It was also used as a cosmetic (Yu, 1988 p.12).

($C_{14}H_6O_2(OH)_2$) (Yu, 1988 p.11) and purpurin ($C_{14}H_5O_2(OH)_2$) (Yu, 1988 p.11). The structural formulas are given (Figure 64) and (Figure 65). Ippolito notes that references to madder in Chinese texts are scant; it is not referred to in *The Mustard Seed Garden Manual of Painting*, nor listed by Uyemura, but is discussed by Yu Feian. Ippolito concludes that safflower was probably more commonly found in China (Ippolito, 1985 p.77).



R=H

R=CH₃ alizarin 2-methyl ether

Figure 64.

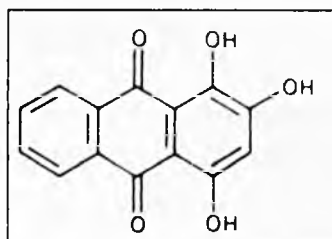


Figure 65.

Figure 64. (Left) The structural formula for alizarin. (Mills and White, 2003 p.143)

Figure 65. (Right) The structural formula for purpurin. (Mills and White, 2003 p.143)

Wang, Wang and Wang (1992) indicate that *yen chih* [yan zhi] ‘which can stain indelibly’,²³³ was an organic red derived from a number of plants and berries, including safflower *Carthamus tinctorius* (*hung hua*) [hong hua] which yields the dye carthamin having the molecular formula $C_{43}H_{42}O_{22}$, (structural formula given in Figure 66), and the Chinese scholar tree *Sophora japonica* (*kêng hua*) [geng hua] (para. 4.4.12.2).²³⁴

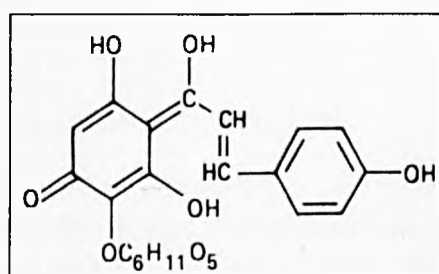


Figure 66. The structural formula for carthamin. (Mills and White, 2003 p.143)

Rouge could also be prepared from the vine *chih hua* [zi hua] (*Mirabilis jalapa*) (March, 1935 p.10; Watson, 1930 p.209). Winter concludes that since *Mirabilis jalapa* is a New World species, its use must have been adopted later (Winter, 2008 p.42).

²³³ According to the writers of *The Mustard Seed Garden Manual of Painting*, this red could be removed by applying vinegar (Wang, Wang and Wang, 1992 p.41).

²³⁴ Watson notes that both yellow and red colouring is obtained from safflower.

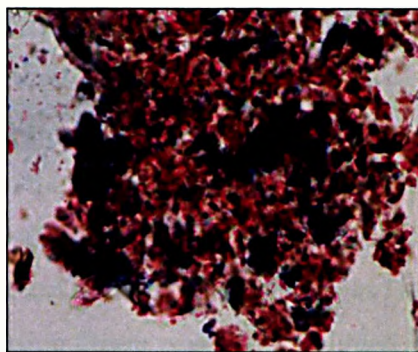


Figure 67. An organic red, together with a blue pigment, possibly Prussian blue (X 400 Magnification). Chinese Drawings of Plants Small Volume II. (The Royal Horticultural Society)

Yu Feian reports the research carried out by Xia Nai confirming the use of safflower rouge at the Mogao Caves at Dunhuang (Yu, 1988 pp.24 and 27) and on a handscroll entitled *Admonitions of the Court Instructress* which was painted circa 405 AD (Yu, 1988 p.23). This colour may have originally been imported; 'It is also said that when Zhang Qian of the Han Dynasty was an envoy to the Western Regions, he returned from the country of Yanqi with *Yan zhi*, that is to say, rouge' (Yu, 1988 p.12). Uyemura similarly concludes that *yenshi* [yan zhi] was an introduction, during or after the Han period, possibly from Kyodo (Uyemura, 1931 p.57).

Of its use, Yu Feian observes that:

Rouge was always the principal color used in ancient times for the crimsons and purples in Chinese painting and for the red washes that were used over cinnabar. However, with the passage of time, paintings done with rouge have faded in color. Today, 'Western red' or carmine is used as a substitute and is more brightly colored (Yu, 1988 p.13).

Li Qiaoping gives the method for collecting safflower dye:

Its seed are sown at the beginning of the first lunar month, and the plant blossoms in the summer. The flowers were collected and pounded by means of a foot-pestle. The pounded pulp was washed with water and the yellow liquor, safflower yellow, was completely removed by squeezing it in a bag. The residue was pounded and washed with sour rice soup and squeezed once more. The paste was repeatedly pounded and dried in the sun. It was often made into cake-like pieces to be ready for use (Li, 1948 p.141).

The authors of the *Mustard Seed Garden Manual of Painting* provide a preparation method as follows:

Take a little of it and soak in boiling water. Use two brushholders the way dyers use their two sticks to dip and wring the cloth. Any fine grains should be strained off. Place the red in lukewarm water and bring to a boil; boil until the

water is absorbed; then it is ready for use (Wang, Wang and Wang, 1977 p.41).

March stated that the time of writing (1935), in the south, rouge was mixed with flour, and that prior to use, it was boiled out of the flour and mixed with glue (March, 1935 p.10). This writer noted that in painting it was principally used for flowers, and that *mu tan hung* [mu dan hong] (peony red) was derived from it and used for painting peonies (March, 1935 p.10). The importance of *yen chih* [yan zhi] in flower painting is recorded in *The Mustard Seed Garden Manual of Painting*:

Rouge red with white contributes to the painting of flowers. The purity of white pertains to the nature of flowers, and the freshness of red to their very spirit. Applying these colours in painting flowers is like tinting the cheeks of lovely women. Their beauty is not, however, in the amount of rouge on their cheeks; that is why, in painting, red should be used lightly and in light coats to obtain a perfect effect (Wang, Wang and Wang, 1977 p.583).

A purplish-red colour and evidence of fugitivity on some pages within the Chinese Drawings of Plants Small Volumes which suffered water-damage, pointed towards the possible presence of carmine (Figure 68). An initial test for these organic reds is given by Schweppe and Roosen-Runge: under ultraviolet radiation, carmine fluoresces vivid pink while lac does not fluoresce. These can both be distinguished from madder lake (purpurin) which fluoresces a dull orange (Schweppe and Roosen-Runge, 1986 p.273). When Chinese Drawings of Plants Small Volume II page 90, on which reddish-purple fruits are illustrated, was placed beneath a UV light source, it was noted that the pigment did not fluoresce. This may indicate the presence of lac, or rouge made from safflower or *Mirabilis jalapa*, for example.



Figure 68. Drawing of *Prunus salicina*. Chinese Drawings of Plants Small Volume II, p.20. (The Royal Horticultural Society)

Winter notes that safflower red 'is notoriously prone to fading in light' (Winter, 2008 p.42), and therefore the conservation proposals will need to take account of the possible presence of this pigment.

The presence of a red lake mixed with azurite and another mixed with charcoal, has been identified, as have an organic red lake precipitated onto alum and a pure organic red on drawings within Chinese Drawings of Plants Small Volume II using PLM. Currently, it is not possible to be more precise about the identity of these pigments.

4.4.13 Indigo

Called *tien hua* [dian hua] (indigo) in the *Mustard Seed Garden Manual of Painting* (Wang, Wang and Wang, 1992 p.42) and by March (March, 1935 p.9), indigo is an organic substance prepared from a number of plants in China.



Figure 69.

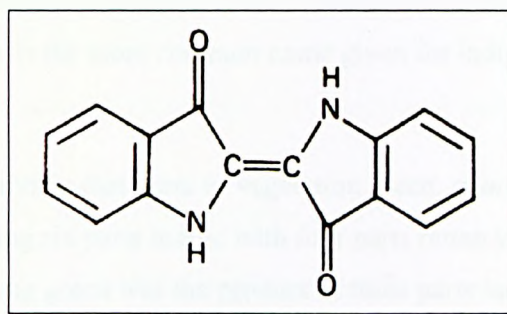


Figure 70.

Figure 69. (Left) Sample of modern Winsor and Newton indigo painted out. (Author's own)

Figure 70. (Right) The structural formula for indigotin. (Mills and White, 2003 p.149)

In each case, the main colouring constituent is indigotin $C_{16}H_{10}O_2N_2$ (Fitzhugh, 2003 p.153) (Figure 70). Watson notes that:

The species known as *ta-ch'ing* [da qing] or *mu-lan* is grown in South China and generally classified as being *Indigofera tinctoria*; that known as *sung-lan* [song lan], also grown in South China is *Isatis tinctoria* – the 'woad' of Western countries; while that known as *liao-lan* grown chiefly in Hupeh, Manchuria and North China is *Polygonum tinctorium* (Watson, 1930 p.193).

Writing in 1846, Robert Fortune found a new species of *Isatis*, which he proposed to call *Isatis indigotica* (Fortune, 1846 p.269), and unspecified indigo-producing plants were noted growing 26 miles inland from Canton by the wife of Archdeacon Gray (Gray, 1880 p.30).

Li says that this dyestuff was usually made in the 7th month of the lunar calendar by the following means:

The stems and leaves of the plant were put into a pit, vat or jar... [and] were covered with water and pressed down by means of some pieces of wood or stone. A fermentation soon began, causing a rise in temperature. The greenish-

yellow liquid was separated from the plant residues, lime was added, and the mixture was violently stirred and splashed by workmen for several hours in order thoroughly to aerate and oxidize the soluble, colorless indigo white. The insoluble blue color, indigo, was precipitated, and after settling, the liquor was drained off. The precipitate was washed, filtered, and finally pressed into cakes (Li, 1948 p.140-141).

The *Mustard Seed Garden Manual of Painting* deals with its preparation from pre-formed cakes, which were sifted through silk to remove impurities, then repeatedly crushed with a little water and dried. On the final wash, the top layer was skimmed off, mixed with glue and allowed to dry in the sun for one day only (Wang, Wang and Wang, 1977 p.43). The Manual refers also to 'flower-blue' or *hua ch'ing* [hua qing], but does not indicate its source (Wang, Wang and Wang, 1977 p.70); however, March says that this is the more common name given for indigo (March, 1935 p.9).

The *Mustard Seed Garden Manual of Painting* advises that grass or vegetation green, *ts'ao lu*, [cao lu] (vegetation green), was achieved by mixing six parts indigo with four parts rattan yellow to produce old green or *lao lu*, while fresh or young green was the product of three parts indigo mixed with seven of rattan yellow (Wang, Wang and Wang, 1977 p.43). Indigo is one of the most common pigments and has many uses in all classes of subjects' (March, 1935 p.9). Although the pigment has not been traced among the loose pigment samples from Small Volume II, the literature would suggest that it is probably present in the Collection.

4.4.14 Ultramarine (Lapis Lazuli)

Winter gives $\text{Na}_{8-10}\text{Al}_6\text{Si}_6\text{O}_{24}\text{S}_{2-4}$ as the formula for lazulite, the alternative name for ultramarine (Winter, 2008 p.15). According to Uyemura, this was not generally used because of its rarity, ground blue glass being more commonly employed (Uyemura, 1931 p.50). However, a writer in *The Chinese Traveller* notes that in 1773, at least, 'Lapis lazuli is found in several places near Yunnan,²³⁵ and is not very dear, it differing in nothing from that which is imported into Europe' (*The Chinese Traveller*, 1773 Vol.II p.168) and the same writer also records that lapis 'and other fine colours' were imported from China (*The Chinese Traveller*, 1773 Vol. I p.197).

Du Halde describes the making of a fine blue pigment for painting chinaware, which he believed to be lapis, by baking the ore and then repeatedly adding boiling water to it to produce a fine paste. He writes:

²³⁵Yu Feian says that 'flat blue', otherwise called 'pure blue', is found in Yunnan (and therefore known as 'Yunnan blue') and Burma, and that this is azurite (Yu, 1988 p.7). It may be that the writer of 1773 was incorrect in stating that the pigment was ultramarine.

I have been assured that this Azure or Lapis Lazuli is found in Coal - Pits, or among the red Earth that lies near them...They are found in the Mine in small pieces about the bigness of a large Finger, not round but flat: The coarse Lapis Lazuli is common enough, but the fine is very rare, and is not easily discernable by the Eye...If Europe could supply this fine Azure...it would be a valuable Commodity... (Du Halde, 1736 Vol.2 p.325).

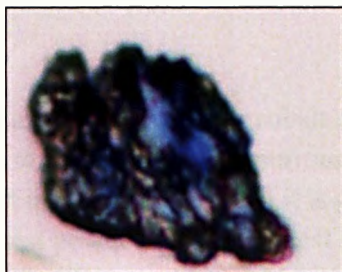


Figure 71. Ultramarine (X 400 Magnification). Chinese Drawings of Plants Small Volume II. (The Royal Horticultural Society)

Writing nearly fifty years later, Milburn records the export of ultramarine from China:

[Ultramarine] is prepared from Lapis Lazuli, by a very peculiar process; when genuine, it is an extremely bright blue colour, somewhat transparent both in and out of water. Ultramarine should be chosen of the most beautiful blue. well [*sic*] ground, and not gritty. To ascertain if it be genuine, heat a little of it red hot on an iron; if its colour be not changed, it is good; if it be adulterated, there will be dark coloured spots on it. Its principal use is in painting (Milburn, 1825 p.509).

Yu Feian writes of a pigment called ‘granulated blue’, also known as ‘Buddha blue’ (traditionally the colour of the Buddha’s hair), ‘Hui blue’ (Moslem blue), or ‘Tibetan blue’ which was imported from western regions (Yu, 1988 p.8). His editors and translators conjecture that the mineral was imported from the Badakshan mines in Afghanistan or that in the alternative, Yu may be referring to smalt, particularly since he distinguishes between a fine variety, questionably ultramarine, and a coarse variety, possibly smalt (Yu, 1988 p.8). However, Yu adds that ‘It [ultramarine] is still found today in Xikang and Xinjiang Provinces and in Tibet as well as in other sites’ (Yu, 1988 p.8), which is consistent with the English accounts given above.

PLM has detected the presence of this pigment in the samples taken from the gutters of Chinese Drawings of Plants Small Volume II (Figure 71). This pigment is recognizable by colour and gives a very good red with a Chelsea filter. Since there are very few true blue flowers in the Collection, it is likely that Reeves’ painters mixed the pigment with reds to produce purples and mauves, or with yellows to add to their repertoire of greens.

4.4.15 Smalt

Harley gives the formula for this pigment as $K_2Co(Al)_2Si_6O_{16}$, silicate (glass) (Harley, 1970 p.51) and Watson states that its Chinese name is *Ta-ch'ing* [da qing] (Watson, 1930 p.212), although he gives the same name for the plant *Indigofera tinctoria* (para. 4.4.13). As noted above, this pigment was imported from the west on East India Company ships. Watson states that cobalt glass was made by:

fusing pure sand and carbonate of potash with cobalt oxide. The deep blue liquid glass ... is allowed to stand until the impurities have settled and is then granulated by being placed in water, after which it is ground and levigated ;... [smalt] is a powder-the finest powder has the lightest colour...[it] is used, to a certain extent, as a pigment...(Watson, 1930 p.212).



Figure 72. Smalt with visible inclusions (X 400 Magnification). Chinese Drawings of Plants Small Volume II. (The Royal Horticultural Society)

At the time of writing, Watson noted that smalt was being used for 'making blue glass, colouring porcelain, earthenware, enamels, also tinting wallpaper and linen' (Watson, 1930 p.212). The editors of *Chinese Painting Colors* say that '...smalt was ...Near Eastern in origin and appeared in Chinese paintings as early as the eleventh century' (Yu, 1988 p.8). Small glassy, transparent particles with conchoidal fractures and visible inclusions have been identified among the pigment samples from Chinese Drawings of Plants Small Volume II, indicating the presence of smalt, which turns pinkish-red under a Chelsea filter (Mactaggart, P and Mactaggart, A, 1998).

4.4.16 Prussian Blue

4.4.16.1 Introduction

Watson says that the Chinese name for this pigment is *yang-lan* (Watson, 1930 p.207).

Prussian blue has been described as the first of the modern pigments with an established date of preparation— although the date varies between 1704 and 1710.

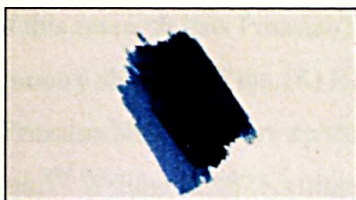


Figure 73. Painted out sample of modern Winsor and Newton Prussian blue (Author's own).

The conventional story of the discovery of Prussian blue is given by Berrie, author of the chapter on Prussian blue in *Artists' Pigments: A Handbook of their History and Characteristics* (Berrie, 1997 pp.191-217). This author quotes the chemist Georg Stahl, writing in 1731:

'The pigment maker Diesbach used to make Florentine lake by boiling cochineal, adding alum and some ferrous sulphate, and precipitating this with fixed alkali (potash). One day when he ran out of alkali he borrowed some from J.C. Dippel, in whose laboratory in Berlin he was working. Dippel gave him some alkali he had repeatedly distilled from his animal oil and no longer was usable for this purpose. To Diesbach's surprise, when he used this a very beautiful blue pigment appeared, instead of the red colour he expected.' (Stahl quoted in Berrie, 1997 p.193).

The new pigment was known by a number of names, such as Berlin blue and Paris blue, but perhaps became most well-known as Prussian blue due to its use for dyeing the uniforms of the Prussian army. It is thought that Diesbach or one of his pupils set up a factory in Paris and that he managed to keep the manufacturing process a trade secret until it eventually leaked out and competing factories were set up in England, Holland, Russia and elsewhere. In England, the procedure for preparation was published by John Woodward in *Philosophical Transactions* (1724/5). His method involved heating equal amounts of potassium nitrite (KNO_3) and potassium tartrate ($\text{K}_2\text{C}_4\text{H}_4\text{O}_6$) in a red hot crucible, adding dry powdered cattle blood and then heating the mixture to incandescence, after which it was washed with water. The wash water was next treated with a solution of alum (commonly $\text{K Al}[\text{SO}_4]_2 \cdot 12\text{H}_2\text{O}$)²³⁶ and ferrous sulphate (Fe SO_4) to produce a greenish precipitate which turned blue with the addition of hydrochloric acid (HCl). Thereafter, it is said that a London manufacturer called Wilkinson began production in the latter part of the eighteenth century and gradually more colour-makers followed suit (Gettens and Stout, 1942 p.151).

4.4.16.2 The Chinese Trade

Pritchard notes that the East India Companies Canton Diaries list Prussian blue as one of the articles of 'Private Trade' as early as the 1775-76 trading season (Pritchard, 1957 p.131). The

²³⁶ 'Alum' denotes aluminium sulphate $\text{Al}_2(\text{SO}_4)_3$, but also potassium aluminium sulphate $\text{K Al}(\text{SO}_4)_2$. It is not clear to which substance Woodward was referring.

earliest record consulted as part of this research lists Prussian blue as being an import into Canton on East India Company 'country ships'²³⁷ in the 1811/1812 trading season.²³⁸ For the 1815/16 season, 11 ships carried Prussian blue and there appears to have been a steady trade up to and including the 1823/24 season.²³⁹ Writing in 1825 Milburn noted that 'The price of this article varies, taking one kind with another, from 100 to 150 Spanish dollars per pecul.'²⁴⁰ Both Milburn and the East India Company records confirm that the pigment was not part of the Company's trade, but was one of the 'investments' which could be made by the commanders and officers of the Company's ships. Clearly, substantial quantities were being imported. Phipps, in *A Practical Treatise on the China and Eastern Trade* (Phipps, 1836) gave the reason, 'For a long period it was a matter of astonishment what the Chinese required such large quantities of Prussian Blue for, and it was at last discovered—that article was required for giving bloom and freshness to old unsaleable teas,...' and added a fascinating footnote, referring to an earlier publication, *The Canton Register*:

A late number of the Canton Register mentions a fact connected with this subject, which is one instance out of many of the desire to be independent of foreigners; it is as follows: "Prussian Blue, an article which was formerly brought in considerable quantities from England, is now totally shut out from the list of Imports, in consequence of its mode of manufacture being acquired by a Chinaman in London; and from timely improvement, it has been brought to that perfection which renders the consumers independent of foreign supply" (Phipps, 1836 p.90).

The Company records reveal that by the 1827/8 trading season, there was no listed import of Prussian blue and the same held true of the following seasons until 1831²⁴¹ (the year of Reeves' final departure from China).

4.4.16.3 The Chinese Espionage Theory

That Chinese crew were taken on by the East India Company for the trip home is beyond doubt. In a letter dated 27th December 1788, Sir Joseph Banks wrote to William Devaynes, 'The Inhabitants of Canton are now in the habit of Shipping [*sic*] themselves on board our India-men whenever hands are wanted' (Chambers, 2000 p.116). On arrival the East Indiamen frequently docked at Blackwall, East London. It is also known that a few Chinese stayed in England. One such person was Yang Sam Tak, a Cantonese who lived in Clapham and later at 14 Pitt Street,

²³⁷ These were owned or hired by the Company and sailed between Canton and ports on the Indian sub-continent, sometimes carrying goods which had originated in Britain.

²³⁸ The East India Company Consultations for 1811-1812. IOR G/12/176. British Library.

²³⁹ The East India Company Consultations for 1811-1812 to 1823-1824. IOR G/12/176- IOR G/12/229. British Library.

²⁴⁰ A pecul was a unit of weight equivalent to approximately 6.5 Kg.

²⁴¹ The East India Company Consultations for 1830-1831. IOR G/12/245. British Library.

Fitzroy Square, and who taught Chinese to Robert Morrison, a missionary in Canton and a contemporary of John Reeves (Barrett 1988 p.23). There are also recorded instances of Europeans bringing their Chinese servants home with them.²⁴² In 1806, Sir Joseph Banks had proposed installing a Chinese gardener at Kew to be 'comfortably and properly maintained and sent back with the return cabin the next season'.²⁴³ It would appear that a Chinese in London in the early part of the nineteenth century may not have excited very much interest.

Quite when the espionage theory emerged is not clear, but there are a number of references to it. In 1875, the Archdeacon of Hong Kong, John Gray, published his *Walks in the City of Canton* in which he described a walk to the north of the city, as follows:

...we proceeded on our way to the Yeung-tin-ch'ong [Yong din chong] or Prussian blue manufactory. The manufactory in question is large, and within its walls, a considerable quantity of Prussian blue, is, annually, manufactured. Of this beautiful pigment, much is used in Canton, and not a small quantity is, at intervals, exported to Shanghai. A knowledge of the art of manufacturing Prussian blue was acquired by the Chinese from the Europeans, not very many years ago. On this subject, McCulloch, in his Commercial Dictionary, observes that "blue is a favourite colour with the Chinese, and in 1810/11 the imports of Prussian blue into Canton from England amounted to 1,899 piculs, or 253,000 lbs. But for some years past, the Chinese have not imported a single pound weight. The cause of the cessation of trade deserves to be mentioned. A common Chinese sailor, who came to England in an East Indiaman; having frequented a manufactory where the dye was prepared, learned the art of making it and on his return to China, he established a similar work there, with such success that the whole empire is now amply supplied with native Prussian blue. The west has derived many important arts from the east; but we incline to think that this is the first well authenticated instance of any art having ever been carried from the west to the east, by a native of the latter" (Gray, 1974 pp.607-608).

A slightly more colourful version of the story had been given in 1855, by Baron Ernst von Bibra:

A citizen of the Celestial Empire came to London as a sailor. He then worked for a while in a factory where Prussian blue is made; he apparently would not be able to find the same opportunity upon returning to his homeland. People at the factory mocked this simple-minded Chinese man, with his long braids, yellow silk shirts, small slanted eyes, and crazy language. After some time the Chinese returned to his native country, and soon afterward all orders for Prussian blue stopped coming. The ex-sailor had learned this by watching the process in London, and as was discovered later, had opened a number of large

²⁴² The East India Company Consultations for 1811-1812. IOR G/12/176. British Library.

²⁴³ Banks, J (1806) Letter dated 6th May. Banks Correspondence 1765-1821. Add.MSS33981. pp.234-235. British Library.

and small enterprises where this colour was excellently prepared (von Bibra, 1995 pp. 28-29).

The story of the enterprising sailor was also reiterated by Theophilus Sampson in the September 1882 issue of *The China Review*:

An establishment for the manufacture of Prussian blue has existed for many years outside the North Gate of Canton. I have several times visited this manufactory, and seen as many as a hundred earthenware vessels containing the clippings of leather from which the dye is made, exposed at a time to the white heat of as many little furnaces, the evolving gases burning as they escaped through a hole in the otherwise closed vessels. Stores of alum were also on the premises. Whether this is the identical factory opened by the Chinese sailor I am unable to say; but it is by no means improbable that it is. One of the writers in Notes and Queries, referring to this establishment, say that a strict guard is kept against the prying eyes of intruders, who might discover trade secrets. And F. Porter Smith says that the Chinese keep the manufacture a great secret. On visiting the premises near Canton, I have also observed an indisposition to allow me to witness the process of manufacture, and an unwillingness to give me any information regarding the history of the establishment (Sampson, 1882 p.130-131).

4.4.16.4 Conclusions

If the records are correct, Prussian blue was being imported into Canton in some considerable quantities certainly until 1825 (the date of Milburn's *Traders Guide*). Thereafter, it seems reasonably certain that the Chinese had acquired the know-how to manufacture their own pigment. The Canton factory records support this view, and the writer of the piece in *The China Review* would have been correct in saying that by 1882 the factory had been operating 'for many years'.

John Winter refers to research carried out by Smith (Smith, 2005) in which he investigated the importation of the pigment into Japan in the early part of the nineteenth century. Smith found that the Dutch and the Chinese participated in this trade, and that the quantities brought in fluctuated until the late 1820s, at which time the price fell dramatically due to greatly increased imports from China. If the Chinese had indeed set up their own factory shortly before 1827, as suggested above, this would account for Smith's findings. Referring to work previously undertaken by Sasaki who 'put forth the provocative theory that the Chinese in the 1820s had begun to manufacture Berlin blue', (Sasaki quoted in Smith, 2005 p.242) Smith noted that 'no corroborating evidence on the China side has yet been found (although few have looked)' (Smith, 2005 p.242). It is suggested that while such evidence may not have yet come to light in China, there is ample source material in this country to support Sasaki's theory.

This would accord with the first reference to the Chinese sailor made by Phipps in 1836. This story may, at first sight, appear somewhat far-fetched. However, as has been shown above, the Chinese were adept at manufacturing pigments and some of the constituents of manufacture, alum, saltpetre and animal products, for example, would have been readily known to them. The story becomes rather more credible if the 'sailor', far from accidentally stumbling upon the method of manufacturing Prussian blue in London, deliberately set out to learn the process with a view to making his fortune from a ready domestic and Japanese market. The location of the Cantonese Prussian blue factory is perhaps telling.



Figure 74. Map of Canton: Factory area to the south-west of the city edged green; city walls edged red.

[Online image] Available from:

<http://www.nla.gov.au/apps/cdview?pi=nla.map-lms636-sd&rgn=0.3863408102,0.01>

[Accessed 16th January 2009].

By situating the Prussian blue factory at the north gate of the city, the Chinese placed it at the furthestmost point from the prying eyes of the *fan quai* (foreign devils), who were restricted to the Factory area (Figure 2) and (Figure 74). That they were sensitive about the factory and its history is clear from the article in *The China Review*.

The factory seems to have ceased trading some time before 1882. Sampson, writing in *The China Review* continued:

During recent years the prosperity of this branch of industry in the manufactory referred to, has gradually declined. An effort was made to preserve it by adding to the manufacture of Prussian blue that of a vegetable blue dye made from *Polygonum tinctorium*, which was grown in the adjacent

fields. But modern science as applied to manufacture of dyes seems to have given a death-blow to this imported but jealously-guarded industry: the manufacture ceased; the ground on which there used to stand numerous jars of liquid blue, became covered with rank herbage; the buildings fell into ruin; and now the debris has been carried away; the site has been converted into a vegetable garden; and thus this interesting little episode in the industrial history of Canton is brought to a close' (Sampson, 1882 p.130-131).

4.4.17 **Prussian Blue in the Reeves Collection: Preliminary Testing**

Typical molecular formulas for Prussian blue are given by Fitzhugh as $\text{Fe}_4[\text{Fe}(\text{CN})_6]_3 \cdot x\text{H}_2\text{O}$ and $\text{KFe}[\text{Fe}(\text{CN})_6] \cdot x\text{H}_2\text{O}$ (Fitzhugh, 2003 p.154). It is not possible to make a positive identification of Prussian blue using PLM alone.

However, making reference to work previously undertaken by Plesters, Berrie notes that 'The extreme sensitivity of Prussian blue to alkali differentiates it from other blue pigments; the reformation of the blue color with acid provides further confirmation' (Berrie, 1997 p.205). In 1955/6, Joyce Plesters had reported that in the presence of sodium hydroxide, Prussian blue went into solution with the precipitation of brown ferric hydroxide and that 'if sufficient pigment is present it may be re-formed after being browned by NaOH by addition of excess hydrochloric acid.' (Plesters, 1955-6 pp.110-157).

PLM was therefore supported by chemical tests carried out on detached dark blue pigment samples collected from the debris in the gutters of Chinese Drawings of Plants Small Volume II. Prior to testing the Reeves pigment, a known sample of Prussian blue was placed on a spot plate under a stereo microscope to which sodium hydroxide (NaOH) was added. As expected, the Prussian blue quickly turned reddish-brown, with some bubbling visible.

Next, a fairly large fragment of dark blue pigment was selected from the debris from Chinese Drawings of Plants Small Volume II and this was cut in half. The first half was placed on a white spot plate and sodium hydroxide (NaOH) added in the same way as the control. The pigment turned a reddish-brown. On the subsequent addition of conc. hydrochloric acid (HCl) to the sample, the colour reverted to a greenish-blue, strongly suggesting the presence of Prussian blue.

A small portion of second half of the sample pigment was used to make a microscope slide. Using a Chelsea filter, this was identified as a likely example of Prussian blue, although it is not possible using PLM alone to detect the pigment from a mixture of Prussian blue and indigo.

The remaining portion of the second half of the pigment sample was placed on the spot plate and sodium hydroxide (NaOH) again added. This sample also turned reddish-brown (Figure 75)

and was kept under observation for 4 hours to see whether it partially dissolved which, according to Plesters (Plesters, 1955-6), may have indicated the presence of indigo. At the end of the 4-hour period, no partial dissolution was apparent.



Figure 75. Sample of Prussian blue with NaOH showing reddish-brown colouration. (Camberwell College of Arts)

The results of this preliminary work suggest that there is Prussian blue present in the Reeves Collection.

4.4.18 Testing a Chinese Traditional Method for Reverting Darkened Lead White

The problem of progressive darkening of this pigment was recognised by the authors of the *Mustard Seed Garden Manual of Painting*, who advised ‘Chew the heart of a bitter apricot seed, and with the juice wash these spots once or twice. The dark spots will then disappear’ (Wang, Wang and Wang, 1977 p.49).

In order to test the method, modern Chinese lead white, procured from an art shop in Hong Kong,²⁴⁴ was prepared using gelatine as a binder. A flower shape was painted out on modern drawing paper and exposed to ammonium polysulphide (NH_4S_2) in a fume cupboard, with approximately 10% hydrogen sulphide (H_2SO_4) gas being given off. As predicted, the sample turned dark brown, indicating the presence of lead sulphide on the painted surface.



Figure 76. Apricot kernels used to test the Chinese method of converting darkened lead white. (Sourced from Hailsham Healthfoods Unit 2, St. Mary’s Walk, Hailsham, East Sussex)

²⁴⁴ Man Luen Choon of 2/F, Harvest Bldg, 29 Wing Kut St, Central, Hong Kong.

Two apricot kernels²⁴⁵ weighing a total of 0.8964 gm. were ground finely in 2 cc. of 0.2 g/l amylase solution using a small pestle and mortar. The resulting mixture was applied to the surface of the darkened lead white by dotting it, using a fine paint brush. Ten spots were applied to the top 'petal', and eight to the right-hand 'petal'. The sample was left to air dry. No diluted apricot kernel mixture was applied to the left-hand or bottom 'petals'. Pale white spots appeared on the treated 'petals' by the end of 7 days (Figure 77). These were most visible under a raking light. Initially, all 18 spots were visible as small whitish spots, surrounded by a feint blue/grey halo.

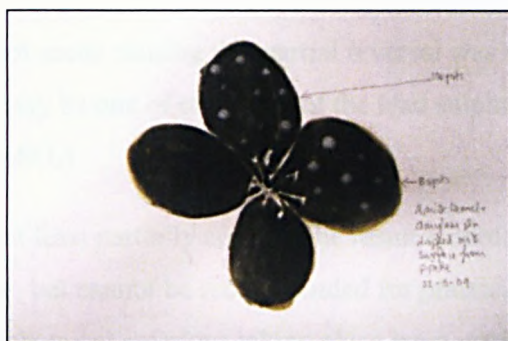


Figure 77. Reverted lead white spots on top and right-hand 'petals' after 7 days.

During the following six-month period the centres of the spots appeared pale brown with a pronounced brown outer ring. The halo area became visibly larger and whiter (Figure 78).

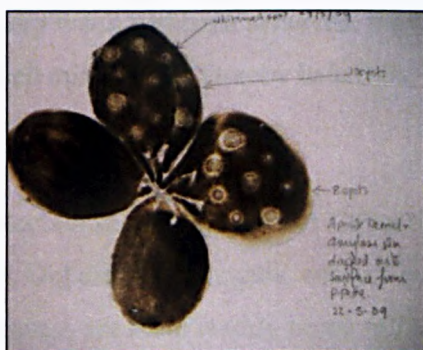


Figure 78 The same sample as above after a further six-month period.

²⁴⁵ Organic Sweet Apricot Kernels supplied by Queenswood Natural Foods Ltd TA6 4AW sourced from Hailsham Healthfoods Unit 2, St. Mary's Walk, Hailsham, East Sussex on 24th January 2009.

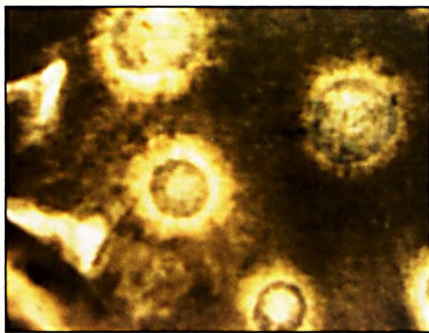


Figure 79. Portion of the right-hand ‘petal’ at higher magnification to show inner ring and halo effect after the six months from the date of application of the lead white and the amylase solution.

The constituent in the apricot seeds causing this partial reversal was not identified, but it is suggested that the process may be one of oxidation of the lead sulphide (PbS) to produce colourless lead sulphate (PbSO_4).

This modest trial serves to at least partially confirm the result recorded in the *Mustard Seed Garden Manual of Painting*, but cannot be recommended for practical use in the conservation studio, mainly because the chemical reactions taking place have not been identified.

Furthermore, the rate of change in the appearance of the darkened lead white is unacceptably slow and not controllable. The size of the halo effect outweighs any advantage gained by the reversal. While it is a matter of speculation, the Chinese may have achieved a more satisfactory result by restricting the application of the apricot seed mixture to minute spots of darkened pigment. As soon as a satisfactory result had been achieved, they may have washed the painting to remove the excess apricot seed mixture and thereby halted the chemical reaction.

4.5 Summary

The range of pigments in a collection such as the Reeves Collection presents a challenge for curators and conservators alike. Organic and inorganic colours behave differently. The organic colours, such as indigo and carmine, are more readily prone to fading, while the mineral colours, such as vermilion and lead white, interact with the environment and other pigments according to their metallic elements. Very few pigments are said to be entirely stable. The method of manufacture and the way in which the colours were mixed may also have a bearing on the longevity of the colours and, particularly in the case of malachite and azurite, upon the binders and paper substrates. This will have implications for the conservation, storage and display of the Collection. The identification of the pigments and the other physical components of the Collection is not, therefore, of purely academic interest.

The Table overleaf condenses this area of research.

TABLE 1. SUMMARY OF PIGMENTS FOUND OR LIKELY TO BE FOUND WITHIN THE COLLECTION

English Name	Chemical Formula	Chinese Name (Pinyin)	Found	Comments
Graphite	Carbon-based product.		Yes	Under-drawing on western papers only: pencils not commonly available in China.
Chinese Ink	Carbon- based product.	<i>Mo</i>	Yes	Found on inscriptions of plant names on western papers; not commonly found on Chinese papers. Made from soot.
Azurite	$\text{Cu}(\text{OH})_2 \cdot 2\text{CuCO}_3$	<i>Shi jing</i>	Yes	Copper-based. Chinese name translates as 'mineral blue'.
Malachite	$\text{Cu}_2\text{CO}_3 \cdot \text{Cu}(\text{OH})_2$	<i>Shi lu</i>	Yes	Copper-based. At least 2 types found. Name translates as 'mineral green.'
Red Ochre	Contains red iron oxide: $\alpha\text{-Fe}_2\text{O}_3$	<i>Zheshi</i>	Yes	Collectively known as the 'earth pigments', these are iron oxides which include haematite, limonite, goethite, magnetite, and lepidocrocite. Several varieties identified by PLM, but they are difficult to distinguish. Chemical formulas vary and impurities are expected to be present. Chinese terms for these pigments are not precise (Winter, 2008 p.17).
Yellow Ochre	$\text{Fe}_2\text{O}_3 \cdot \text{H}_2\text{O}$ or HFeO_2 (goethite)	<i>Tuhuang</i>	Yes	
Brown Ochre	$\text{FeO}(\text{OH}) \cdot n\text{H}_2\text{O}$ (others possible)	None found	Yes	
Umber	$\text{FeO}(\text{OH}) \cdot n\text{H}_2\text{O}$ to $\text{Fe}_2\text{O}_3 \cdot n\text{H}_2\text{O}$ (limonite)	<i>Heizhishi</i>	Yes	
Orpiment and Realgar	As_2S_3	<i>Shihuang</i>	Yes	Arsenic sulphides, therefore toxic. May fade to white but some evidence of realgar darkening.
	AsS or As_4S_4	<i>Xionghuang</i>	No	
Cinnabar and Vermilion	$\alpha\text{-HgS}$ (same formula for both)	<i>Chu sha</i>	Yes	Cinnabar is a mineral ore; vermilion manufactured by the Chinese and exported to Britain.
Lead White	$\text{Pb}(\text{OH})_2 \cdot 2\text{PbCO}_3$	<i>Qian fen</i>	Yes	Manufactured by the Chinese from metallic lead and exported to Britain. Lead carbonate darkens to lead sulphide in the presence of atmospheric hydrogen sulphide.
Red Lead	Pb_3O_4	<i>Hongqian</i> or <i>Qندان</i>	Yes	Manufactured by the Chinese from the residues of white lead.
Calcite	CaCO_3	<i>Fu fan</i> or <i>Ha fen</i> for shell white. <i>Bai e</i> for other whites.	Yes	Two forms: shell white and chalk white. Two forms of shell white identified by PLM. No chalk found.
Gamboge	(Contains gambogic acid) $\text{C}_{38}\text{H}_{44}\text{O}_8$	<i>Teng huang</i>	Yes	A gum-resin obtained from <i>Garcinia</i> species, particularly <i>Garcinia hanburyi</i> . Identified as a binder mixed with malachite in Small Volume II. Chinese also called it 'rattan yellow' and noted its toxicity.
Sophora Yellow and Yellow Lake		<i>Huai-Mi</i>		Yellow pigment obtained from a leguminous plant: <i>Sophora japonica</i> . Organic yellow lake detected, but not identified.

English Name	Chemical Formula	Chinese Name (Pinyin)	Found	Comments
Carmine and Lac	(Contains carminic acid) $C_{22}H_{20}O_{13}$ (Contains laccaic Acid) $C_{20}H_{14}O_{11}$	<i>Yanghong</i> <i>Yigong</i>		Recorded in China from 1582; called 'western red'. Highly fugitive. Derived from insects including <i>Dactylopius coccus</i> . Derived from insect, <i>Laccifer laccae</i> .
Rouge and Organic Reds	Alizarin: $C_{14}H_6O_2(OH)_2$ Purpurin: $C_{14}H_5O_2(OH)_3$ Carthamin: $C_{43}H_{42}O_{22}$	<i>Yan zhi</i> <i>Qiancao</i> <i>Honghua</i>	Yes	Prepared from plants including <i>Carmathus tinctorius</i> (safflower), <i>Rubia tinctorium</i> and <i>Sophora japonica</i> . Unidentified organic reds detected in the Collection.
Indigo	Mainly indigotin $C_{16}H_{10}O_2N_2$	<i>Dian hua</i>		Prepared from plants including <i>Polygonum tinctorium</i> , <i>Isatis tinctoria</i> , and <i>Isatis indigotica</i> .
Ultramarine (Lapis Lazuli) Lazulite	$Na_{8-10}Al_6Si_6O_{24}S_{2-4}$	No references in selected texts	Yes	May have been known as 'granulated blue', <i>hui</i> blue, Buddha blue (traditionally used for Buddha's hair) and Tibetan blue.
Smalt	$K,Co(AL)$	<i>Da qing</i>	Yes	Manufactured by grinding blue glass.
Prussian blue	Variable, but typically : $Fe_4[Fe(CN)_6]_3 \cdot xH_2O$ or $KFe[Fe(CN)_6] \cdot xH_2O$	<i>Yang lan</i>	Yes	Imported into China via the East India Company and subsequently manufactured by the Chinese. Constituents vary but iron always present. Sensitive to alkali.

4.6 Papers

4.6.1 Introduction

The Collection principally comprises western wove drawing papers, which have been bound to form the pages of the eight volumes, and smaller Chinese papers. The latter are primary supports adhered to 1837 Whatman papers (secondary supports). It is not within the remit of this research project to examine the history of paper-making in China and England although reference has been made to historical sources where these contribute to an understanding of the papers in the Collection.

Carter Gilmour lists five categories of paper-making fibres: seed hairs, bast fibres, grass fibres, leaf fibres and wood fibres (Carter Gilmour, 1965 p.17). As part of this research, microscope slides have been prepared from damaged areas of western and Chinese papers using Xam (R.I $\pm$ 1.49) as a mountant. These have been examined using PLM. The slides have been compared with reference slides held at Camberwell College of Arts, and with micrographs given by

Collings and Milner (1978, 1979 and 1982). The findings in each case are given under their respective headings.

4.6.2 Western Papers

The pages of all eight volumes in the Reeves Collection are of English wove papers, with Whatman papers predominating (Figure 80). M&J Lay papers and those from the mills of Taylor and Green are also present. Where countermarks are present, these have been recorded against the pictures numbered by Reeves, listed in Appendix IV.

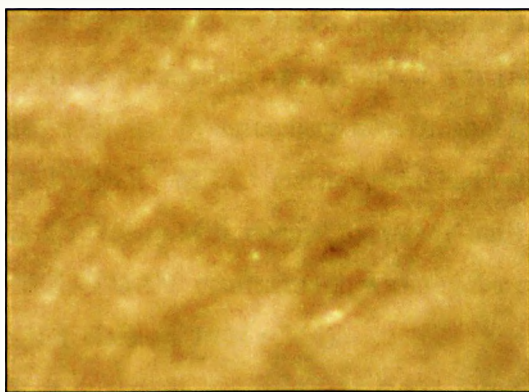


Figure 80. Paper surface shown through stereo microscope. Chinese Drawings of Plants Small Volume II p.92. (The Royal Horticultural Society)

4.6.2.1 Whatman Papers

These papers are countermarked 'J WHATMAN' with the dates 1794, 1804, 1805, 1817, 1826 and 1837. The 1837 papers are all secondary supports, to which primary supports, mostly Chinese papers, and a few English wove papers, must have been adhered after Reeves returned to England. The lettering of the papermaker's name has been compared with printed examples of forged Whatman countermarks (Balston, 1992 Plate 16); as far as can be ascertained the Whatman papers are genuine.

The Turkey Mill at Boxley near Maidstone, Kent, came into the hands of the Whatman family in 1740 on the marriage of Ann Harris, widow of Richard Harris and the previous owner of the mill, to James Whatman (Coleman, 1958 p. 153). On the death of James Whatman in 1759, the mill passed to his son, also called James Whatman, when he attained the age of majority three years later. According to Coleman who compared the annual wage bills for 1762 with 1780, 'Turkey Mill was already an outstanding enterprise under the elder Whatman' (Coleman, 1958 p.153). On 2nd October 1762 Whatman married Sarah Stanley who bore three daughters, only two of whom survived (Balston, 1992 Table XX). It is thought that in about 1770 he started to produce drawing papers of high quality at the Mill (Labarre, 1952 p.364). In 1775 Sarah died,

and in December of the following year James married Susanna Bosanquet, who gave birth to one son, also called James, in 1777 (Balston, 1992 Table XX). Susanna's brother-in-law was Jacob Bosanquet who, from 1782 until 1827, was a Director and then Chairman of the East India Company (Balston, 1957 p.113-4).

In 1793 James Whatman the younger decided to retire and 1794 the four Whatman mills, Turkey Mill, Poll Mill, Loose Mill and Hollingbourne Mill, were sold to the partnership of Thomas and Finch Hollingworth and William Balston (Coleman, 1958 p.154; Hills, 1988 p.77). The Whatman countermarks continued to be used; the countermark on the 1794 papers in the Collection matches the example reproduced for the Hollingsworths-Balston partnership by Balston (1954 p.165). In 1804 this partnership was dissolved. The Hollingworths continued to conduct business from Turkey Mill, and by agreement with Balston in 1805 used the countermark 'J WHATMAN TURKEY MILL'. Balston, who had been apprenticed to Whatman and later became manager at the Turkey Mill, opened the newly-built Springfield Mill in Maidstone, and used the 'J WHATMAN' countermark, with regular changes in the date (Hills, 1988 p.77; Labarre, 1952 p.364; Balston, 1954 p.164).

It will be seen that the early Whatman papers in the Collection (with the possible exception of those countermarked '1794') were hand-made by the Hollingworth-Balston partnership at Turkey Mill until 1805. The later papers would have been produced by Balston at Springfield Mill. According to Baker, a paper conservator based at the University of Michigan Libraries, the 'J WHATMAN' countermark gives some comfort as to quality (Baker, 2006). This researcher undertook a study of the Whatman papers used for J. J. Audubon's *The Birds of America* (Audubon, 1827 to 1838) and found that '... the J Whatman papers, with very few exceptions, now seem to be superior to the J Whatman /Turkey Mill papers regardless of the date of manufacture' (Baker, 2006 p.6).

In Hunter's view 'The value of watermarks as a means of determining the dates of paper, books, and prints or the locality where the paper was made is to be questioned' (Hunter, 1947 p.264). He reasons that dated papers may have been held at the mill or warehouse for some years prior to sale, that papermakers did not always change the dates on the mould and that countermarks were forged, citing the 'J. WHATMAN' forged countermark as a well-known example (Hunter, 1947 pp. 264-265).

It is suggested that there are at least three reasons for accepting the Whatman papers in the Collection at face value. Firstly, as has been noted, the countermarks do not match any of the known forgeries, examples of which are given by Balston (Balston, 1992 Plate 16 no pagination). Secondly, the East India Company is known to have invited tenders for large

supplies of paper for India and that 'the Company had been among Whatman's best customers' (Balston, 1954 p.63). Importantly, the family connection between the Whatman family and the East India Company through Susanna Bosanquet is known to have been exploited from a draft of a letter written on paper countermarked 'J WHATMAN 1804' and quoted by Balston:

It was one of the primary objects of Mr Whatman's early attention to supply such papers as would stand the Indian climates in exclusion of the Dutch papers which till then the Company had exclusively used. The pleasure which he experienced from the successful exertion of his abilities was great and, if I appear as solicitous on the present occasion, I beg to be understood that it arises much less from any idea of individual advantage therefrom than the ambition of supporting that reputation which Mr Whatman acquired, and that approbation of his papers by the Court which afforded him so much gratification (Balston, 1957 p.114).

Balston speculates that it was either written on behalf of the partnership shortly after the mills were sold by Whatman, or later by Balston alone (Balston, 1957 p.114). It is suggested that the latter is perhaps the more likely case since the writer refers to 'I' and 'individual advantage'. Furthermore, Balston is known to have run into early financial difficulties (Coleman, 1958 p.244; Balston 1954) and may therefore have been anxious to secure the business. By 1812-13, Balston faced financial ruin, which was averted largely due to the intervention of Jacob Bosanquet who reconstructed the business (Balston, 1954). During this time, orders continued to be met for the East India Company; Balston says, for example, that on the 14th April 1814 an order was received from the Company for paper to the value of £3116 (Balston, 1954 p.112). Eventually Balston's fortunes improved in the 1820s with the creation of the new firm of Balston, Gaussen & Bosanquet. Coleman says that:

...thereafter, by concentrating on those sorts of writing- and drawing-papers which can be produced only with the best raw materials, fine craftsmanship, and the use of the vat instead of the machine, the firm moved into the front rank of the hand-made producers (Coleman, 1958 p.244).

It may be said, therefore, that the papers in the Collection represent the best that were being manufactured at the time.

Clunas suggests that it would not have seemed improper at the time for family connections to have been used to commercial advantage (Clunas, 1984 p.45) and as Archer notes, the Company wanted drawings from China for commercial rather than aesthetic reasons and therefore had an interest in securing a reliable supply of good watercolour paper (Archer, 1972 p.254).

Thirdly, by virtue of the 1794 Parliamentary reforms to Customs and Excise duties,²⁴⁶ drawing paper, together with four other Class 1 papers, writing, printing, elephant and cartridge, attracted Excise Duty at 2½ d. per lb. and 10 d. Import Duty, with detailed provisions as to the wrapping, inspecting, weighing and stamping reams and bundles of paper, and penalties for non-compliance (Hills, 1988 p.64). In 1801, the duties were doubled, although Excise Duty paid on exported paper could be clawed back (Coleman, 1958 pp.136-137). Papermakers were also required to countermark papers with the year of manufacture, at least until 1811 when the Act was repealed, by which time, according to Baker, mills had grown accustomed to making the annual change of date in their countermarks (Baker, 2006 p.5). In view of the above, and the fact that Balston says that at Springfield Mill the countermark date was changed on a regular basis from 1806 onwards (Balston, 1954 p.164), it is considered likely that the papers in the Collection which bear dates accurately record the year of manufacture.

4.6.2.2 Lay, Taylor and Green Papers

Three other paper manufacturers are represented in the Collection. Papers bearing the countermark 'M & J LAY 1817' are bound in as pages, but in at least one instance this paper has been trimmed and adhered to a Whatman 1837 paper. Balston says that there is evidence of a Samuel Lay working at St. Mary Cray Mill, Sittingbourne by 1780 and that the St. Mary Cray Land Tax Returns confirm that he continued at the mill from 1780-1790 (Balston, 1992 p.307). Shorter states that Samuel Lay was a master paper-maker in 1801 (Shorter, 1957 p.184). According to Balston, Samuel Lay died in 1803/4; the return for 1804/5 shows a Mrs. Lay in occupation; in 1812 Martha Lay and a John Evans are recorded jointly, and by 1816 Martha Lay alone is shown at the mill (Balston, 1992 p.307). The Excise General Letter of June 1818 confirms a John Lay operating the mill at St. Mary's Cray. It is suggested that in the intervening years mother and son may have jointly worked the mill.

One sheet found in Chinese Drawings of Plants Small Volume 1 at page 78 shows the countermark 'I. TAYLOR', but there is no indication of date, which may have been trimmed during binding. Labarre links a John Taylor with Basted Mill, Wrotham; in 1786 he was named in a list of paper-makers and in 1796 it was recorded that the mill has stopped in 1789 and again in 1796 due to industrial action on the part of journeymen papermakers (Labarre, 1957 p.196). Labarre recites that at a Meeting of Master Paper Makers of Kent and Surrey on 30th April 1801, John Taylor was listed as a master maker and therefore concludes that the mill must have remained in his occupation after 1800 (Labarre, 1957 p.196).

²⁴⁶ 34 Geo.III,c.20

The third paper is countermarked 'J. GREEN 1818' and has been used only as a primary support for small drawings. Hills states that 'J. Green started at Hayle Mill in 1810, and was certainly making wove paper by 1815, if not from the very beginning' (Hills, 1988 p.77). According to Green, the mill was erected in the first decade of the nineteenth century, was then advertised for sale in *The Times* in 1813 due to the first owner being unable to meet the mortgage repayments and was bought by John Green V (Green, 1986 p.55). He says that 'The earliest known Hayle Mill paper ... has the watermark "J. GREEN 1814" ' (Green, 1986 p.55). Green concentrated on making the best quality handmade papers, but nevertheless went bankrupt in the 1838 slump, with the result that his brother Samuel took over the mill and employed John as manager (Green, 1986 p.57).

4.6.2.3 Paper Constituents

The principal source of raw material for paper-manufacture up to about 1860 was rags, either collected from householders or imported (Hills, 1988 p.126). Due to a constant shortage of old rags, Hunter writes that, 'In the eighteenth century...there was considerable research and interest in finding new material, other than rags, from which to make paper' (Hunter, 1947 p.327). In 1800 and 1801, Matthias Koops was granted two patents for 'a method of manufacturing paper from straw, hay, thistles, waste, and refuse of hemp and flax, and different kinds of wood and bark' (Hunter, 1947 p.333). The shortage of rags upon which hand-made paper-makers depended was exacerbated by the Napoleonic wars, while the demand for paper increased due to population expansion and an increase in *per capita* consumption (Hills, 1988 p.126).

The handmade papers in the Collection show little sign of degradation despite water damage and mould-staining. Both the Whatman-Balston and Green enterprises are known to have produced best quality papers, and Taylor was recorded as a master-maker. The East India Company was clearly interested in obtaining best quality paper for its drawings. It is therefore to be expected that these papers would have been made predominantly from rags. This is confirmed by fibre slides which indicate the presence of cotton and linen in the Whatman 1805 and 1837 papers.

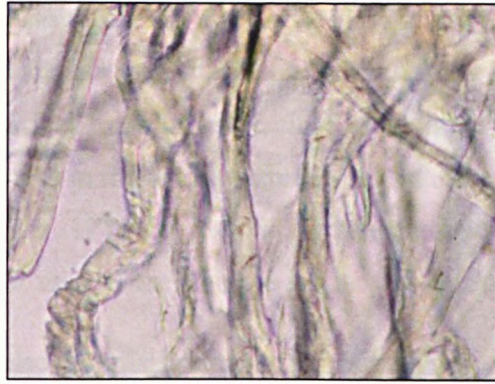


Figure 81. Mixed fibres including cotton (*Gossypium hirsutum*) and linen (*Linum usitatissimum*) (X 400 Magnification). Chinese Drawings of Plants Small Volume II, p.92. (The Royal Horticultural Society)

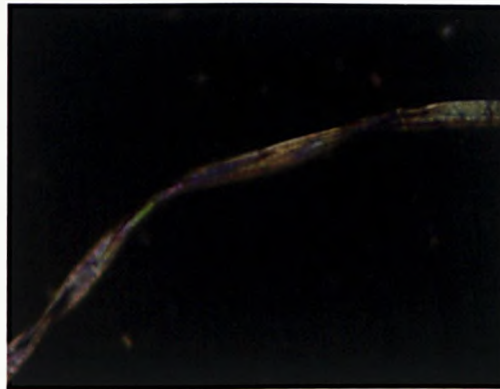


Figure 82. Cotton fibre (*Gossypium hirsutum*) through crossed polars (X 400 Magnification). Chinese Drawings of Plants Small Volume II, p.92. (The Royal Horticultural Society)

4.6.3 Chinese Papers

4.6.3.1 Introduction

March notes that *chih* [zhi] is the general Chinese term for paper (March, 1935 p.3). Together with brush, ink and inkstone, paper was one of 'The Four Treasures' of the artists' studio (Sze, 1957).

One of the contributors to *The Chinese Traveller* wrote at some length about the various sorts of paper known to westerners at that time, concluding that 'In reality, almost every province has its several paper; that of Sechwen [Szechuan] is made of hemp, that of Chekiang of wheat or rice straw, that of Fokien [Fukien] of soft bamboo, and the bark of the mulberry tree furnishes the paper used in the northern provinces' (*The Chinese Traveller*, 1773 Vol. II p.88).

He then described the making of bark paper, taking bamboo as an example, which was manufactured from the inner bark only of the plant. From this account, it appears that a mould

was used and that the paper was repeatedly sized with alum solution so that it ‘not only hinders the paper from imbibing the ink, but gives it a lustre’ (*The Chinese Traveller*, 1773 Vol. II p.88). The paper itself is described as ‘white, soft, close, and without the least roughness’, but cracked readily, was ‘apt to take in moisture’, suffered dust adhesion and was liable to worm damage (*The Chinese Traveller*, 1773 Vol. II p.88). From this description, it would appear that this was not the type of paper used by the Chinese artists working for Reeves.

Writing in 1848, Morrison also describes several types of papers produced for specific purposes. He says the paper:

such as that on which this book is printed, is manufactured from the common yellow bamboo paper of the Chinese by sizing it in water saturated with alum, to which glue is added; the sheets are dried and smoothed by rubbing them on a warm wall. The glazing which is upon writing paper is made by waxing the sheet, and afterwards rubbing it with a smooth stone; two, three and four sheets are made into one thick sheet for ledgers, or other account-books by the same process, after wetting the inner surfaces with glue water, and drying the sheet in the sun. There is also a thin paper called Nanking paper, which is manufactured from cotton wool, that is tougher and more flexible than the bamboo paper. Coloured paper is exported in considerable quantities; the exportation of all kinds is principally to India and the archipelago. The consumption of Chinese writing paper is great in this part of the world, on account of its not being injured by the climate; foreign paper sized with glue being liable to spoil (Morrison, 1848 pp.177-178).

The raw materials identified as used in paper production in China included hemp (*Cannabis sativa*), jute (*Corchorus capsilaris*), flax (*Linum perenne*), ramie (*Boehmeria nivea*), rattan (*Calamus rotang*), wheat straw, many species of bamboo including giant bamboo (*Bambusa arundinacea*), mulberry (*Morus alba*) and paper mulberry (*Broussonetia papyfera*), cotton (*Gossypium*), reeds, blue sandalwood (*Pteroceltis tatarinowii*), hibiscus (*Hibiscus mutabilis*) and seaweed (*Algae marina*). Wood pulp was used from the beginning of the nineteenth century (Collings and Milner, 1978 pp.76-77; Needham and Tsien, 1985 p.64; Winter, 2008 p.68; Tsien, 1973).

The authors of *The Mustard Seed Garden Manual of Painting* (Wang, Wang and Wang, 1992), perhaps surprisingly, say very little about papers. Paper known as *Ch'eng Hsin T'ang* [Cheng Xin Tang] (translated by Ferguson as ‘Paper from the Pure Heart Hall’), bamboo-pulp papers such as *hsüan chih* [xuan shi] and *ching mien kuang* [jing mian guang] (mirror smooth), as well as papers from Ch’u (Hupeh), Korea and a paper from Yunnan called *ya chin chien* [ya jin jian] were all said to be suitable for painting (Wang, Wang and Wang, 1992 p.47).

4.6.3.2 The Paper-making Process

Needham and Tsien state that paper was mostly made by hand using natural resources and chemical agents, and that workshops were frequently sited near mountain streams to provide a ready supply of clean water and firewood (Needham and Tsien, 1985 p.68). In the last respect, Chinese papermakers differed little from their English counterparts. Although the manufacturing process varied slightly according to the raw materials used, the key processes remained the same (Needham and Tsien, 1985 p.68). The necessary steps were recorded in the *Thien Kung Khai Wu* [Dian Gong Gai Wu] (The Exploitation of the Works of Nature), an encyclopaedia published by Sung Ying-hsing [Song Ying-Xing] in 1637, which is reproduced by Needham and Tsien, and described as follows:

Step 1: 'Cutting and soaking bamboo twigs'.

Step 2: 'Cooking inner mass of bamboo in a pot'.

Step 3: 'Dipping the mould and lifting pulp from a vat'.

Step 4: 'Pressing moist paper sheets to release water'.

Step 5: 'Drying paper sheets on a heated wall' (Song Ying-Xing quoted in Needham and Tsien, 1985 p.70).

The mould referred to would have been a Chinese 'laid' transfer mould, which enabled moist papers to be removed immediately. This was made 'by placing thin strips of rounded bamboo side by side and stitching them or lacing them together at regular intervals with silk, camel, yak-, or horse-hair' (Hunter, 1947 p.86). The width between the laid lines and chain lines was variable, but '... the original type of laid mould from the earliest years of Chinese paper-making served as a model for all the moulds that followed, and throughout the world there has been but slight change in the pattern. The principle of the invention remains practically un-altered' (Hunter, 1947 p.94).

Many of Reeves' letters, including all four of the existing letters to his family, were written on fine, white, laid Chinese papers. The letters held at the British Library and elsewhere appear to have been written on a selection of similar papers, predominantly Chinese notepaper. It has not been possible to obtain samples for identification by fibre analysis, but from visual inspection these papers look very similar to the papers found in the Reeves Collection. Without exception, the papers show no sign of discolouration or deterioration, nor is there any evidence of fugitivity from the iron gall and Chinese inks used by the writer. This would suggest that these papers were sized, probably with alum.

The papers in the Collection are smooth, white, laid papers with laid and chain lines clearly visible and bear strong similarities with modern xuan paper (Figure 11). This is said to have originated in Anhui province and to be made from a mixture of bast fibres from the *than* tree (*Pteroceltis tatarinowii maxim*) and rice straw (*Oryza sativa*) (Mullock, 1995 p.23). Microscope slides of three Chinese papers in the Reeves Collection, taken from torn and fragmented corners, were compared with reference slides held at Camberwell College of Arts, with the monographs in Collings and Milner (1978, 1979 and 1982) and a micrograph of *Pteroceltis tatarinowii* given by Mullock (1995 p.27). The paper surfaces were also examined *in situ* with a hand lens, with and without the aid of a light box. The slides indicate a predominance of rice straw, with larger fibres of bamboo and a few long, thin fibres of *than* also present; under a hand lens in raking light the paper surface exhibits a feint sheen consistent with the presence of an animal glue and alum size.

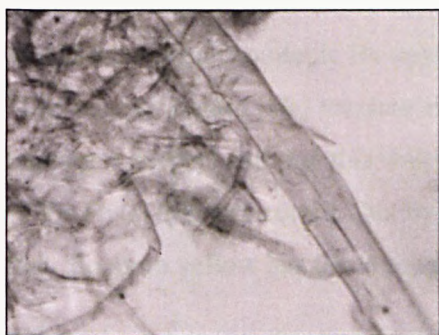


Figure 83.

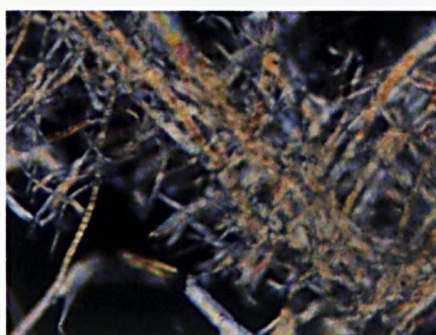


Figure 84.

Figure 83. (Left) Chinese paper fibres; predominantly rice straw (*Oryza sativa*) with a section of bamboo fibre (*Bambusa arundinacea*) also visible (X 200 Magnification). Chinese Drawings of Plants Small Volume 1, p.69. (The Royal Horticultural Society)

Figure 84. (Right) Chinese paper fibres, under crossed polars (X 200 Magnification). Chinese Drawings of Plants Small Volume 1, p.69. (The Royal Horticultural Society)

4.7 Gums and Resins, Adhesives and Binders, Fixatives and Sizes

4.7.1 Introduction

The gums, resins, binders and similar products used by painters, which fall to be briefly described in this section, are those which either appear in the literature, or those listed in including contemporary accounts and are therefore known to have been in Canton during Reeves' time. Gums and resins are included because a few of the pictures on western papers have been coated with gum arabic or similar. Alum is ubiquitous in Chinese painting, serving as a paper-size, additive to adhesives and binders, and as a fixative for paint layers. Gamboge similarly functioned as a pigment, a binder and as a gum.

4.7.2 Gums and Resins

Morrison lists gum arabic, bdellium, copal, gum animi, resin, dammar and gamboge, as well as benzoin (or Benjamin), olibanum, myrrh and dragons blood from the juice of *Calamus rotang* among imported commodities (Morrison, 1848 p.148). He gives little information about these products, apart from dragons blood, of which he says 'Its uses are various in painting, medicine, varnishing, and other arts' (Morrison, 1848 p.148). Phipps adds that *Calamus rotang* is a large rattan and that 'the Chinese hold Dragons Blood in much estimation, and are the principal consumers of it' (Phipps, 1836 p.326). According to Phipps, 'dammer or damar' was collected from a species of pine growing in the Malay peninsular; there is no mention of its use in painting, but he says, it was 'used, like pitch, for closing seams in boats and other wooden vessels' (Phipps, 1836 p.325).

Yu Feian mentions none of the above-listed products, apart from gamboge, many of which would have been unsuitable for application to watercolour paintings (Yu, 1988). Acker says 'The juice of *sagina* [*sic*] *maxima* and clarified glue are both used for going over a colour and making it deeper' and that this was a long-established practice (Acker, 1954 p.189). According to Yu Feian this was correct, but by the mid twentieth century, he was equally of the opinion that 'Sophora yellow has taken the place of the juice of *Sagina maxima*' (Yu, 1988 p.63).

Within the Reeves Collection there are a few pictures on western papers in which the upper surfaces of dark leaves appear glossy, but without any trace of yellow overtones. There are no glossy leaves on any of the small paintings on Chinese papers. This suggests that Reeves' painters did not habitually use gum and resins known to the Chinese, but may have used gum arabic, which was clearly available in Canton, on a very few of the western papers.

4.8 Adhesives and Binders

4.8.1 Agar-agar

Agar-agar is also listed as an import; a 'jelly or glue made from *Gigertina tenax* which was also made in China and used to coat paper lanterns to render them transparent' and 'also used in paper and silk manufacture' (Morrison, 1848 p.139). Watson gives the Chinese name of *hai-ts'ai* [hai cai] for this product, which he states was made from several species of marine algae and used, among other purposes, as a vegetable glue and a size for paper and silk (Watson, 1930 p.298). He describes the substance as 'thin, translucent, gelatinous...tough when damp, possessing a light brown colour, an irregular sponge-like appearance, a cartilaginous consistency, a slight odour' (Watson, 1930 p.298).

4.8.2 Bovine Glue

In his walks about the City of Canton (following the lifting of previous restrictions on the movement of foreigners after 1842), Archdeacon Gray came across two or three large shops selling glue, the preparation of which he describes:

This adhesive substance, or gelatine, is obtained from the parings of hides of cattle. These parings are placed in pans containing water and in which, over slow fires, they are, for twelve hours, suffered to boil. The liquid is then poured from these pans, into coarse earthenware pots, and which vessels, for the purpose of congealing, it is, during a period of three days, allowed to remain. When in a congealed state, it is, by means of sharp knives, cut into strips. These strips, or sticks of glue having been carefully arranged on trays of latticework, are, then, taken to an open shed, or Dutch barn, and placed, for the purpose of drying, on the shelves with which that building is furnished. The time required for drying them, varies according to the season of the year...At Pak Sha, a village not far distant from Canton, there is an extensive tannery and in which, for the Canton market, much glue is prepared (Gray, 1974 p.138-39).

Watson gives a similar method of preparation, but says that the glue was made from 'hoofs, horns, skins (usually parings), sinews etc of oxen' and that the raw material was soaked in lime water prior to boiling (Watson, 1930 p.415). Acker says ox-glue was used for mixing colours (Acker, 1954 p.189), as does Yu Feian who gives the *modus operandi*: 'It is melted in water over a low fire. Only the light, upper, clear layer is used to add to colours ...' (Yu, 1988 p.17). These accounts accord with Toogood Downing's description of the process (para. 3.2.1.2).

4.8.3 Asses Glue

The most superior glue was made with water from a well at *A-hsien* [A-xian], which gave this product its name, *A-chiao* [A-qiao] (animal glue) (Watson, 1930 p.416). The method of manufacture and characteristics are described by Watson, who says that it was used for medicinal purposes and 'long celebrated in China':

... the skin is cut into small pieces, placed in water, and boiled for 2 or 3 days, the liquid being strained off at intervals and replaced by fresh water; the whole of the liquid obtained is afterwards placed in one vessel and boiled down until it is of the required consistency, after which it is poured into trays and allowed to solidify; while still soft the mass is cut into slices or cakes of regular size...Genuine asses glue is clear, translucent, and in colour reddish brown (Watson, 1930 p.416).

Yu Feian notes three types of donkey-hide glue that, at the time of writing (prior to 1955), also contained hides of horses, and other animals, of which ‘the one that is clear, thin and transparent, and of light yellow hue is the choice for adding to pigment’(Yu, 1988 p.17).

4.8.4 Deer-horn Glue

Watson names this *lu-chiao* [lu qiao] (deer glue) and describes a method of manufacture very similar to that adopted for asses glue. He describes the product as ‘bright, clear, semi-transparent, smooth, glossy and somewhat flexible’(Watson, 1930 p.416). This was ‘much used as a medicine’ (Watson, 1930 p.417), but was also used for painting (Acker, 1954 p.189).

4.8.5 Fish Glue and Isinglass

Fish glue, named as *yü-chiao* [yu qiao] (fish glue) by Watson, was made from ‘air-bladders, noses and other gelatinous parts of various carp’ and imported from India (Watson, 1930 p.434). It was used as an adhesive, in the production of ink and ‘mixing with watercolours for painting on porcelain, sizing silk and clarifying liquors etc’(Watson, 1930 p.434-435). Acker gives the Chinese for fish glue as *p’iáo chiāo* [piao qiao] and makes clear that it was used for water-colour painting (Acker, 1954 p.189). Fish glue is among the glues (together with deer glue and ox glue) listed by Zhang Yanyuan in his *Record of the Famous Painters of Successive Dynasties* and quoted by Yu Feian (Yu, 1988 p.19). According to Winter, ‘Fish-glue solutions gel much less readily than those of mammalian glue and are usually liquid at room temperature...Glue from swim bladders of fishes was known to the Chinese...and corresponds with Western isinglass’ (Winter, 2008 p.85).

4.8.6. Other Glues

Watson lists fowl’s blood glue, tiger bone glue and tortoiseshell glue, but says that all these were used for medicinal purposes only (Watson, 1930 p.417). There are frequent references to mixing glue with pigments in *The Mustard Seed Garden Manual of Painting*, but the type of glue is not specified. Only two types of glues are mentioned in this work: soap bean glue or *tsao chüeh* [zao jue] made from *Gleditschia sinensis*, which ‘is lighter and clearer than ordinary glue’ and used to make liquid gold (Wang, Wang and Wang, 1977 p.41) and glue made from acorns which was applied to fans made of raw silk by the monk *Hui-hung* [Hui-hong] (Wang, Wang and Wang, 1977 p.400). In each case, the application seems to have been very specific.

4.8.7 Alum as a Fixative

As described previously, (para. 3.2.1.2) alum was used as a fixative. The efficacy of the substance can be appreciated from Yu Feian's advice on its frequent application during the painting process:

If a painting has several layers of color applied, a light alum solution should be spread on, separating each or every other layer, especially the bottom layer of color. This is done to prevent the pigments underneath from spreading...if a layer of cinnabar is put down first—no matter what concentration of glue it contains—and if no alum solution is applied, then when a heavy or light layer of rouge is washed over it, the cinnabar can begin to spread and to become mixed with the rouge. If alum is applied, the cinnabar will remain fixed no matter what kind of wash is applied over it (Yu, 1988 p.18).

The authors of *The Mustard Seed Garden Manual of Painting* give similar information for fixing the finished picture:

In painting ch'ing lu shan shui [qing lu shan shui] (blue and green landscapes) [pictures requiring the predominant use of azurite and malachite] in which a good deal of color is used, a solution of alum and water may be applied lightly on the finished picture to protect the colors...when the picture is mounted, the colors will not crumble and shed (Wang, Wang and Wang, 1977 p.47).

Winter attributes the effectiveness of the alum solution to its recognised hardening action on gelatine products, thereby rendering them less likely to swell and spread when wetted (Winter, 2008 pp.85 and 78).

4.9 Sizes

4.9.1. Alum

Yu Feian stresses the importance of working on sized paper, 'Because ink and colors will halo and bleed when used on raw paper, glue and alum sizing are brushed onto it so that there is no haloing or bleeding' (Yu, 1988 p.18).

To produce alum for a variety of purposes, including use as a paper-size, quarried alum stone or shale was thrown into brushwood fires until it cracked, the smaller pieces were then placed in shallow vessels with water and allowed to stand in the sun until the alum crystallized out (Watson, 1930 p.307). This writer states that alum was either potash or common alum called *chia-ming-fan* [jia ming fan], its composition being potash 9.95%,²⁴⁷ alumina 10.83%, sulphuric

²⁴⁷ 'Potash' is an imprecise word used to mean several potassium salts, potassium hydroxide (KOH) or potassium chloride (KCl), for example.

acid 33.71% and water 45.50%, or ammonia alum called *an-ming-fan* in which ammonia replaced the potash (Watson, 1930 p.307).

Of this substance, Morrison wrote in his 1848 *A Chinese Commercial Guide*:

The supply in the market is abundant, but it is often impure, either from intentional adulteration, or from the rudeness of the manipulations; the taste is not so sharp as that of European alum, but the pieces are usually crystallized [*sic*] and transparent. Great quantities are employed by the Chinese in purefying [*sic*] the water which they use for culinary purposes; they also use it in sizing bamboo paper for foreign printing (Morrison, 1848 p.170).

Its application as a size during the paper-making process is recorded by one of the contributors to *The Chinese Traveller* in 1773 as follows:

In order to harden the sheets, and make them bear ink, they undergo the following operation called fanning, from the Chinese word fan, which signifies alum. Six ounces of fish-glue being cut small and steeped in water, it is afterwards boiled and stirred all the time to prevent lumps; and, the whole being reduced to a thin liquid substance, they melt and incorporate it with three quarters of a pound of calcined alum. Then this mixture is put into a wide bason [*sic*], and, each sheet being drawn nimbly through it by means of a stick they use for that purpose, the paper is hung up to dry...(*The Chinese Traveller*, 1773 Vol.II p.90).

The true nature of the procedure is identified by Winter, 'Occasionally this preparation technique is described as if alum itself were the sizing agent, but the mechanism involved is clearly one of filling the interstices or coating fibers or threads with glue' (Winter, 2008 p.78).

In 2003, Chen, Katsumata and Inaba reported on the properties and permanence of three types of *xuan* paper, which was noted as having been said to be the most suitable paper for Chinese calligraphy and painting, as well as four other types of paper. They found that traditionally-made *xuan* paper showed high buffering capacity towards *jiaofanshui* [animal glue and alum] used as a sizing agent. Furthermore, the rate of deterioration in paper strength was lower for *xuan* paper and *daqian* writing paper, which had higher pH values, than for the remaining five papers (Chen, Katsumata and Inaba, 2003). In 2005, Yeh and Munn reported their research on the permanence of *xuan* paper and concluded that 'the addition of alum in the *dōsa*- like glue [animal glue] preparation did not contribute appreciably to the deterioration of these papers, perhaps because the low percentage that was used' (Yeh and Munn, 2005 p.71).

4.9.2 Gelatine

Gelatine size was commonly used on western papers (Hills, 1988 p.173; Hunter, 1947 p.475). A few loose paper fibres were lifted from the upper surface of the bound edge of page 92 of Chinese Drawings of Plants Small Volume II and placed on a microscope slide, to which 1 drop of ninhydrin was added. The slide was then placed on a hot plate to allow the ninhydrin to evaporate. A purple-violet colour appeared which indicated the presence of gelatine size. The rattle of many of the large western sheets suggests that they were very heavily sized.

4.10 Conclusions

The aim of this chapter is to consider the principal materials used, or likely to have been used, in the Reeves Collection. Standard works on artists' pigments have been considered in the light of Ippolito's research, practitioners' manuals and contemporary accounts. This has been supported by pigment and fibre identification using PLM, FTIR and chemical tests. The limitations associated with PLM, particularly for the identification of organic pigments, include thin application and resulting low surface density which makes sampling difficult (Winter, 2008 p.19). This has become apparent during this part of the research. It is also clear from the painters' manuals, *The Mustard Seed Garden Manual of Painting* (Wang, Wang and Wang, 1977) and Yu Feian's *Chinese Painting Colors* (Yu, 1988), that colours were mixed, making identification more problematic using PLM alone.

Nevertheless, this approach to an investigation of Chinese use of Prussian blue has proved fruitful. The regular import of this pigment, evidenced by the East India Company records, led to further research of contemporary accounts and to testing for the pigment on loose samples from Chinese Drawings of Plants Small Volume II. According to Winter, 'There do not seem to be any published occurrences [of Prussian blue] on Chinese or Korean works so far' (Winter, 2008 p.32). This research is believed to have revealed the first accurately dated example of the pigment on a picture collection from China. The finding confirms Wise and Wise's conclusion that 'It is obvious that the straightforward list of a handful of pigments usually quoted as being used by Chinese painters is, at least by the nineteenth century, not the whole story' (Wise and Wise, 1997 p.135). Needham's Table 95, referred to in the text, testifies to this (Needham, 1974 p.164 *et seq.*). This raises the possibility that more sophisticated identification methods, such as Raman spectroscopy, may reveal further unexpected materials.

The testing of the Chinese method for reversing blackened lead white has not previously been reported in conservation literature. Although of interest, the preliminary results indicate that it has no practical advantage for the conservator.

The presence, or possible presence, of a number of pigments which may change colour on exposure to light and atmospheric conditions, and the presence of Prussian blue which is recognised to be sensitive to alkali (Berrie, 1997 p.200) will all have implications for future treatment and storage of this Collection. Similarly, the problem of darkened lead white and flaking malachite, the most visually intrusive changes in the Collection, will also be considered as part of the conservation strategy in the next chapter.

It has not been possible to test the substance used to create the gloss on some of the painted darker leaves, but gum arabic was in Canton at the time, and may have been used. The yellow gum resin gamboge was used as a binder for malachite, as well as a colourant, on certain drawings. This imparts a fresh yellow-green hue. Pigment loss from the upper green layers of paint on some of these drawings suggest that, in places, this binder has broken down.

Visual examination, paper fibre slides, and the ninhydrin colour test all tend to confirm the presence of fibres and sizes which are to be expected on these papers. If a sufficient sample of fibres from the Chinese papers could be obtained an Aluminon test would enable the presence of alum to be confirmed.

In the next chapter, the condition and conservation of the Collection will be discussed, with further reference to the problem of darkened lead white and flaking malachite.

CHAPTER 5

CONSERVATION: CONDITION, PROBLEM PIGMENTS, CONSOLIDATION AND PROPOSALS

5.1 Introduction

While previous chapters describe and discuss the drawings as they were originally produced, the emphasis in this chapter is on their current condition, treatment proposals and future preservation. The principal conservation issues affecting the Chinese Drawings of Plants Small Volumes will be considered, with particular emphasis on darkened lead white and flaking malachite. Treatment options are discussed. The chapter concludes with conservation proposals for the Collection.

5.2 The Conservation Literature

Apart from commonly met problems of surface and ingrained dirt, staining, tears, poorly executed repairs and planar distortion, two significant conservation issues emerged from an inspection of all the drawings contained in the Chinese Drawings of Plants Small Volumes: the darkening of lead white and the loss of green pigment from leaf and stem areas on many of the drawings. In varying degrees, both are visually intrusive, but the loss of copper greens from the surface of some of the drawings requires the more immediate attention if the pictures are to be preserved intact.

The darkening of lead white and its 'reversion' (inverted commas indicate that there is no true conversion) was considered by Daniels and Thickett (1992). Referring to work previously undertaken by Plenderleith and Werner (1971), Costicova (1978), Hoevel (1985) and others, they concluded *inter alia* that the darkened substance was lead sulphide, which could be 'reversed' with hydrogen peroxide, but that repeated applications of ethereal hydrogen peroxide raised the water and peroxide content of the paper substrate. Smith and Clark (2002) confirmed Daniels and Thickett's view that the darkening was due to the action of atmospheric hydrogen sulphide on the basic lead carbonate, while Petushkova and Lyalikova (1985) found that the degradation of some pigments on murals, including lead white, could be attributed to microbiological causes. The alteration in the appearance of this pigment on wall paintings was also the concern of Matteini and Moles (1981) and Giovannoni, Matteini and Moles (1988).

Researchers have applied themselves also to discovering the optimum methods for introducing the hydrogen peroxide to works of art on paper. Plenderleith and Werner (1971) favoured the use of vapour, but Costicova (1978) drew attention to the destructive effects on paper when vapour or brushed hydrogen peroxide was applied, and advocated a refinement of Plenderleith's

method by applying ammonia and hydrogen peroxide vapours alternately. More recently, Blyth-Hill (1997) developed a method of application for hydrogen peroxide through Gore-Tex® and McFarland (1997) has advocated the use of peroxide gels which are prevented from penetrating the paper by cellulose ether. Lussier (2006) tested methods of application of hydrogen peroxide, and in conjunction with Smith (Lussier and Smith, 2007) has written a fairly comprehensive article in which the process and products of degradation are discussed, and treatment practices, efficacy and ethics for 'reverting' the pigment are examined. The decision to treat, or more correctly, the decision not to 'revert' darkened lead white, is discussed by Bescoby *et al* (2007).

The second significant conservation issue is the loss of green pigment and the consolidation of the remaining paint layers. The identification of copper green pigments, carbonates, chlorides and acetates, has been the subject of research by Winter (Winter, 1985), Yamasaki and Emoto (1979), Wise and Wise (1997), Fitzhugh (2003) as well as Winter, Giaccai and Leona (2003) and more recently Giaccai and Winter (2005). The point here is that although malachite has been identified on the Reeves pictures by PLM, other copper compounds may be present. Differing compounds may account for the variation in the brown discolouration on the verso of many pictures. The technique of painting with malachite is described by Nishio (1987) which serves to explain some of the reasons for mechanical breakdown of the paint layers researched by Wise and Wise (1997) and Winter (1985).

The chemical means of the deterioration of cellulose attributable to copper-based pigments are not fully understood. Work has been undertaken by Williams *et al.* (1977), Banik and Ponahalo (1981 and 1982-83), Banik (1989) and Daniels (2002) to describe and explain the possible chemical mechanisms. The causes of discolouration of the verso of papers painted with copper greens have been looked at by Hoshi and Kitada (2002) and Winter (2008). Copper greens have also been implicated in the breakdown of protein-based binders, causing depolymerisation in a similar way to that caused in cellulose. Deasy (1967 and 1970) undertook research for the leather industry, which has been drawn on by subsequent researchers such as Banik (1989) and Mairinger *et al.* (1980). Emoto (1980) looked at the copper-induced deterioration of proteinaceous sizes.

Part of this chapter is devoted to a discussion of the selection and application of consolidants for the flaking copper green pigments. The criteria for assessing the suitability of consolidants are considered briefly, with reference being made to those laid down by Keyes (1986), Rosenqvist (1963) and Welsh (1980). The selected groups of consolidants are considered within three categories, namely: animal derived products, plant based products, and the cellulose ethers. It is not within the remit of this research to undertake a comprehensive survey of all consolidants and methods of application, but rather to identify one or two of the most promising substances

and methods of application for future testing on painted out samples. The testing of these does not form part of this research project, but reference will be made to these in the conclusions as an area of work to be pursued in the future. It should be noted that the literature on consolidation is legion and somewhat contradictory.

Schellmann (2007) has reviewed the key properties of the animal glues, while some of the cellulose ethers are compared in a paper by Strnadová and Ďurovič (1994). The penetration of consolidants has been trialled by Ream (1995). The success of particular consolidants on Chinese papers is reported by Rickman (1988) and Lee, Xiangmei and Hon (2003), on matt green pigments by Burgio *et al* (2007) and on Indian mica and textile paintings by Wheeler *et al.* (2002). Reliance has also been placed on *The Paper Conservation Catalog* (Rogers, 1988) which gives a good general overview of the consolidants most used by paper conservators, including caveats.

Research into the efficacy of funori and WS-EHEC, undertaken at Camberwell College of Arts by Dr. Sandra Grantham as part of her MA and PhD research (Grantham, 1994 and 1999), has been heavily drawn upon for this part of the research. This is partly due to the success of these consolidants on Japanese pictures (which would have a similar range of pigments to Chinese pictures), partly also because this research is relatively recent, but also because Grantham made two interesting innovations: the use of the medical nebulizer for the application of consolidant in a fine mist, and the use of the 'Post-It'® note for testing the adhesion of consolidants.

The final part of this chapter is devoted to conservation proposals drawn up as a result of this research.

5.3 Condition

There is no written record of any previous conservation treatment having been carried out. However, minor repairs using non-conservation grade materials were carried out at unspecified times. The condition of the drawings in the Chinese Drawings of Plants Small Volumes is consistent with this. This part of the research commenced with an examination of all the drawings in the Chinese Drawings of Plants Small Volumes.

5.3.1 Examination

Each page of the five Chinese Drawings of Plants Small Volumes was scrutinized on several occasions. A brief examination has been carried out on 16 % of the pages at the Royal Horticultural Society's Lindley Library using a hand lens, light box, raking light and hand-held ultra-violet light source. The results were recorded and photographed. A sample of a completed

record sheet is included in Appendix V from which it will be noted that it is not a detailed condition record. Its purpose was to record points of interest.

This was not a condition survey and the pages were not selected randomly, but rather for the information they might yield. The total numbers of pages selected for documentation from each of the Chinese Drawings of Plants Small Volumes were as follows:

TABLE 2. TO SHOW NUMBERS OF DOCUMENTED SHEETS IN CHINESE DRAWINGS OF PLANTS SMALL VOLUMES

VOLUME NUMBER	TOTAL NO. OF PAGES IN VOLUME	NO. OF PAGES EXAMINED	PERCENTAGE OF TOTAL
I	98	15	15% plus
II	130	22	15% plus
III	124	19	15% plus
IV	148	25	16% plus
V	130	21	15% plus
TOTAL	620	102	16.4 %

5.3.2 Summary of Condition

5.3.2.1 Bindings

The Chinese Drawings of Plants Small Volumes, measuring 490mm x 380mm, have been half-bound in green morocco as a matching set. They have rounded, hollow back bindings and headbands are in evidence. The pages, guarded and unguarded, have been sewn together in sections of eight onto tapes. The edges of the text block are uncut. The front and back boards have been covered with a marbled paper in a combed design similar to that described as ‘nonpareil’(Wolfe, 1990 Plate XXXV). Identical papers have been used as end papers. The title piece is gold-tooled. These bindings are similar to others in the Lindley Library, which suggests that the Horticultural Society had a house style. All the volumes have suffered abrasion both to the leather and to the boards, and there are small losses to the paper surface on the external surfaces of the boards. The spine and gold tooling to Chinese Drawings of Plants Small Volume I is intact and in fair condition. The spine to Chinese Drawings of Plants Small Volume II was already partially detached, and was manually removed on 23rd October 2008 to allow two sheets to be removed for conservation testing as part of this research project. The stitching on Chinese

Drawing of Plants Small Volume III has broken down along the lower 16cm length of the spine: this is most visible from page 58 onwards to the end of the volume (Figure 85).



Figure 85. Damaged spine. Chinese Drawings of Plants Small Volume III. (The Royal Horticultural Society)

Chinese Drawings of Plants Small Volumes IV and V have intact spines and there is no visible loss of gold-tooling. In all cases, the marbled end-papers are intact and appear to be in fair condition. The pages have been tightly bound with significant amounts of brittle brown animal glue²⁴⁸ found during the dismantling of Chinese Drawings of Plants Small Volume II. The Royal Horticultural Society has sought to provide a degree of protection to the pictures by loosely interleaving the pages with acid-free tissue paper (Figure 86): it is suggested that this may have contributed to the damage in two ways:

1. The bulk of tissue paper imposed on the already tightly-bound volumes has placed additional stress on the spines. This is exacerbated by the fact that the volumes are stored horizontally, in pairs, one above another, thereby placing additional weight on to the spines of the lower albums.
2. Tissue paper is brittle and liable to crease. During handling, these papers inevitably move across the surface of the drawings. Abrasion caused by the movement, particularly of creased papers, may have contributed to the loss of surface pigment.



Figure 86. Interleaved acid-free tissue. Chinese Drawings of Plants Small Volume 1. (The Royal Horticultural Society)

²⁴⁸ Large particles of the brown adhesive were tested using the Hydroxyproline Test.

5.3.2.2 Drawings on Western Papers: Full Page

The pages vary in size but are approximately 380mm in width and 482 mm in height; measurements taken with a Messmer micrometer indicate that the thickness of these papers is variable but in the region of 0.18-0.22 mm.

5.3.2.2.1 Surface and Ingrained Dirt

Surface and ingrained dirt is readily visible on every page. Large, loose particles of dirt are particularly visible on the pages of Chinese Drawings of Plants Small Volume II which appear to have suffered the most water damage.

5.3.2.2.2 Planar Distortion

Under raking light, planar distortion is apparent. The degree of distortion appears to be directly related to the degree of water damage, but may also be attributable to the attachment of some sheets to guards, and to tight binding. Similarly, all the pages show evidence of cockling; the extent to which the pages have been affected varies according to volume and to the position within the volume.

5.3.2.2.3 Fungal Infestation

At least three types of fungal staining would appear to be present. Evidence of microbiological attack is not uniform; many pages have been affected to a small extent, most notably along the spine edge; some sheets have been heavily infected and show the presence of more than one type of fungal infestation (Figure 87). Apart from environmental factors e.g. high humidity, fungal growth is dependent upon an adequate supply of nutrients. These are obtainable from the amorphous areas of cellulose in the paper (Szczepanowska, 1986) and collagen present as adhesive and size (Winter, 2008 p.155). The discoloration is caused firstly by colourless pigments produced in the fruiting bodies or the mycelium that penetrate the paper substrate and react with it to produce a coloured stain, and secondly, pigments which are secreted into the paper substrate (Szczepanowska, 1986). Certain colours secreted into the paper substrate are commonly associated with particular fungi.



Figure 87. Primary support for drawing of *Rhododendron simsii*. Chinese Drawings of Plants Small Volume IV, p.3. (The Royal Horticultural Society)

Brown/black spots (the most prevalent of the stains) may be due to the presence of *Alternaria solani*; yellow staining may be attributable to *Chaetomium globosum* and pink/purple stains are commonly associated with *Fusarium oxysporum* (Szczepanowska and Lovett, 1992). Pink and purple staining is found, for example, on pages 12 and 54 of Chinese Drawings of Plants Small Volume IV. However, most fungi produce multiple colours; the spores of *Aspergillus niger*, for example, change from black to yellow-brown and finally to yellow, partly as a result of metabolic processes within the organism itself and partly due to the presence of trace elements within the paper (Szczepanowska, 1986). Black and brown fungal stains are also prevalent on, and along the edges of, the guards (Figure 88).



Figure 88. Guard attached to drawing of *Rosa banksiae* var. *normalis* 'Lutea'. Chinese Drawings of Plants Small Volume II, p.33. (The Royal Horticultural Society)

Present on only a limited number of sheets, and where Reeves' original number is extant, the guards appear to be adhered only to sheets with lower numbers, these may have been the original guards attached to the early pictures when they were first received by the Horticultural Society (para. 2.9). This mould damage is consistent with the presence of an animal glue

adhesive.²⁴⁹ The guard adhered to page 33 of Chinese Drawings of Plants Small Volume II (Figure 88) amply demonstrates this phenomenon. It has not been possible to remove samples of mould-stained paper fibres for microscopic examination and identification. Under a portable UV light source no fluorescence has been detected. Further research on microscopic samples of infected paper fibres would be required to make positive identifications of the fungal bodies present on the Collection. However, such identification is not a pre-requisite for drawing up conservation proposals.

5.3.2.2.4 Staining

Staining is evident on most pages to some degree. Green staining, particularly along the bound edges, appears to be consistent with the movement of a water-soluble green dye used on the leather bindings.



Figure 89. Drawing of *Lilium concolor*. Chinese Drawings of Plants Small Volume V, p.2. (The Royal Horticultural Society)

Brown staining takes two forms: a generalized, blotchy, pale brown staining which causes no visual impairment to the image, and tide-marks consistent with water damage (Figure 89). The incidence and severity of these are variable, depending upon the volume and the position of the page within the volume. Some of these stains detract slightly from the overall visual appeal of the picture, but in most cases while the staining is clearly apparent on the paper surface, it does not directly interfere with the image. There are no instances where the image of the plant has been rendered less accessible due to staining. On the verso, brown staining appears to correlate with areas of green pigment. The phenomenon of staining caused by copper greens is dealt with below (para. 5.5).

²⁴⁹ A small sample of adhesive was removed from a loose guard. A Hydroxyproline Test indicated the presence of animal glue.

5.3.2.2.5 Tears and Creasing

There are a few instances of large tears and several instances of small edge tears have also been noted. Old repairs have been poorly executed, usually with pressure sensitive adhesive tape, 'Sellotape' or similar. Chinese Drawings of Plants Small Volume IV, p.79 provides a good example of this, where a large tear and two smaller edge tears have been crudely taped together.



Figure 90.

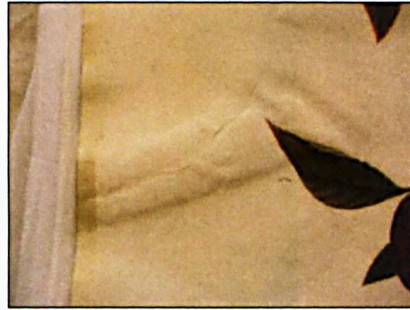


Figure 91.

Figure 90. (Left) Repair on verso of drawing of *Prunus salicina*. Chinese Drawings of Plants Small Volume II, p.20. (The Royal Horticultural Society)

Figure 91. (Right) Repair showing on recto of drawing of *Prunus salicina*. Chinese Drawings of Plants Small Volume II, p.20. (The Royal Horticultural Society)

At page 20 of Chinese Drawings of Plants Small Volume II pressure sensitive tape has been applied to the verso and has been wrapped round the edge of the page to adhere to the recto. In this instance, the tape has caused localized planar distortion so that the shape of the tape on the verso appears as a raised area on the recto (Figure 90) and (Figure 91). Adhesive tape repairs have become embrittled, some are partially detached, and all have caused staining to the paper substrate. However, it would be fair to acknowledge that these repairs appear to have prevented the tears from enlarging. Repairs have also been carried out with paper strips. At page 85 of Chinese Drawings of Plants Small Volume II, for example, a paper strip approximately 30mm wide has been adhered to the verso. In some cases, the paper strip repair carried out along the right hand edge of the page on page 85 of Chinese Drawings of Plants Small Volume II, for example, has attracted mould staining, probably due to the animal glue adhesive.

Creasing is not a significant conservation problem with these papers. However, there are examples of this type of damage, in Chinese Drawings of Plants Small Volume II at pages 1 and 33, for example.

5.3.2.2.6 Pigment changes

Pigment migration has been noted, most markedly in the greens and deep reds. Chinese Drawings of Plants Small Volume II at page 20 for example, amply demonstrates the migration of a dark red pigment, possibly carmine or lac used for ripe fruit. Pigment off-set is also readily apparent; the colours most affected appear to be greens, yellows and browns.



Figure 92. Drawing of *Archidendron lucida*. Chinese Drawings of Plants Small Volume I, p. 81. (The Royal Horticultural Society)

In each case, the off-set has been captured on the blank facing page i.e. the verso of the picture immediately in front (Figure 92). Therefore, although the off-set has caused pigment loss, there are no instances where the pigment from one picture visually interferes with the image of its immediate neighbour.

The most visually intrusive damage results from pigment changes, which include areas of substantial loss of surface layers of copper green pigment (Figure 93) and (Figure 94).



Figure 93.



Figure 94.

Figure 93. (Left) Extract from drawing of *Canarium pimela*. Chinese Drawings of Plants Small Volume II, p.94. (The Royal Horticultural Society)

Figure 94. (Right) Enlarged extract from drawing of *Canarium pimela*. Chinese Drawings of Plants Small Volume II, p.94. (The Royal Horticultural Society)

Lead white and red lead pigments have darkened, particularly near the edges of the pages i.e. where the pigments are most likely to have come into contact with sulphur in the atmosphere. These areas of damage are discussed in further detail below.

5.3.2.3 Drawings on Western Papers: Adhered

In a few instances, western papers were trimmed and adhered to 1837 Whatman papers as secondary supports. This strongly suggests that they were trimmed and adhered at the same time as the Chinese papers (see below).

5.3.2.3.1 Surface and Ingrained Dirt, Mould and Staining

Both types of dirt are present. Mould and water stains are also visible (Figure 95), but are less prevalent than on the full-page drawings. It would appear that the secondary supports have provided a degree of protection.



Figure 95. Drawing of *Dendrobium nobile*. Chinese Drawings of Plants Small Volume V, p.30. (The Royal Horticultural Society)

5.3.2.3.2 Tears, Creasing and Loss of Support

Small tears and creases are evident, but again the secondary supports have protected these drawings. Several pictures have become detached from their secondary supports and are now vulnerable to further damage.

5.3.2.3.3 Pigment Loss

Flaking and migrating pigments are apparent, but to a lesser extent than on the larger pictures.

TABLE 3. SUMMARY OF CONDITION OF DRAWINGS ON WESTERN PAPERS

DAMAGE	FULL-PAGE	ADHERED
Surface and ingrained dirt.	Large, loose particles of dirt present on worst-affected pages.	Present
Planar distortion and cockling.	Extent varies according to volume and position within volume.	Present, but far less apparent than on full-pages.
Fungal Infestation.	At least 3 types: <i>Alternaria solani</i> ? <i>Chaetomium globosum</i> ? <i>Fusarium oxysporum</i> ? No fluorescence under UV light.	Present, but less affected than full-pages. No fluorescence under UV light.
Staining.	Brown stain lines consistent with water damage. Green staining: pigment migration from binding? Brown patchy stains. Extent varies according to volume and position within volume.	Patchy brown staining. No green stains.
Tears, creasing and old repairs.	Small edge tears. Evidence of poorly executed past repairs. Some creasing.	Some torn and missing corners. Maybe evidence of re-binding in 1837.
Pigment changes.	Loss and flaking esp. copper greens and blue-greens. Off-set to verso of adjoining pages, especially greens and yellows. Darkened lead white and red lead, especially where image adjoins edge of page.	Less noticeable than on full-page drawings.
Loss of Support.	Some pages detached from guards and some guards loose. Spine to Small Vol.II broken down.	Some detached from supports and therefore vulnerable to further damage.

5.3.2.4 Drawings on Chinese Papers

Paper sizes vary considerably. By way of example, page 1 of Small Volume I holds three Chinese papers measuring 190mm x 130mm, 245mm x 165mm, and 187mm x 130mm. Some of these papers have one neatly torn edge, which suggest that they may have been removed from albums, although there is no other evidence for this such as slight discolouration of non-torn edges. Measurements taken using a Messmer micrometer indicate that these papers are approximately .08 mm in thickness.

5.3.2.4.1 Ingrained and Surface Dirt

The condition of the western papers would suggest that both types of dirt are likely to be present. However, this is not visible to the naked eye or under a hand lens on these papers. It has not been possible to remove any of these pictures for examination of the paper surface under a stereo microscope.

5.3.2.4.2 Mould and Water Staining

There are very few instances of this type of damage. It is suggested that the secondary supports have protected these papers and a degree of protection may also have been afforded by an alum size (Pasnak, Tse and Murray, 2005, p.82).

5.3.2.4.3 Tears, Missing Areas and Creasing

A few small tears are visible and there is a prevalence of missing and damaged corners.



Figure 96.

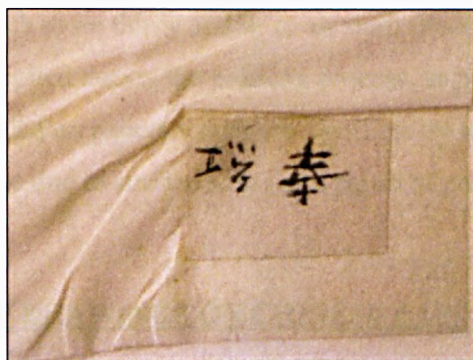


Figure 97.

Figure 96.(Left) Extract of drawing of *Gardenia angusta*. Chinese Drawings of Plants Small Volume III, p.66. (The Royal Horticultural Society)

Figure 97. (Right) Extract of drawing of unidentified plant (*Chaenomeles*?). Chinese Drawings of Plants Small Volume II, p.1. (The Royal Horticultural Society)

Creasing, often severe, is also very apparent at the corners (Figure 96). In Figure 97, a label cut from a heavier western paper has been adhered at the corner of a Chinese paper, which has resulted in creasing. It is suggested that this damage is consistent with the presence of adhesive, possibly animal glue,²⁵⁰ used to attach these small paintings to secondary supports comprising 1837 Whatman papers. It appears that the adhesive used was far too heavy for the delicate papers. As the papers have moved due to handling, changes in environmental conditions and the

²⁵⁰ It was not possible to remove a sample of glue for testing, but the residue on the verso of the loose Chinese papers appeared brown and embrittled in the same way as the animal glues on the guards and spine.

application of the adhesive, the soft, short paper fibres typically associated with Chinese papers have weakened, creased and fractured (Figure 33).

5.3.2.4.4 Loss of Support and Adhesive Damage

A few of these papers have become completely detached, while some drawings are held to their secondary supports by one corner. This damage is consistent with the application of a heavy adhesive on a lightweight paper which has caused the corners to cockle, crease and break. Embrittlement of the adhesive is also apparent in places and brown adhesive staining at the corners is apparent on the recto of certain pictures. Many of these drawings are now very vulnerable to further damage.

5.3.2.4.5 Pigment Loss

There is no pigment loss visible to the unaided eye, or through a hand lens. This may due to the loss being small, which might be apparent under higher magnification. It may also be attributable to the paint layers being applied much more thinly and/or to an alum (Pasnak, Tse and Murray, 2005 p.82) or alum/glue fixative applied during the painting process, as previously described (para. 3.2.1.2). These pictures are painted on papers which are significantly smaller and lighter than those on western papers: damage due to surface stress as a result of pages being turned would therefore be less likely to occur.

TABLE 4. SUMMARY OF CONDITION OF DRAWINGS ON CHINESE PAPERS

DAMAGE	ADHERED CHINESE PAPERS
Surface and ingrained dirt.	Undoubtedly present, but none visible under hand lens.
Planar distortion and cockling.	Cockling prevalent at the corners (see creasing).
Fungal infestation.	Very extremely sparse. Possibly protected by alum in the size.
Staining.	Brown stains striking through at the corners from verso to recto, consistent with adhesive damage.
Tears, creasing and old repairs.	Creasing prevalent, especially at the corners where adhered to secondary support. A few small tears. Several sheets have one torn edge, suggesting that they may have been removed from an album. None of these papers show signs of previous repair.
Pigment changes.	Questionable. There is little visible loss when viewed with a hand lens. Paint has been laid down much more thinly than on western papers giving a transparent, delicate appearance, which may be less liable to migration.
Loss of support.	Some papers have become detached from secondary supports and are therefore vulnerable to further damage.

5.4 Lead White Reversal

The use of lead white in the Collection appears to be ubiquitous. In some instances, darkened lead white has caused significant visual changes to the image and therefore it is suggested that reversion should be considered.

5.4.1. Terminology

A variety of terms have been employed in the conservation literature to describe the unintentional darkening of lead white and the resumption of its white appearance after treatment. In this work, the terms adopted by Lussier and Smith (2007) will be used: the word 'reversion' (without inverted commas) describes the colour change back from dark to white, while 'conversion' (without inverted commas) is used to describe the chemical process. It should be noted, however, that while 'darkening' is often an accurate description of the effect of deterioration of this pigment, lead white can also change to light and dark grey, speckled grey, brown, or light pink (Smith and Clark, 2002 p.102; Lussier and Smith, 2007 p.41). Orange, black and silvery-black discolouration has also been recorded (Hoevel, 1984 p.35).

5.4.2 The Problem Identified

According to Smith and Clark, the blackening of lead white ($2\text{PbCO}_3 \cdot \text{Pb}(\text{OH})_2$) is 'One of the most notorious, pervasive, and visually offensive pigment transformations on unvarnished artwork' (Smith and Clark, 2002 p.101). The problem was evidently taxing artists in the west well before the Industrial Revolution: the earliest written reference to treatment for the reversion of darkened lead white in Britain appears to have been made by Norgate in 1624 who advised the use of distilled rosemary water (Lussier and Smith, 2007 p.42), while in the same century the Chinese used masticated apricot seeds for the same purpose (para. 4.4.18). In the west, it was recognised at least as early as the 1860s, that the compound within lead white paint which is most likely to darken is the hydrated oxide (OH) (Carlyle and Townsend, 1990 p.40).

In the Reeves Collection, lead white has been used on the western papers in two ways: as a base coat for darker pigments and as a surface paint layer to depict white petals, buds etc. In the first instance, darkening is visible under a stereo-microscope along the edges of the paint layers, where the top layers have fallen marginally short of the white base coat (Figure 29). These discoloured areas are minute and could not be said to detract from the image. The same cannot be said for the darkened surface layer of some of the flowering plants, the white camellias, for example. Here, in very many instances there has been significant interference with the image caused by the depth and degree of the darkening, which is markedly visually intrusive.

Deterioration of the pigment is not uniform. In some instances, at page 98 of Small Volume III, for instance, the lead white appears brownish; in Small Volume IV at page 8 there is a mottled effect and there are at least two instances of the pigment taking on a pinkish hue, at page 49 of Small Volume III and on page 108 of Small Volume II. The discolouration also varies according to its position on the page, the white-painted areas nearest to the edges of the pages being more affected than those nearer the centres (para 4.4.8) (Figure 53) and (Figure 98).



Figure 98. Drawing of *Lochnera rosea*. Chinese Drawings of Plants Small Volume III, p.98. (The Royal Horticultural Society)

Signs of deterioration of lead white on the Chinese papers are rare. It is clear from the history of the Collection that these pictures are about the same age as those on English papers and that they share a common provenance. One conclusion might be that a solution of alum, or an alum-glue mix, applied during the painting process, may have acted as a protective barrier for the lead white. However, Hoevel's research seems to suggest the opposite (see below).

5.4.3 Causes of Lead White Discolouration

The darkening of lead white, basic lead carbonate and lead hydroxide, on exposure to atmospheric hydrogen sulphide, may be expressed by the following equation:



(The Conservation Unit Museums and Galleries Commission, 1992 p.53),

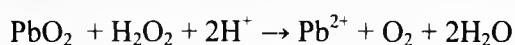
or alternatively:



(Hoevel, 1985 p.35)

It will be seen from the above that the lead carbonate and lead hydroxide are converted to lead sulphide (PbS or galena), a black lead precipitate, with water and carbon dioxide being given off.

Daniels and Thickett also noted the presence of brown lead dioxide (plattnerite) (PbO_2) as a product associated with darkening lead white paint, which they identified by x-ray diffraction (Daniels and Thickett, 1992 p.109). According to Lussier and Smith (Lussier and Smith, 2007), the formation of lead dioxide is less common than the formation of lead sulphide, but it is important for a conservator to know which substance is present in advance of treatment with wet chemical methods: while lead sulphide treated with hydrogen peroxide should achieve complete reversion, the reversion of lead dioxide may be wholly or partially ineffective. If lead dioxide is present, reversion can, in theory at least, be achieved using acid hydrogen peroxide:



(Daniels and Thickett, 1992 p.109)

In 1981, Matteini and Moles reported the successful use of compresses of an unknown percentage of hydrogen peroxide and 1% acetic acid on areas of lead dioxide on the Cimabue frescoes in the cathedral at Assisi (Matteini and Moles, 1981). Daniels and Thickett note, however, that the acid would attack the lead white, so that 'the method should be used with caution, if at all' (Daniels and Thickett, 1992 p.109).

The formation of lead dioxide on wall paintings is attributed by Petushkova and Lyalikova (Petushkova and Lyalikova, 1985) and Giovannoni, Matteini and Moles (Giovannoni, Matteini and Moles, 1990) to the action of micro-organisms in an alkaline environment (in this instance, the plaster). Petushkova and Lyalikova further state that this degradation of lead white is aided by the presence of animal glue binders (Petushkova and Lyalikova, 1985 p.68).

In 1985 Hoevel drew attention to the fact that many conservators had noticed orange or pink discolouration associated with darkened lead white, which could be successfully treated with hydrogen peroxide in the same way as lead sulphide. After testing, she was able to conclude that the (unidentified) pink or orange substances were intermediate stages in the formation of lead sulphide, and were produced as a result of the action of hydrogen sulphide on the pigment in the presence of acid. Carboxylic, suberic and oleic acids were all shown to produce this discolouration, as was aluminium sulphate. Alum solution brushed directly onto the white painted surface produced the same result. Hoevel concluded that 'Acid may be only one factor in a complex mechanism that produces these colours' (Hoeval, 1985 p.41). This finding is of interest with regard to the small drawings on Chinese papers in the Collection, which may have been sized with alum, but on which the lead white has remained unaffected.

In 2001 Smith and Clark published a paper entitled *The Role of H₂S in Pigment Blackening* in which they reported upon a research project which set out to discover whether atmospheric hydrogen sulphide alone could be responsible for the darkening of lead and copper compounds (Smith and Clark, 2001). Prior to testing, all the samples were checked for homogeneity and their identity confirmed by Raman spectroscopy. Each sample was placed in a glass vial and was exposed to a stream of H₂S. An extract of the results for the lead-based pigments is as follows:

TABLE 5. TO SHOW RESULTS OF APPLICATION OF H₂S TO LEAD COMPOUNDS

PIGMENT or COMPOUND	FORMULA	APPEARANCE AFTER 5 DAYS UNDER H ₂ S ATMOSPHERE
Lead white	2PbCO ₃ ·Pb(OH) ₂	Black
Lead (II)carbonate	PbCO ₃	Dark Grey
Lead (II) sulphate	PbSO ₄	Light Cream
Lead (II) sulphate tribasicmonohydrate	PbSO ₄ ·3PbOH ₂ O	Black

(Smith and Clark, 2001 p.102)

Using Raman spectroscopy, these researchers showed that the pigments which had rapidly blackened had formed PbS. They also suggested that some of the lead carbonate in white lead resisted the attack by H₂S; if this is correct, this might account for the mottled appearance of some of the darkened lead white on the Reeves drawings (Figure 98).²⁵¹ They also suggest that the reactivity of lead white may be influenced by the amount of Pb(OH)₂ in the crystal, which may again account for some areas of lead white darkening more readily than others (Smith and Clark, 2002 p.103).

The difficulties associated with identifying black degradation products are discussed at some length by Lussier and Smith. These may be summed up as differences in the composition of the original paint (Lussier and Smith, 2007 p.48) and the limitations of analytical methods, although the authors conclude that these substances should be capable of identification by Raman spectroscopy. As these writers point out, the possibility of microbiological processes being involved in the blackening of lead white is ‘intriguing’, especially since copper pigments are known to be equally susceptible to change in the presence of atmospheric hydrogen sulphide, and yet often appear unaffected (Lussier and Smith, 2007 p.48; Smith and Clark, 2002 p.102;

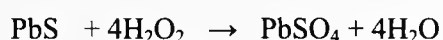
²⁵¹ An alternative explanation might be that these areas of white paint consist of a mixture of lead white and shell white: the latter does not darken in the presence of H₂S.

Banik and Ponahlo, 1982-83 p.5). The fact that copper-based pigments, such as malachite, verditer and azurite, which are known to have inbuilt resistance to microbial and fungal attack (Smith and Clark, 2002 p.104), remain unchanged while lead white is degraded, would suggest that biological factors cannot be discounted. The larger Reeves drawings on western papers are, perhaps, a case in point. While there are many instances of lead white changing to grey, brownish-grey, mottled grey, dark grey/black, and tinged pink, there appear to be no instances of the green stems and leaves changing to blue-black covellite (CuS), as might be expected if atmospheric hydrogen sulphide were the sole cause of the blackening of the lead white.

Lussier and Smith report the work done by Vitale from which it now seems settled that the formation of black lead sulphide takes place on the surface of the paint film, and does not penetrate the lower layers (Lussier and Smith, 2007 p.46). This was also the conclusion of Norville-Day *et al.* (1992 p.107).

5.4.4 Treatment with Hydrogen Peroxide

Apart from photo-oxidation, tested by Daniels and Thickett (1992), the treatment of darkened lead white involves the oxidation of lead sulphide by an oxidizing agent to form white lead sulphate. Since the nineteenth century, hydrogen peroxide has been the preferred agent: the conversion is expressed by the following equation:



(The Conservation Unit Museums and Galleries Commission, 1992 p.53)

Several methods have been advocated for the application of hydrogen peroxide to prints, drawings and paintings: these may be classified as direct (the oxidising agent is put into immediate contact with the object) and indirect (in which the reversion is achieved by vapour given off by the peroxide).

Plenderleith and Werner (1971) outlined one example of each. Direct application is carried out using ethereal hydrogen peroxide in which equal parts of hydrogen peroxide and ether were shaken together; since these liquids are immiscible, the lighter ether rises to the top of the vessel holding sufficient peroxide to enable a cotton wool swab to take up the peroxide for direct application to the surface of the object by dabbing. According to the authors, the bleaching time may be increased by placing a sheet of blotting paper over the treated area, presumably by slowing down the rate of evaporation. For miniatures on paper or parchment, Plenderleith and Werner advocated 'freshening up' these small works of art by applying the ethereal hydrogen peroxide with a small brush (Plenderleith and Werner, 1971 p.88). Their indirect method involves pouring hydrogen peroxide solution onto a porous plate or tile which is then fixed

about 3 cm. above the work of art, in this instance the vapour released from the plate is responsible for the reversion. The advantage of this method is that any impurities in the hydrogen peroxide do not come into contact with the object.

In 1978, Costicova made reference to work carried out by Scott which, again, sought to bypass the problem of impurities in the peroxide by means of a 'Paris' gypsum plate onto which the bleach was poured, the drawing then being placed face down on the plate (Costicova, 1978 78/14/7/1). However, as Costicova pointed out, the drawback of the method is that the middle of the drawing takes up more of the vapour than the edges, making it liable to swell, causing cockling and distortion which may be difficult to remove by pressing between boards (Costicova, 1978 p78/14/7/2). Reviewing alternative methods of application proposed by Scott and Plenderleith, Costicova concluded that the prolonged subjection of a drawing to peroxide vapours or to repeated brushing could be both destructive to the paper substrate and to the paint layer itself. Basing his new method on Plenderleith's formula of ether solution of perhydrol and concentrated ammonia vapour, Costicova proposed an elaborate system of alternately sliding two covers across the treatment areas, one containing 1 volume of perhydrol and 2 volumes of sulphuric ether, and the other a concentrated solution of ammonia (Costicova, 1978).

Working on two-eighteenth century Indian paintings which showed 'blackening' and 'mottled discolouration', Blyth-Hill discounted the use of 3% w/v ethereal hydrogen peroxide (due to the special conditions required for storage and handling and the fact that it is not always successful) and 3% (w/v) aqueous solution of hydrogen peroxide (aqueous solution may soften media and binders, especially if there are repeated applications) in favour of an indirect method using 3% (w/v) hydrogen peroxide solution and Gore-Tex ® (Blyth-Hill, 1997 p.51). By this author's method, a cotton blotter was soaked in the solution and a modified Gore-Tex ® sandwich was made which allowed the peroxide vapours to pass through the Gore-Tex® to achieve an even conversion of the darkened lead white. It is of interest that in this instance the conservator was faced with the problem of lead white mixed with several colours, so that a direct method would have involved several pigments and binders being placed in contact with moisture. The other advantage to this method was stated to be that it allowed for prolonged exposure to the peroxide. Lussier and Smith state that Singer, Dobrusskin and Banik were responsible for the introduction of this method as a general treatment for bleaching paper (Lussier and Smith, 2007 p.43).

However, over-exposure, even to a 2% (w/v) aqueous solution of hydrogen peroxide, may well produce undesirable consequences. Lussier and Smith report the experience of Mowery who applied a 2% (w/v) aqueous peroxide solution by brush to darkened areas within a bound volume, and then closed the book, thereby slowing down the rate evaporation of the oxidizing

agent. This resulted in peroxide vapours migrating through the text block to cause patchy fading of the iron gall inks (Lussier and Smith, 2007 p.45).

Other methods of application include Butterfield's placing a blotter moistened with 3% (w/v) aqueous hydrogen peroxide on the treatment area, Norville-Day and Townsend's treatment of Turner's oil sketches carried out on a suction table, and Derbyshire's refinement of the Gore-Tex® method by inserting a Melinex® template between the Gore-Tex® and the picture, which combines the advantages of vapour with localized treatment (Lussier and Smith, 2007 p.43).

Lussier and Smith point out that the most recent innovation in the application of hydrogen peroxide is the use of peroxide gels. In 1997, Margo McFarland presented a paper to the Book and Paper Group of the American Institute of Conservation at its 25th Annual Meeting in San Diego entitled *The Whitening Effects of Peroxide Gels on Darkened Lead White Paint* in which she reported the successful use of a gel to revert darkened lead white on a sixteenth century Italian painting, *A Design for a Façade Decoration* (McFarland, 1997). McFarland gives the method for making the gel (a 3% (w/v) acetic acid-stabilized aqueous solution of hydrogen peroxide mixed with a solution of cellulose ether) and lists the factors which affect its performance. These are as follows:

1. It is well-recognised that lead white that has remained darkened over a considerable length of time becomes more crystalline and therefore more resistant to treatment. By first brushing the surface of these areas with ethyl alcohol, the peroxide is better able to penetrate the pigment and effect reversion.
2. While Daniels and Thickett (1992) state that conversion from lead sulphide to lead sulphate requires a concentration of hydrogen peroxide of no more than 1 part per 1,250,000, nevertheless, some darkened lead white is not capable of reversion at 3% (w/v) or higher w/v hydrogen peroxide.
3. A degree of warmth (e.g. a studio lamp) is conducive to the reaction.
4. An elevated pH maximizes the efficiency of the treatment.
5. The duration of exposure is a consideration. McFarland notes that the application of the oxidising agent by way of a poultice increases the exposure time.
6. The cellulose ether restricts the evaporation and decomposition of the hydrogen peroxide, in effect, locking it in to react with the lead sulphide.

5.4.5 The Reversion of Blackened Lead White on the Reeves Collection

Lussier and Smith point out that the reversion of darkened lead white is ‘an aesthetics-driven treatment with visual improvement remaining an indicator of success’ (Lussier and Smith, 2007 p.42). It is not the intention here to enter into ethical debate, particularly since at the time of writing the Royal Horticultural Society has made a considered decision to have the darkened lead white reversed on the Reeves drawings. Suffice it to say, this treatment does not return an object to its original state, but rather to what appears to be its original condition. Furthermore, it produces no identified tangible benefit to the object (in that there is no suggestion in any of the literature that a treated drawing is likely to deteriorate more slowly than an untreated one), and it could therefore be argued with some justification that reversion treatment has more to do with restoration than conservation.

An interesting dilemma has arisen over the darkening of red lead and lead white in Japanese woodblock prints. Walsh, Berrie and Palmer identified two types of discolouration of lead white: the first, a silver-grey lead sulphide, which, it is concluded, was deliberately induced by the artist, and the second, black lead sulphide arising from atmospheric pollution (Walsh, Berrie and Palmer, 1997). In this instance, the former was retained while the latter was removed, based on the following justifications :

The curator and conservator agreed the treatment was justified based on the conservator's obligation to remove disfigurement from a work of art, when safely practical, in order to better display the artist's intent [My underlining]. (Walsh, Berrie and Palmer, 1997 p.123).

If Muñoz Viñas' (2002) ideas of ‘functional conservation’ are accepted, it could equally be argued that the restoration of the white colour on the Reeves Collection is of benefit to those who view the drawings, especially horticulturalists, botanists and botanical artists who will continue to use the drawings for research purposes.

Lussier has defined the characteristics of a successful reversion treatment, as follows:

1. Achievement of a colour close to the original (white)
2. No discernable alteration in the pigment/paint layer
3. No undesirable visual imbalance after treatment
4. No adverse effect to the paper substrate (Lussier, 2006 p.10).

Factors which militate against this treatment include:

1. Research into the impact of conversion treatments is scarce (Lussier, 2006).
2. The treatment is said to be irreversible (Bescoby *et al.*, 2007 p.14), although it is difficult to envisage a situation in which treatment to achieve such a reverse would be

contemplated. However, there is evidence that lead sulphate is also liable to darken in the presence of sulphur (McFarland, 1997; Smith and Clark, 2002), although Norville Day *et al.* found that converted lead white samples in an oil medium were not affected by further exposure to lead sulphide (Norville Day *et al.*, 1992).

3. Images can now be produced digitally to show the drawings as they may have originally looked. A good example of this approach was taken by conservators at the British Museum in 2007 with the conservation of a fire and water-damaged collection of natural history drawings made by the English artist John White in the sixteenth century (Bescoby *et al.*, 2007).
4. Without the technical means to distinguish deterioration products, there can be no guarantee that darkened lead white is lead sulphide and therefore potentially capable of reversion (Daniels and Thickett, 1992; Smith and Clark, 2001; Lussier and Smith, 2007). There may also be other reasons why the treatment may be unsuccessful, or partially successful. These include the possibility that attempts have been made previously to reverse the darkening or that the surface lead sulphide layer has become intractable with age (McFarland, 1997). Furthermore, the original white may have been lead sulphate, and not lead carbonate. Winter reports finding anglesite on an undated Chinese painting, but could not be certain whether this was the original pigment, or whether it appeared as a result of later restoration (Winter, 1981).
5. Possible damage to paper substrate, paint layers or binders (Lussier and Smith, 2007; Daniels and Thickett, 1992).
6. Bleaching effects may continue unchecked in situations similar to that reported by Mowery (Lussier and Smith, 2007).
7. Repeated treatments may be necessary (McFarland, 1997; Norville Day *et al.*, 1992).

5.4.6 Conclusions

It is undoubtedly the case that some of the darkened lead white on the Reeves drawings is visually distracting, particularly the pages of camellias in Chinese Drawings Large Volumes. For scientific researchers, it may be important to be able to distinguish between pink hues due to the plant's own pigmentation from that caused by the intermediate stages in the darkening process. Colour imbalance may also mislead. There are also instances where it may be difficult to distinguish the number of stamens, styles and other features within a darkened white inflorescence.

The Royal Horticultural Society has made the decision to exhibit some of the drawings and has concluded that the reversion of lead white on these pictures is an essential prerequisite to future display.²⁵² The adoption of the guidelines for the formulation and use of peroxide gel set out by McFarland will overcome some of the disadvantages of treatment set out above while possibly conferring the dual benefits of the consolidation of the lead sulphate and the creation of a protective barrier of cellulose ether residues over the lead sulphate to prevent the surface re-darkening (McFarland, 1997 pp.62-64).

There is no suggestion in the literature that drawings on which the lead white remains un-treated i.e. which are not to be used for research or display purposes, will deteriorate any faster than the treated pictures. Images of these pictures could be produced digitally. This approach would allow for new treatment options to be pursued in the future. For example, Smith and Clark suggest that unstable lead pigments might, after further research, be treated with antibacterial agents (Smith and Clark, 2002 p.104).

5.5 Copper Greens : Identification, Problems and Consolidation

5.5.1 Introduction

The authors of *The Mustard Seed Garden Manual of Painting* state that indigo was: ‘the basis of many blues and greens’ (Wang, Wang and Wang, 1977 p.584) and Yu sets out a table of pigments which includes several greens produced from organic colorants alone (Yu, 1988 p.68). However, it is the mineral greens which give cause for concern in the Collection.

Malachite has been identified in the Reeves Collection by PLM (para. 4.4.3). In many instances, the top layers of malachite, and possibly other copper greens also, are flaking from the surfaces of the large western papers, to reveal the pale, finely ground base layer (Figure 94). In some instances, the loss is significant and visually disturbing. Furthermore, visual inspection of the verso of some drawings reveals the presence of pale brown discolouration, which appears to replicate areas of copper green on the recto. The same problems do not appear to have beset the smaller pictures on Chinese papers, although most of these remain adhered so that it is generally not possible to inspect the verso.

5.5.2 The Identification of Copper Greens on Chinese Works of Art

Wise and Wise note that ‘The Chinese have had a long history of working with malachite and azurite’ (Wise and Wise, 1997 p.127) and that ‘malachite seems to have been the preferred green of the Chinese export painters’ (Wise and Wise, 1997 p.128). Although several copper compounds were noted by these authors as listed in the Chinese *materia medica*, including

²⁵² Barbara Collecott, Head of Library at the Royal Horticultural Society. Pers. Comm. 30th April 2010.

verdigris (copper acetate), copper carbonates (mineral form, malachite ; manufactured, green verditer)²⁵³, chlorides (naturally occurring atacamite),²⁵⁴ sulphates (a mineral form, brochanite) and oxides (a compound, cuprite) (Wise and Wise, 1997 pp.127-128), not all were used as pigments. These writers have identified copper chloride on pith paintings dating from the early nineteenth century; verditers, which they suggest may have been in common use by Chinese painters up to at least 1889, natural malachite, which was sometimes mixed with the artificial product during the first half of the nineteenth century, and emerald green, the use of which they consider to have been insignificant until 'well into the 1840s' (Wise and Wise, 1997 p.129). Verdigris does not seem to have been used as a pigment. Gettens speculates that it may have been recognised as being an unstable pigment, and injurious to both paper and silk (Gettens, 1972 p.503). These findings are consistent with research previously undertaken by Winter, Giacciai and Leona (2003).

In 1985, Winter had identified malachite as the main green pigment in use in far eastern art, but noted that other copper compounds had been found, including basic copper chlorides. Citing Yamasaki and Emoto (1979), he also noted the inclusion of verdigris in the literature, but said that it had not been detected on paintings researched at that date (Winter, 1985). In 2003, Winter, Giacciai and Leona contributed a paper to the first Forbes Symposium entitled *East Asian Painting Pigments: Recent Progress and Remaining Problems* in which they write: ' We have ... been seeing a kind of gradual encroachment of basic copper chlorides on the malachite hegemony in mineral greens. Chinese and Korean results are no longer hypothetical but have been actually appearing (Winter, Giacciai and Leona, 2003 p.157).

This was followed by a paper by Giacciai and Winter (2005) entitled *Chinese Painting Colors: History and Reality* which reported the pigments found on seven Chinese paintings, including three copper greens-malachite, atacamite and emerald green (copper acetoarsenite). The latter originated in Europe and was found on the two later paintings on which it appears to have superseded the other copper greens. Another point of interest here is the way in which shades were achieved: rather than relying solely upon the varying grades of pigment, the artists mixed lead white with copper green to achieve a paler shade (Giacciai and Winter, 2005 p.107).

Put simply, the results of this research seem to suggest that malachite was the traditional pigment, which was partially superseded by the copper chlorides, which in turn tended to fall out of favour with the introduction of emerald green from the west, probably after the Treaty of

²⁵³ Verditer may be distinguished from natural malachite microscopically. The particles are small and therefore pale green in colour; because they are spherulitic in shape they exhibit a black cross when viewed between crossed polars (Gettens and Fitzhugh, 1974 p.16).

²⁵⁴ Three other forms of naturally occurring copper chlorides have been identified: namely paratacamite, botallackite and clinoatacamite all having the molecular formula $\text{Cu}_2\text{Cl}(\text{OH})_3$ (Scott, 2000).

Nanking. This would accord with Yu Feian's statement that, 'By...1851...foreign blue (made in Germany, foreign green (Grumbacher brand, made in Germany), and carmine...were used everywhere in dyeing textiles, in the colored paintings done on architecture, and in folk artisans' painting' (Yu, 1988 p.30). However, Wise and Wise found instances of mixtures of natural and artificial malachite on early nineteenth century paintings, and on pictures produced later in the century they note that it is 'common to find...mixtures of natural and artificial malachite and emerald green' for which they could find no clear explanation (Wise and Wise, 1997 p.129).

Furthermore, the identification of copper greens is not straightforward. Fitzhugh found malachite, and the basic copper chlorides atacamite and paratacamite ($\text{Cu}_2\text{Cl}(\text{OH})_3$) on Japanese ukiyo-e paintings in the Freer Gallery of Art (Fitzhugh, 2003). Making reference to work previously undertaken by Scott (2000), Fitzhugh notes that while these compounds occur naturally as minerals they are also alteration products. Scott had looked at the basic copper chlorides both as products of 'bronze disease' and as pigments, and suggests that the mixture of malachite and atacamite on one of the caves at Dunhuang was not a mixture of the two copper compounds, but rather that the latter was an alteration product of the former (Scott, 2000 p.47). He had concluded that further research needed to be carried out on a number of copper alteration products, including botallackite and atacamite (Scott, 2000 p.50). The implications for the Reeves Collection are clear: although several samples of malachite have been identified by PLM, and reference will continue to be made to malachite in this work, this does not rule out the possibility that other copper compounds may also be present. Winter points out that 'Care is needed to avoid mistaking basic copper chlorides ... for malachite, particularly when using optical microscopy' (Winter, 2008 p.27).

5.5.3 Mechanical Failure of Paint Layers and the Paint-Support Interface

The technique of painting with malachite is given by Nishio (1987). He advises that the pigment should be mixed with animal glue by finger, to form a colloidal suspension, and that each particle must be coated 'otherwise the paint has a tendency to flake off'; however, 'if the solution is too strong, the colour will not show brightly, and the paint is liable to crack' (Nishio, 1987 p.40). To achieve a satisfactory paint therefore, the artist must ensure a good coverage of animal glue for each particle of pigment, and then thin the paint to the required consistency with water for use. The upper layers of paint must be made with a more dilute glue solution than the base layers (Nishio, 1987 p.40). It will be appreciated from this description that the ratio of pigment to binder is of critical importance. Winter notes that Chinese watercolours are noteworthy for their 'leanness' of binder, resulting in paints which tend to be fragile and prone to cracking, flaking and powdering (Winter, 1985 p.29). As has already been discussed, one of the ways in which the painter could fix each layer of paint on lightweight, porous Chinese

papers was by repeatedly dipping the picture in alum solution (para. 3.2.1.2), but this method would not have been viable on large sheets of thick, heavily sized western papers.

The result of repeated applications of mineral-based paint is an 'exaggerated surface topography', particularly noticeable with pigments having a lower refractive index, such as malachite and smalt, where the paint is more thickly applied in order to achieve the same intensity of hue as could be obtained from thinner layers of pigment with a high refractive index such as red lead (Wise and Wise, 1997 p.130). The potential for breakdown of the paint layer is greater where the paper support has been heavily sized, rendering it relatively impermeable to the pigment and binder. In this circumstance, the paint sits on the paper surface, largely unable to penetrate the support and coat the paper fibres, thereby predisposing it to flake and powder (Winter, 1985 p.29). Where the paint layer covers the page, Winter suggests that the upper un-penetrated paint layer eventually becomes detached from the lower, fixed, layer by shearing action (Winter, 1985 p.29).

However, on the pictures in the Collection, the paint does not form a layer across the entire page, because each plant is painted as a stand-alone specimen without background. It is suggested that the upper malachite layers may have become detached for a variety reasons, including one or more of the following:

1. Incorrect pigment to binder ratio causing poor adhesion within each paint layer and between layers.
2. The application of excessive layers of copper green paint to ensure that the plant specimen stands out on the page i.e. to achieve sufficient depth and variation of colour, particularly when compared to pigments having a higher refractive index which may have been used for the inflorescence.
3. Abrasion caused by cockling of the primary support coupled with movement of the tissue papers across the surfaces of the pictures.
4. Heavily-sized, impermeable paper causing the paint layers to sit on the surface of the support.
5. Tension set up across the surface of the supports when the album pages are turned, causing the shearing action referred to above.
6. The mechanical breakdown of binders, assisted by tensions referred to above (point number 5) and the internal and external stresses set up as a result of changes in relative

humidity (Winter, 2008 pp.84), although the action of alum in animal glue binders would militate against this (Pasnak, Tse, and Murray, 2005, p.82).

7. The chemical breakdown of the binders.

The complex mechanisms which may be involved in the deterioration of animal binders due to the chemical properties of copper greens are discussed below, as is the deterioration of paper supports. Both animal glues (fibrous proteins) and cellulose (carbohydrate i.e. D-glucose in the β -pyranose form) are linear polymers: the processes of molecular deterioration, which are not fully understood at present (Daniels, 2002 p.120), are said to be similar (Banik, 1989 p.67; Deasy, 1967 p.259).

5.5.4. Copper Greens as a Source of Paper Deterioration

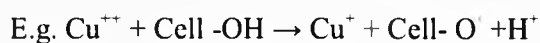
In a brief survey of earlier research, Banik and Ponahalo list the fact that cellulose and some copper green pigments react together to cause the decomposition of both (Banik and Ponahalo, 1982-83 p.3). Although malachite is an inert metallic compound (Banik and Ponahalo, 1981), nevertheless it contains copper may be similarly implicated even in low concentrations (Williams *et al.*, 1977 p.49). Daniels points out, however, that the presence of copper alone is not sufficient to destabilize cellulose: other factors such as access to the cellulose fibres, pH, the presence of other metals, humidity and the activity of the metal are all relevant (Daniels, 2002 p.121). Several mechanisms are thought to be involved in the destruction of cellulose by copper pigments, including the natural ageing of paper, the chemical composition of the pigments and their ability to react with the paper and size (Banik, 1989 p.61).

The two principal mechanisms by which cellulose is known to deteriorate are acid-catalysed hydrolysis and oxidation, which may be catalysed by certain metals, notably iron and copper (Williams *et al.* 1977; Daniels, 2002). Metal-catalysed oxidation and acid-catalysed hydrolysis may occur at the same time (Daniels, 2002 p.117; Winter, 2008 p.150). The acid hydrolysis of paper, possibly arising from acids naturally occurring in paper e.g. formic and acetic acids, or acids which have been introduced, causes chain scission of the cellulose molecules at the glucocidic links, resulting in carbohydrate fragments (glucose) which then oxidize to form carboxylic acids. These in turn increase the acidity of the paper and catalyse further hydrolysis (Shahani and Harrison, 2002).

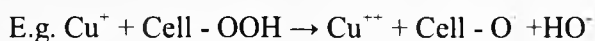
Copper has a variable oxidation state and can occur in its metallic state as Cu (0), but also as Cu (I) or Cu⁺ and Cu (II) or Cu⁺⁺. By accepting or donating an electron (e), copper can change from Cu (I) to Cu (II) and vice versa, thereby instigating a free radical chain reaction. Banik and Ponahalo note that in deteriorated areas of paper support both copper (I) and copper (II)

compounds are present (Banik and Pohalo, 1981 pp.81/14/1-2). Daniels gives three possible routes: in each case the superscript dot indicates the presence of a free radical which has an unpaired electron:

1. Production of a free radical of cellulose, where Cell OH=cellulose



2. Decomposition of hydroperoxides formed by the autoxidation process (oxydation at room temperature)



3. Direct interaction with oxygen in acid conditions



(Daniels, 2002 p.116)

The primary hydroxyl (OH) groups in cellulose, of which there are many, oxidize to form aldehydes (compounds which contain the $-\text{CHO}$ group) at the end of the chain (C6) in acid or neutral conditions and ketones (compounds containing the carbonyl group $\text{C}=\text{O}$) at C2 or C3 in alkaline conditions, which in turn oxidize to form carboxylic acids (Banik, 1989 p.67; Daniels, 2002 p.117; Mills and White, 1999 p.73). The presence of carboxyl (COOH) groups in carboxylic acids is associated with an increase in the absorption of copper into the cellulose (Banik, 1989 p.67) because metals are able to exchange with hydrogen ions on the carboxyl groups which have been formed as a result of oxidation (Daniels, 2002 p.117).

Oxidation causes extensive depolymerization by breaking the polymer chain (usually in the amorphous part of the cellulose molecule), thus reducing the degree of polymerization (DP) (Williams *et al.*, 1977 p.49). Mills and White point out that only one break in the chain would be required to halve the DP of cellulose; it follows that the effects of oxidation and hydrolysis have a disproportionate effect on the physical properties of the cellulose (Mills and White, 1999 p.73).

Copper is capable of catalysing oxidation of cellulose in a wide range of pH values (Banik, 1989); the decomposition of cellulose may also be catalysed by high humidity, atmospheric sulphur dioxide and light (Williams *et al.*, 1977; Banik, 1989). Where the copper pigment is soluble in water, e.g. the copper acetates (verdigris), Banik reports that it appears to be able to accumulate within the paper fibres so that deterioration starts in the lumen area of each fibre (Banik, 1989). The effect of visible light is to cause the copper ions to photosensitize the paper

support and thereby act as a catalyst (Winter, 2008 p.152; Banik, 1989 p.69). Hoshi and Kitada (2002) propose that discoloured areas arise from incident light and excited electrons in the cellulose becoming trapped in the impurity level of the paper substrate created by copper ions which have diffused through the paper from recto to verso. This would explain why the degradation manifests as darkened areas on the verso of supports which match the areas of painted copper pigments on the recto (Banik, 1989 p.71; Daniels, 2002; Winter, 2008). Banik and Ponahalo state that carbonyl and aldehyde groups, as chromophores, are associated with the discolouration of cellulose (Banik and Ponahalo, 1982-3 p.3). The paper in the affected areas becomes embrittled and in extreme cases, the paper fibres become weakened sufficiently to cause the image to fall out of the paper support (Banik, 1989 p.61; Daniels, 2002 p.118).

When Banik and Ponahalo looked at the products of degradation of paper, they identified substances which were consistent with a Fehling-type reaction (the reduction of Cu (II) by reducing carbohydrates), in this instance, carbohydrate derived from the glucose within the cellulose molecule (Banik and Ponahalo, 1982-83). This type of reaction is more commonly found in alkaline environments and Banik suggests that the hydroxides formed during the aging process create alkaline conditions which enable the oxidation of the cellulose to continue (Banik, 1989 p.69).

Sizing may affect the mechanisms described (Banik, 1989 p.61). The action of alum as a paint fixative may in some way inhibit the metal ions from coming into contact with the cellulose; although Emoto (1980) suggests the opposite (see below). Another possibility would be that since copper (and other transition metal ions) is known to photosensitize cellulose, the fact that the Chinese papers have been adhered or, if detached, have been kept 'face up' in the small volumes, has hindered the photosensitization process. This is in contrast to the pictures on western papers; as each drawing is viewed, the verso of the previous one in the album becomes exposed to light.

5.5.5 Copper Greens as a Source of Binder Deterioration

Copper greens have also been implicated in the deterioration of binders, particularly polysaccharides (Daniels, 2002 p.119). Copper ions are said to bind to functional groups in proteins e.g. gelatine (animal glue) and cause discolouration (Banik, 1989; Mairinger *et al.*, 1980 p.181). According to Banik, citing Deasy's 1967 and 1970 experiments with copper compounds and leather, an oxidative process takes place in which hydrogen peroxide (H_2O_2) is formed in collagenous substances by the action of UV radiation or by the oxidation of unsaturated fats and this, in turn, leads to depolymerization by breaking the peptide bonds within the protein by the action of the free radicals $HO\cdot$ and $HO_2\cdot$ (Deasy 1967 and 1970 cited

in Banik, 1989 p.67). In practical terms, the binder becomes water-soluble and breaks down (Banik, 1989 p.68).

A similar process is described by Emoto (1980) except that he concentrates on the animal glue in size, rather than as a pigment binder. He speculates that *dōsa* (alum size) is decomposed by hydrolysis to produce sulphuric acid, which in turn causes hydrolysis of the animal glue in the size. Since this is a protein, it breaks down to form amino acid. The acids produced by the decomposition of both alum and animal glue react with the pigment particles, in this instance malachite, rendering them soluble in water. According to this writer, malachite staining is a phenomenon arising from a water-soluble copper compound staining the substrate.

5.5.6 Conclusions

Malachite was identified by PLM in the samples taken from the gutters of Small Volume II (para. 4.4.3): other copper greens including copper chlorides, may also be present in the Reeves Collection. The green pigments appear to be a contributory factor in the brown staining on the verso of some of the drawings on western papers. Although slightly discoloured, these papers do not appear to be weakened, but depolymerization is undoubtedly occurring due to age. The literature suggests that this process is likely to be accelerated in these areas due to the presence of copper ions, resulting in patchy brown discolouration. It is not possible to determine whether the discolouration is due to the metal-catalysed oxygenation of the cellulose or the binder, or both. Nevertheless, it is clear that in very many instances the binder is no longer holding the pigment to the paper substrate and is in need of consolidation.

5.5.7 The Consolidation of Copper Greens

5.5.7.1. Introduction

In order to prevent further loss of the green pigment in the leaf and stem areas of many of the drawings on western papers, it was concluded that the damaged matt green paint layers in these areas should be consolidated. According to Geiger and Michel, 'The consolidation of matt paint is one of the most challenging aspects of conservation' (Geiger and Michel, 2005 p.193). For this reason, the Western Association for Art Conservation (WAAC) produced a newsletter entitled *Matte Paint Its History and Technology, Analysis, Properties, and Conservation Treatment*, with Special Emphasis on *Ethnographic Objects*, a bibliographic article, which was issued in May 1996 (Brown, 1996). This looks at the properties of matte paint, the problems associated with producing laboratory facsimiles of objects, and treatment options. Although still useful, consolidation methods and materials have moved on since this was published.

Research has been undertaken to ascertain the consolidant(s) most likely to meet the pre-selected criteria for suitability set out below. The discussion of the characteristics of widely-used consolidants is not comprehensive, but is intended to inform the selection of the most appropriate consolidants for future testing on painted-out samples.

5.5.7.2 Criteria for the Selection of a Consolidant

Keyes lists the following criteria for the selection of an appropriate consolidant, which she defines as ‘an agent to raise the threshold of tolerance of a vulnerable medium and fragile paper against moisture, pressure and physical handling...’ (Keyes, 1986 p.11):

1. The substance must act as an effective consolidant in a low concentration to minimise changes in the object.
2. It must not cause an appreciable change in the reflectance (gloss), texture and other visual qualities of the art work.
3. It must be compatible with the medium and the paper (Keyes, 1986 p.11).

Rosenqvist identified additional requirements:

4. It must penetrate as deeply as possible.
5. It must set with preferably no loss in volume.
6. It must be possible to remove the consolidant by resolving again. (However, she appears to have been more concerned with antiquities, made from, for example, wood and metal rather than paintings) (Rosenqvist, 1963 p.140).

to which Welsh added:

7. Flexibility (Welsh, 1980 p.141).

This is not an exact science and Grantham and Cummings point out that there is ‘room for debate about desirable properties’ (Grantham and Cummings, 2002 p.201). These might include:

1. The avoidance of toxic solvents for the safety of the conservator.
2. The consolidant needs to retain its adhesive quality, while at the same time permitting re-treatment in the future if required.
3. The consolidant should have demonstrated a good track record in aging tests e.g. consolidants which are known to become embrittled or discoloured with age should be avoided.

4. Ease of application. Where two or more consolidants (or methods of applying them to the paint surface) are under consideration, both equally suitable, the treatment which can be applied more readily may as well be selected.
5. Ideally, all conservation treatments should be reversible. In practice, it is suggested that it would prove very difficult indeed, if not impossible, to remove all traces of a consolidant without further damaging the paint layer (Shashoua and Rugheimer, 1997). This makes it all the more important to select the most appropriate consolidant and method of application at the outset.

The consolidation of matte paints on Asian paintings poses a particular problem. Reference has already been made to the 'leanness' of the binders in eastern art (para. 5.5.3) above. Not only is this a contributing factor to the breakdown of the paint layer, thus instigating the need for consolidation, but means that treatment which causes the interstices to be filled with consolidant will change the colour of the paint (Winter, 1985 p.29). This may be partly overcome by making several applications of consolidant at a lower concentration, as opposed to fewer applications at higher concentration (Keyes, 1986 p.12).

5.5.7.3 Consolidants Compared

The purpose of making comparisons between the more commonly-used products is to eliminate the consolidants least likely to be suitable for testing and eventual use on the Reeves drawings. Gums, resins, waxes and PVACs have not been researched, since they were considered to be incompatible with the pigments, binders and papers in the Collection. Other commonly-used consolidants, such as Paraloid B -72™, have been discounted because they are carried in more toxic solvent vehicles and cannot be reactivated with water.

For ease of reference, the consolidants to be discussed will be classified in three ways: collagen-based products, plant-based products, and cellulose ethers.

5.5.7.2.1 Collagen-based Products

There are several collagen-based products which can be used as consolidants, of which the three most commonly used by paper conservators have been selected for consideration here.

Nikawa

This is a protein-based adhesive which was tested by Grantham as part of her MA project (Grantham, 1994) and PhD research (Grantham, 1999). She concluded that although this animal glue has good adhesive qualities, there is an unacceptable colour change. This accords with the findings of Schellmann (2007) who undertook a survey of animal glues and their properties, and

states that gelatine and isinglass are the only two collagen-derived glues suitable for pigment consolidation.

Gelatine

This protein-based adhesive has been tested by a number of researchers. Keyes notes that a concentration of approx. 1.5 % (w/v) can be used with droplets of formaldehyde as a hardener, but that the result was slightly glossy. She considers it particularly effective for watercolours because it simulates the slight sheen of the medium (Keyes, 1986). Rickman (1988) suggests that gelatine used in a very low concentration of 0.5% -1.5 % (w/v) may cause an alteration in the refractive index (RI) of the paint surface. Ream (1995) notes that gelatine tends to penetrate absorbent watercolour and drawing papers more easily than methyl cellulose, which she attributes to the lower viscosity of the gelatine at the temperature and concentration employed (1.0% w/v). In tests, the addition of ethanol caused the consolidant to diffuse throughout the paper, which led her to conclude that repeated applications would be necessary. The most desirable result was achieved when the gelatine was applied with water alone, by syringe and on a suction table (Ream, 1995). It should be noted that none of the researchers referred to above gave details as to the source or purity of the gelatine under consideration.

Apart from the slight gloss imparted to the paint layer, which is not desirable on a matte surface, gelatine also possesses a slightly yellowish tinge (Lee, Xiangmei and Hon, 2003). However, Schellmann says that although gelatine may yield a slightly yellow solution, when it dries to a thin film it is 'virtually colourless' (Schellmann, 2007 p.63). Conservators writing in *The Paper Conservation Catalog* (Rogers, 1988 p.6) have entered several caveats, including the fact that gelatine yellows with age and that it can support mould growth in humid conditions. This would be a very real concern for the Reeves drawings, which may be exhibited in China in the future.

Isinglass

Schellmann (2007) says isinglass is particularly popular as a consolidant due to its low refractive index when compared to mammalian gelatine: it therefore causes least change in appearance. It was used by Lee, Xiangmei and Hon (2003) at a concentration of 1% (w/v) as a fixative prior to the further treatment of Chinese ancestor portraits and two applications were required using an airbrush. These researchers found that isinglass did not penetrate the pigment, had good working properties and there was no colour shift in any of the pigments tested (Lee, Xiangmei and Hon, 2003). Burgio *et al.* (2007) successfully consolidated glossy and matte green pigments on a Coromandel screen using a combination of isinglass and white spirit for the matte paint areas. In this instance, the treatment areas were pre-wetted with white spirit so that when the isinglass was applied, it displaced the white spirit which moved to the surface, thereby

preventing the formation of a thin surface layer of consolidant and darkening of the paint (Burgio *et al.*, 2007 p.249). According to Geiger and Michel (2005) gelatine and sturgeon glue produce unwanted gloss, darkening and tide marks, but they show good stability in ultra violet radiation and variations in temperature and relative humidity. The technique used by Burgio *et al.* would appear to overcome the problem of glossiness and darkening, but they advise that ‘Some collagen-derived adhesives can offer long-term stability if natural contaminants are minimized, relative humidity fluctuations limited and high light levels avoided’ (Burgio *et al.*, 2007 p.249).

The contributors to *The Paper Conservation Catalog* have issued the same caveats for isinglass as for gelatine (Rogers, 1988 p.7); this, combined with the observations of Burgio *et al.* (2007) (above) as to changes in relative humidity, means that isinglass has been similarly eliminated from further consideration.

5.5.7.2.2 Plant-based Products

Funori

Funori is a polysaccharide mucilage which is applied in aqueous solution. According to Rogers (1988 p.4), this is a weak adhesive, but has very low viscosity and several repeated applications can be made. No caveats were entered in *The Paper Conservation Catalog* (Rogers, 1988 p.4). This consolidant was tested by Grantham (Grantham, 1994) who found that funori reduced flexibility, that it lightened pigments rather than causing darkening and that its adhesive power reduced on ageing. Keyes (1986) notes that funori is somewhat glossy, but that concentrations of 1%-1.5% (w/v) are suitable for watercolours. It is used by Japanese mounters (Keyes, 1986).

JunFunori®

This is also a polysaccharide extracted from red alga *Gloiopeltis furcata*. Studies were carried out by Geiger and Michel (2005) using an unbound pigment layer comprising vine black and chalk on canvas, demonstrated that JunFunori® showed good stability when exposed to ultra violet radiation and variations in relative humidity and temperature. Furthermore, JunFunori® exhibited no higher or lower viability against biological attack than the other consolidants tested i.e. gelatine and sturgeon glue, and the cellulose ethers Klucel E® and Methocel MC™. In the view of these researchers JunFunori® shows ‘high potential’ as a consolidant for matt paints (Geiger and Michel, 2005 p.202).

5.5.7.2.3. Cellulose Ethers

These are manufactured from cellulose which has been obtained from wood or cotton. The process involves the purification of cellulose and its transformation into an alkali cellulose by sodium hydroxide, followed by etherication in which the hydroxyl groups which have become attached to an anhydroglucose unit are substituted by molecules from a reaction agent, such as ethyl or methyl chloride (Strnadová and Ďurovič, 1994). All six of the cellulose ethers researched by these writers are soluble in water, with the exception of ethylcellulose, but this study looked at aqueous solutions of cellulose derivatives as impregnation agents in the conservation of paper (not as consolidants for pigments) and is therefore not pertinent to the current research (Strnadová and Ďurovič, 1994). In Welsh's view the cellulose ethers are popular for paint consolidation because they have little effect on the appearance of paint (Welsh, 1980).

Keyes states that ethulose i.e. ethylhydroxyethylcellulose and other ethylcelluloses made up in concentrations of 1% -1.5% (w/v) are suitable for gouache and similar media. Ethulose, as many other consolidants, can be diluted with ethanol to aid penetration, after the initial swelling with a small amount of water, so that it serves as a near non-aqueous consolidant (Keyes, 1986).

Carboxymethylcellulose (CMC) and various methylcelluloses (MC) made up to a concentration of 1% -1.5% (w/v) differ in their working properties depending on their individual molecular weight and viscosity, but all have good 'peelability' when used for facing (Keyes, 1986). Keyes states that CMC, although useful for drawings, has a considerable gloss and is quite viscous at a 1.5% (w/v) concentration; a similar observation is made by Geiger and Michel about Klucel E® and Methocel (MC)TM with the added caveats that these products also produce darkening, stains and tide-lines (Geiger and Michel, 2005). Writing about the consolidation of pigments on Chinese papers, Rickman notes that methyl cellulose solutions, even when used in very low concentrations of 0.5%-1.5% (w/v), nevertheless pose a risk of altering the refractive index of the paint surface. In her view, Klucel G® (hydroxypropyl cellulose) which can be used in aqueous or alcoholic solution, is probably least likely to change the appearance of the paint, and is an effective consolidant for flaking gouache-like pigments (Rickman, 1988).

Ream (1995) undertook extensive trials of gelatine and methyl cellulose to determine the extent of penetration of the consolidant, which varied with the diluent, the absorbency of the paper and method of application. She found that 0.5% (w/v) methyl cellulose benefited from addition of ethanol as a diluent on slowly absorbent watercolour paper, and that none of the treatments with MC on very absorbent paper gave optimum results. During trials, 0.5% (w/v) methyl cellulose gave a consistently shiny surface: however, this consolidant could be successfully used to

secure paint flakes without sheen where ethanol had been added, but it was found that the adhesive penetrated only the top $\frac{1}{3}$ or $\frac{2}{3}$ of the paper layer (Ream, 1995 p.34).

Water-soluble ethyl hydroxyethyl cellulose (WS-EHEC) has been researched by Grantham and was found good adhesion stability in the long term, retained flexibility and no altering of colour reflectance or tone to a significant degree (Grantham, 1994). In her MA dissertation, she suggests further testing using different percentage combinations of WS-EHEC and funori, the former for its good adhesion and retention of flexibility and the latter for its ability to lighten, rather than darken, certain pigments (Grantham, 1994).

In the later research, she found that 6 applications of funori produced a 'whitening' effect on the surface of the dark brown sample, while 4 applications caused less change in appearance (Grantham, 1999). For most samples, WS-EHEC and a mixture of WS-EHEC and funori seem to have produced the least perceptible change in appearance. Although there were variations in effectiveness, consistently good performance for adhesion and cohesion was achieved by 6 applications of WS-EHEC at a concentration of 1 % (w/v), but on dark brown paint she advises the use of 4 applications. For paint layers based on mica, 3 applications of WS-EHEC and 3 applications of funori (1.5% w/v) were found to be more effective (Grantham, 1999). Keyes notes that in order to reduce gloss and other changes in the visual qualities of an object, it is preferable to apply multiple applications of consolidant at a lower concentration than fewer applications at higher concentration (Keyes, 1986 p.12).

Grantham's research pioneered the use of a medical nebulizer (Grantham, 1999). Wheeler *et al*, writing in *The Broad Spectrum: Studies in the Materials, Techniques, and Conservation of Colour on Paper* report using repeated local brush applications of low-viscosity grade of methyl-cellulose solution of 0.5% (w/v) or EHEC (Bermocoll® in a 1% (w/v) solution) on powdery matte paint on Indian paintings on mica and textile (Wheeler *et al.*, 2002). Where the paint lifted during the brush application, he used a nebulizer to hold paint in place prior to further brushing. He found that EHEC was especially suitable for treatment, and occasionally added a small quantity of ethanol to assist in penetration (Wheeler *et al.*, 2002). The only caveat entered against EHEC in *The Book and Paper Catalog* (Rogers, 1988 p.8) is that more studies are required to determine its ageing qualities, but more than 20 years have elapsed since that was written and further research has been undertaken in the meantime. Grantham and Cummings are of the view that 'Water-soluble cellulose ethers are known for their long-term stability, resistance to biological degradation, and pH stability' (Grantham and Cummings, 2002 p.201).

5.5.7.4 Conclusions

On the basis of the research findings set out above, it is suggested that WS-EHEC and funori or JunFunori® would be most appropriate consolidants for initial testing on painted-out samples of copper green pigments, particularly malachite. It is further suggested that multiple applications should be made using a brush and medical nebulizer. Since gamboge as a binder has been detected on the face of one drawing (para. 4.4.10.1), it is suggested that some painted out copper green pigment samples should be prepared using this substance as a binder.

5.6 Conservation Proposals

5.6.1 Pre-treatment Testing

1. Test for animal glue adhesive using the Hydroxyproline Test on Chinese papers.
Reason: To ascertain the whether animal glue is present. If so, it may be possible to lift the glue with a damp swab using purified water.
2. Test for alum on the Chinese papers using the Aluminon Test.
Reason: To ascertain whether alum is present. This may affect the rate and efficacy of localized humidification treatment and the likelihood of success in the removal of adhesive.
3. Using pH indicator strips, test western papers for indications of excessive acidity.
Reason: Excessive acidity is indicative of acid hydrolysis which causes deterioration of the paper fibres. Consistent findings of higher levels of acidity in the brown areas on the verso which correlate to the copper-based pigments on the recto would confirm the degradative effect of these pigments on the cellulose molecules. Treatments to stabilize the paper may be indicated.
4. Test proposed mechanical cleaning methods by carrying out cleaning in small areas under a stereo microscope.
Reason: To identify the most effective cleaning methods for Chinese and western papers without causing damage to the surface of the paper, for example by lifting paper fibres.
5. Identify the optimum method for removal of paper and pressure-sensitive tapes on western papers.
Reason: The old repairs should not be left in situ. The tapes have degraded and caused localized staining; they are coming away from the paper substrate. Preliminary examination would suggest that the old repairs could be removed by mechanical means. A solvent such as propan- 2-one (acetone) may also be employed.

6. Using damp swabs of cotton wool identify fugitive pigments on western papers.
Reason: To locate areas where these pictures may be particularly vulnerable if blotter washing or suction table washing is carried out.
7. Paint out samples of similar western papers with Chinese pigments, particularly malachite and azurite and test consolidants, starting with WS-EHEC and Funori or JunFunori applied with a medical nebulizer. Tests for loose pigment can be carried out using 'Post-It'® notes (Grantham, 1999). The slightly tacky white backing sheet to heat-set tissue might be a useful alternative, since paint particles are more visible.
Reason: To identify the consolidant, or combination of consolidants, and method of application, which will most nearly meet the criteria set out at para. 5.5.7.2 above.
8. If a deacidification treatment is indicated for the degraded areas of western papers, the selected alkaline agent could be tested on un-used paper taken from spare pages in one of the Chinese Drawings Large Volumes.
Reason: To select the agent which causes the least optical and aesthetic change to the paper.
9. Select a variety of xuan paper samples for accelerating aging tests and undertake the testing in enclosed airtight glass tubes as described by Yeh and Munn (Yeh and Munn, 2005).
Reason: Papers will be required for repairing the corners of the Chinese papers. Yeh and Munn reported that the presence of clay additives in modern xuan papers renders them liable to lose optical brightness and darken over time. There is also evidence of staining of adjoining papers. If a reliable xuan paper cannot be sourced, a conservation-grade light Japanese paper may be a suitable alternative.
10. Test the efficacy of wheat-starch paste and methyl cellulose on samples of the selected repair paper to be used on the Chinese papers.
Reason: To select the most appropriate adhesive at the optimum consistency for repairs to Chinese papers.

5.6.2 Mechanical Cleaning

To be carried out on the recto and verso of each sheet of western and Chinese papers.

Mechanical cleaning undertaken on western papers in Chinese Drawings of Plants Small Volume II, pages 92 and 94 under a stereo-microscope indicate that light brushing with a Chinese brush and chemical sponge is effective and does not lift the paper fibres. The cleaning

of the verso of the western papers where pigment loss has occurred should be delayed until the loose pigments have been consolidated.

5.6.3 Removal of Secondary Supports and Guards

The Chinese papers are creased, cockled and stained where they have been adhered to the 1837 Whatman papers. General humidification may result in further cockling, delamination and alteration to the paint layer. Localized humidification, with a steam pencil for example, should enable these papers to be removed from their secondary supports without further damage.

The same treatment can be used on adhered western papers. The guards have been a site of fungal infection and many are now loosely attached. They should all be removed; this process can be carried out with a scalpel blade and steam pencil. Since the guards appear to be indicators of the earliest pictures received by the Horticultural Society, they should be retained and a note made of the number of the volume and page from which each has been removed for the benefit of future researchers.

5.6.4 Aqueous cleaning

The possible presence of carmine and other fugitive pigments in the Collection, and the mechanical instability of many pigments, particularly the green and yellow painted areas, would militate against any form of overall aqueous treatment such as immersion. On the western papers, blotter washing with purified water could be effective in brightening discoloured unpainted areas. Similarly, purified water brushed over these areas on a suction table may give the paper a brighter appearance, while at the same time removing some of the acidity. Care would need to be taken to prevent the formation of tide-lines. Cleaning undertaken on Chinese Drawings of Plants Small Volume II on pages 92 and 94 using distilled water and brushes on a suction table indicate that it is unlikely that the green staining from the binders or the brown lines due to water staining will be removed or lessened as a result of this treatment.

The Chinese papers are generally bright and in good condition. These do not require further cleaning treatments, which may adversely affect these drawings by removing the surface size, de-laminating the paper layers and cause the pigment to sink into to substrate.

5.6.5 Removal of Fungal Stains

Currently, there are no effective methods for the removal of localized fungal staining, prevalent on the western papers. Common solvents, such as acetone, ethanol and xylene have been found to be ineffective (Szczepanowska and Lovett, 1992). The use of an oxidising agent may reduce the visual appearance of some stains, but would need to be thoroughly washed out and may

leave the paper with a patchy or blotchy appearance. For this reason, this treatment is not recommended. Any treatment carried out in the short term should not prejudice the possibility of future treatment; it is possible that an effective treatment for fungal stains will be developed in the longer term.

5.6.6 Deacidification

Depending upon the results of pH testing, the application of an alkaline agent, such as calcium hydroxide ($\text{Ca}(\text{OH})_2$) or magnesium bicarbonate ($\text{Mg}(\text{HCO}_3)_2$) may merit consideration on the western papers. Mairinger *et al.*, found that 'Magnesium seems to inhibit strongly the degradation of the paper carrier' (Mairinger *et al.*, 1980 p.181). There is a danger that the aesthetic and optical properties of the paper and media may be altered, and the gelatine size adversely affected due to its solubility. This treatment should be one of last resort and should be limited to localized treatment carried out on the verso.

Deacidification of the Chinese papers should also not be attempted. It has already been noted that there is sufficient buffering capacity within Chinese papers to withstand acidity attributed to repeated washings with alum, which is acidic (para. 4.9.1). Buffered housing materials would be appropriate.

5.6.7 Flattening

All the western papers are cockled to some extent. This could be reduced by gentle humidification, particularly around the edges of each page, followed by light pressing between boards. The thicker paint layers may need additional protection; gampi (10g/m^2) may be effective.

The Chinese papers are generally flat, except at the corners. Therefore, following localized humidification to remove these pictures from their secondary supports, minimal weight could be applied to reduce the creasing and cockling in these areas, taking care to ensure that these soft papers are prevented from becoming imprinted with the patination of the blotter.

5.6.8 Missing Areas and Consolidation

Lacunae should be repaired with a wove western paper of compatible weight and colour. It is suggested that a small part of an unused page at the end of one of the Chinese Drawings Large Volumes could be used for this purpose. If additional support on the recto is required, a fine, cream Japanese paper, such as *Koso-shi* (3.6 g/m^2) would be suitable. Missing areas at the corners of the Chinese papers will need to be in-filled with the selected repair paper. Minute lacunae in both types of paper could be in-filled with heated cellulose powder.

Subject to satisfactory results of pre-treatment testing (para. 5.5.7.4), friable and flaking areas of pigment should be consolidated to prevent further loss.

5.6.9 Darkened Lead White and Red Lead Reversal

As has already been suggested above, the reversion of dark lead sulphide to white lead sulphate is a cosmetic treatment. The treatment is not required to any of the Chinese drawings. It is suggested that on western papers where darkened lead pigments cause visual disturbance and particularly where the pictures will be used for research purposes, treatment should be carried out with a peroxide gel. In other cases, digital images could serve to show the plants as they were originally painted.

5.6.10 Re-attachment of Small Drawings

Where small papers (western and Chinese) have been removed from secondary supports to permit cleaning, they should be re-attached in their original positions (which will have been recorded). Small drawings which became detached due to wear and tear should be re-adhered to their secondary supports. These drawings should not be re-attaching directly to the secondary supports; they should be hinged using a light Japanese paper. This will permit limited access to the verso, and allow for removal e.g. for display purposes, without directly affecting the drawing.

5.6.11 Housing, Storage and Display

There are four conservation options: to repair the existing bindings, to re-bind with new materials, to dis-bind and mount the drawings individually or to elect for a combination of approaches. It has already been established that:

1. The drawings were originally sent from China in batches of individual sheets (para. 2.9).
2. At least some drawings were bound into guard books almost immediately (para. 2.9).
3. The drawings were re-bound before 1859 (para. 2.9).
4. The appearance of the bindings matches that in the sale particulars of 1859 (para. 2.11).
5. The loss of surface paint may be due to shearing action when pages are turned (para. 5.5.3).

Repair is an option as the leather is in good condition and the sewing intact on some volumes (para. 5.3.2.1). The question is, then, not whether the bindings could be repaired, but rather, whether they should be repaired and remain part of the objects as they have been for over 150 years. In the alternative, they could be detached and retained.

The Royal Horticultural Society commissioned a report from a book and paper conservator, Graeme Gardiner, in which he advised:

It is obvious that the bound format...now presents a risk rather than an asset to the collection...The watercolours should be removed from their bindings and placed into a more appropriate storage system...[which] may change the way the collection is curated, as it will enable items to be grouped and juxtaposed for the first time.²⁵⁵

Muñoz Viñas argues that ‘conservation should enhance or preserve the preferred meanings of the object while impairing as little as possible its ability to convey other meanings’ (Muñoz Viñas, 2009 p.57). When applied to these drawings, it could be said that the detachment of the bindings enhances their original meanings as individual works of botanical illustration and preserves meaning by lessening potential physical damage to the paint. An alternative view would be that the bindings are an integral part of the objects and should be read as such. The Society originally intended to dis-bind all the volumes in accordance with its conservator’s advice, but at the time of writing, no final decision has been made.²⁵⁶

It is suggested that the system of storage adopted by the British Museum (Natural History) for its Reeves botanical drawings should be used. Here, each picture is separately mounted on conservation-grade board within a four-flap enclosure and boxed in conservation-grade boxes in sets of about 10. The advantages are as follows:

1. The papers are no longer turned, causing stress to the paper surface and the paint layers.
2. The papers are not directly handled and no further mounting is required for display
3. There is no exposure to light during storage, but the drawings remain accessible to researchers when required and the pictures are protected, yet remain portable.

In order to provide a degree of protection to areas of increased acidity due to the presence of copper compounds on western papers, it is suggested that buffered Japanese tissue should be placed behind each of the affected drawings. The pH of these drawings should be monitored, particularly where there is brown discolouration.

5.6.12 Environmental Conditions

One of the outstanding features of this Collection is that it appears not to have suffered light damage. The recommended environmental specification is as set out for Class 1 environments in Thomson (Thomson, 2003), and is as follows:

²⁵⁵ Graeme Gardiner of Preservation Solutions. (March 2008). Letter containing conservation report to the Royal Horticultural Society. The Royal Horticultural Society.

²⁵⁶ Charlotte Brooks, Lindley Library, Royal Horticultural Society. Pers. Comm. 22nd November 2012.

Light (Sensitive material)

Artificial light		50 lux
Alternative maximum annual exposure		200 kilolux-h
Highest to lowest illumination over whole picture-hanging area to be within 2:1 ratio		
Photography/television	tungsten lamps	1000 lux
	metal-halide lamps	2500 lux
Flash exposure		f22at 100ASA_(20 lux-min)

UV Radiation

UV content not to exceed	75µW/lm
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Relative Humidity

Day and night throughout the year	50 or 55+/-5%
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Temperature

Winter	19+/-1C
Summer	24+/-C

Air Pollution

Particulates removed to	80% efficiency on Eurovent 4/5	
Sulphur dioxide + nitrogen dioxide removed to	below 10µg/m	
Ozone	removed to	below 2µg/m
Air flow rate: ceiling height	under 3m	8 air changes/h
	under 4-5m	6 air changes/h
	under 6-8m	4 air changes/h

(These can be reduced by 50% during periods of non-occupancy.) (Thomson, 2003 p.268).

5.7. Conclusions

In this chapter, the condition of the three types of drawings is discussed. The two principal areas of concern with this Collection were identified as the darkened lead pigments and the loss of surface copper green pigments. The possible causes of both phenomena have been discussed here. While both are visually disturbing, the latter gives rise to concern for the preservation of these drawings in the long term. Conservation proposals have been advanced with a view to securing the short and long term preservation of the Reeves Collection, while at the same time permitting its display, but not precluding future treatment.

CONCLUSIONS

Introduction

This research project arose as a result of a modest study into the Collection undertaken by the author as part of an MA degree (Bailey, 2007). At that time, almost nothing was known about the Collection. The connection between the drawings and the Horticultural Society's Minutes of Council had hardly been investigated, the Minutes of the Drawings Committee were not known to exist and the relevance of the Chinese committee papers had not been appreciated. Patrick Synge's (1953) early writings on the Collection were inaccurate in part, while other writers such as Bretschneider (1898) were more concerned with plant introductions. It was clear that the Collection had never been properly researched. Equally, it was apparent that John Reeves was a collector of some regard; some of his letters to Banks had been traced and two of his notebooks, together with his own collection of botanical (and zoological) drawings, had found their way into the British Museum (Natural History). Furthermore, a brief survey of the drawing collections of other amateur and professional botanists and natural historians who visited China in the late eighteenth and early nineteenth centuries, in so far as they could be ascertained, revealed that none had the benefit of substantial surrounding documentary evidence. In this regard, the Reeves Collection appeared uniquely placed to inform other collections of Chinese botanical art of this period.

A further impetus to undertake this project was the realization that Reeves was living in China prior to the Treaty of Nanking, and it was therefore expected that all the pigments used on the drawings would be Chinese, with the possible exception of carmine. Concern on the part of the Royal Horticultural Society over the condition of the Chinese Drawings of Plants Small Volumes raised questions as to the material components and conservation of the Collection. It was realized that by investigating contemporary sources for information on materials and methods adopted by the Chinese painters, coupled with western and Chinese academic research into these areas, much might be learned about the way in which Reeves' artists painted the pictures. Again, while previous writers such as Whitehead (1969) had named Reeves' painters, no-one had researched the practicalities of the painting process.

The aims of the research were therefore four-fold:

1. To provide a comprehensive account of the provenance of the Collection.
2. To identify materials used in the Chinese Drawings of Plants.
3. To investigate conservation treatments for darkened lead white and friable copper green pigments for inclusion within the conservation proposals for the Collection.

4. To expand knowledge of commissioned and collected Chinese botanical art in the early nineteenth century.

These were translated more specifically into the following research questions:

1. Accepting that the Collection is relatively well-documented, what can be learned about its inception, formation, subsequent history and use?
2. What are the defining characteristics of the drawings and how do these relate to their Chinese and western origins?
3. Which materials (pigments, binders, papers, sizes, adhesives, gums and resins) were used, or were likely to have been available for use, by the Chinese artists?
4. What conservation treatment (if any) should be recommended, particularly in respect of the darkened lead white and flaking copper green pigments?
5. How might the information gained from an understanding of this Collection be of more general application?

These are now re-visited with a view to discussing and evaluating the outcomes of the research, and identifying areas where further research could usefully be undertaken.

The Research Questions and Answers

1. Accepting that the Collection is relatively well-documented, what can be learned about its inception, formation, subsequent history and use ?

At the outset of the research project, little was known about the Royal Horticultural Society's Reeves Collection. Unlike other collections of Reeves material held at the British Museum (Natural History) and the Zoological Society, the Society's Collection has the benefit of having been recorded in the Horticultural Society's Minutes of Council and Minutes of the Drawings Committee, the latter coming to light as a result of being called for to assist in this area of the research. These were taken as a starting point, and the lines of enquiry extended to include the Reeves - Banks correspondence, Reeves' notebooks at the British Museum (Natural History), the East India Company records for the Canton trade, and to material held at other institutions such as RBG Kew, the Asiatic and Linnean Societies, Sotheby's, The British Library, and the Wellcome Institute. From these sources, it was possible to re-construct the way in which Reeves put together the Collection and much of its subsequent history and use.

The relationship between the large drawings on western papers and the small pictures on Chinese papers was unknown at the outset. By comparing references to these pictures in the Minutes with references in Reeves' correspondence, it was possible to show that the small pictures and the 'miscellaneous drawings' referred to in the Minutes from 1817 onwards, are one and the same. This negates Carden's (1953), and therefore Synge's (1953) supposition that Chinese papers were used for later pictures because the supply of English papers had been exhausted. Further, by closely examining these pictures and finding three of the painters' names in Reeves' handwriting, one of which was also recorded on one of the large pictures (Chinese Drawings of Plants Small Volume IV, p.118), coupled with supplementary information gleaned from Reeves' notebooks, it was possible to conclude that the same small group of painters undertook both types of painting. Investigation into Chinese names, the status of Cantonese export painters and Reeves' living and working arrangements meant that an informed assessment could be made as to the places where the plant material was obtained, where the majority of the painting took place and the relationship between Reeves and his four painters.

Despite exhaustive enquiry, five pieces of information have proved elusive:

1. The meaning of the inscription 'Ackona' on a couple of the larger pictures.
2. The identity of 'EJD' who carefully recorded what appear to have been Reeves' original numbers when he rebound the drawings sometime after 1837.
3. The identity of the owners of the Chinese Drawings of Plants Small Volumes between the death of William Gott and 1908.
4. An explanation for the apparent loss of some of the pictures from the Chinese Drawings of Plants Small Volumes.
5. The date and location of the fire which is said to have resulted in the water damage to the Chinese Drawings of Plants Small Volumes.

None of the above has impacted on the rest of the project. However, work on these specific areas could be continued.

John Reeves had been the subject of limited research previously, but with the exception of *Chinese Natural History Drawings Selected from the Reeves Collection in the British Museum (Natural History)* (Whitehead and Edwards, 1974), research had largely been confined to his plant introductions. No-one had undertaken a substantial study of the pictures. There had also been no previous mention of the documents (copy letters, technical notes and drawings) held at the Wellcome Institute, nor his handwritten notes and topographical drawings held at the British

Library. These additional sources of research material merit inclusion in the entry for John Reeves in the *Oxford Dictionary of National Biography* (2004), written by Fan, not least because the notes at the Wellcome Institute seem to suggest that Reeves was aware in the 1820s that black and green teas are both derived from the same plant, a discovery more usually attributed to Robert Fortune in the 1840s.

2. What are the defining characteristics of the drawings and how do these relate to their Chinese and western origins?

It was immediately apparent on first inspection of the drawings on western papers that these pictures belong neither to the Chinese flower painting tradition nor to that of western botanical illustration. They are, in their way, as hybrid as some of the plants they represent. This, then, begged the question: ‘What is it about these pictures which indicate to a western viewer that they were not drawn by a western artist?’ and conversely, for a Chinese viewer to ask: ‘Why has this Chinese artist not painted according to established canons of Chinese art?’

This area of the research merited discussion of the methods of plant representation in both cultures. The Chinese appear to have had no use for scientifically drawn coloured plant monographs, as they would have been understood in the west in the nineteenth century. During Reeves’ lifetime the influence of Linnaean taxonomy had not reached Chinese horticulturalists. It follows that a true comparison of botanical drawing between the two cultures could not fairly be made. The approach taken has been to endeavour to isolate particular ideas, techniques or features which are known to be Chinese in origin, and demonstrate the way in which they were adapted and applied to drawings which were intended to be scientifically rigorous and to accommodate western intellectual tastes. One of the outcomes of the research has been to demonstrate that the commissioned work in the Collection is not export art, as that phrase is generally understood. It has been argued that these drawings exhibit features of three spheres of artistic endeavour; export art, traditional Chinese art and western botanical illustration. To this extent the drawings on the western papers in the Collection can be said to be *sui generis*.

The drawings on Chinese papers are altogether different. By identifying that the same artists produced both types of picture, this research serves to demonstrate the differences between pictures painted for the export trade and those which were commissioned, as well as the versatility of the Chinese painters.

Inevitably, this research has been undertaken from a westerner’s viewpoint and reliance has been placed on the translations of others, often western writers. A more rounded response to the Reeves pictures might be achieved by a further joint research project involving both western and Chinese art historians and horticulturalists, particularly in relation to underlying Taoist,

Confucian and Buddhist philosophies and the tenets of painting theory laid down by early Chinese artists.

3. Which materials (pigments, binders, papers, sizes, adhesives, gums and resins) were used, or were likely to have been available for use, by the Chinese artists?

A review of the more recent conservation literature relating to materials, especially pigments, used by Chinese painters, undertaken as part of the earlier research project,²⁵⁷ revealed that many of the paintings, fans, wallpapers and other exported paper objects to which reference was made were undated. References were frequently found to 'nineteenth century' pictures, but it was unclear whether these had been produced before or after the Treaty of Nanking. The distinction may be important because the trade in commodities with the west increased after the opening up of additional Treaty ports. It was soon realised that the Reeves Collection at the Lindley Library may be without parallel in terms of its size and the extent of its documentation, and that these factors may make it a unique resource for the study of Chinese painters' materials; the more so, because the pictures seem never to have been displayed. Apart from lead white, and to a lesser extent red lead, the colours appear to be as bright as they must have been when they were first painted.

With a view to attempting to identify pigments and any changes in pigment use over the period 1817-1830, it was decided to reconstruct the original picture order for the western papers, in tandem with the practical work in the research laboratory of identifying the pigments using polarized light microscopy (PLM). This part of the project was hampered by the extensive removal of Reeves' original numbers, but assisted by the realisation that an early handler, probably a bookbinder, appeared to have recorded Reeves' numbers before he trimmed the papers. Nevertheless, most of the numbers have not been retained, and it is impossible to accurately place all the pictures in sequence. The countermarks on the numbered drawings were recorded as part of this exercise and the results of this exercise appear in Appendix IV.

The countermarks on the un-numbered sheets i.e. the majority of the pictures, have not been recorded in Appendix IV. The countermarks on these, with the exception of an 1826 paper, bear the same dates as the numbered sheets. Therefore, the dates which appear on these papers, taken in isolation, cannot be used to date the drawings.

The identification of pigments using PLM alone was of limited value because the organic pigments could not be identified by this method. Furthermore, samples were restricted to

²⁵⁷ Undertaken as part of the research project for the degree of Master of Arts at the University of the Arts London in 2007.

pigment fragments collected in the gutter of Chinese Drawings of Plants Small Volume II and to a few samples taken from areas of off-set in the remaining Chinese Drawings of Plants Small Volumes. It is suggested that additional analytical methods could significantly add further knowledge about the pigments on these pictures. Raman spectroscopy would be particularly useful in identifying organic lakes. Since the equipment can be portable, thus obviating the need to transport the pictures, and the method non-invasive, it is suggested that further pigment analysis be undertaken and the results compared for the pictures on western and Chinese papers. It has already been seen that the large pictures were under-drawn with graphite pencil, while the pictures on Chinese papers appear may have been sketched with a light ink which is invisible to the unaided eye. There may also be variations in the use of pigments.

Furthermore, it has been shown that at least one western pigment is present and there is a suggestion in one of the documentary sources (La Volleé, 1849) that the Chinese were obtaining colours from westerners on a regular basis. This would accord with the trade in pigments which came to light in the East India Company's Diaries of Transactions and Consultations; these also indicated a steady trade in vermilion, gamboge, white lead and white paint travelling in the opposite direction.

Carmine is known to have been used by the Chinese since the time of Castiglione. There may well be other colours present in the Collection, available in the west at the beginning of the nineteenth century, but believed to have been unknown in the east at this time, e.g. chrome yellow, chrome red and Scheele's green. If these were found, Yu Feian's date of 1851 for the introduction of western pigments (Yu, 1988), quoted by Wise and Wise (1997) and others in the conservation literature, may require revision.²⁵⁸

The line of research into Prussian blue arose from an examination of the handwritten Diaries of Transactions and Consultations of the East India Company's Canton Factory, from which it was noticed that the colour appeared fairly regularly as an import, but suddenly ceased.

Contemporary accounts of its use as a tea contaminant led to speculation that it might also have been used by Canton artists. John Winter remarked that, unlike Japanese use of the colour in painting and wood-block prints which had been well-researched, there were no published identifications of Prussian blue on Chinese works. This comment opened up a new line of research into the writings of contemporary commentators about the use of the colour in China. These revealed an intriguing narrative of Chinese industrial espionage and the existence of a hitherto unknown (to western conservators, at least) Prussian blue factory in nineteenth century

²⁵⁸ The word 'may' here has been used advisedly. An alternative explanation might be that Reeves supplied his painters with western paints and that they were not generally available in the Canton market. The fact that graphite pencils were used on the commissioned work and that a few of these pictures appear to have had a coating of gum arabic on leaf areas, suggests that this may be a possibility.

Canton. The fact that the dates of these writings accord with the Factory records of the Prussian blue trade would have been a satisfactory outcome in itself. Further research into the trade brought to light the work carried out by Smith (2005) into the Japanese market, and the realization that the findings of this part of the research neatly correlated with the data in his published research.

4. What conservation treatment (if any) should be recommended, particularly in respect of the darkened lead white and flaking malachite?

Lead white and copper greens were identified at the outset as being the pigments giving the most cause for concern. The mechanisms involved in the darkening of lead white and the deterioration in binders and cellulose known to be caused by copper pigments are not fully understood. One of the often-reported problems with lead white reversal is the failure of the treatment for no discernable reason. There are several possible explanations as to why treatment with hydrogen peroxide may be ineffective, which are discussed. During this part of the research, it was noticed that according to *The Mustard Seed Garden Manual of Painting* (Wang, Wang and Wang, 1977), the Chinese used masticated apricot seeds to treat darkened lead white. This does not appear to have been reported in western conservation literature. A simple test carried out at Camberwell indicated that the method can work, although it is not recommended for the reasons given. However, this does raise the possibility that darkened lead white on Chinese objects may already have been treated by a Chinese method, and that this may have prejudiced later treatment.

The loss of copper green, identified as malachite from the pigment samples collected from Chinese Drawings of Plants Small Volume II, is also of concern. There is good reason to conclude that the breakdown of the binder within the top paint layers and between these layers and the fine, pale, base coat will continue unimpeded unless checked. The selection of a compatible consolidant in accordance with generally accepted pre-determined criteria for future testing on samples is discussed, as is the method of application.

There is a further cause for concern with regard to the degradation of the cellulose fibres caused by copper ions. Historically, it would seem that rather more attention has been given by conservators to damage caused by iron in paper, both in terms of foxing and problems encountered with iron gall inks, than to deterioration attributable to copper. There appears to be no known method of halting the process, although de-acidification may be an option for some objects, particularly where there are no alkali-sensitive pigments. For the affected pictures in the Reeves Collection, a mechanical means of slowing down the loss of degraded areas of paper has been suggested and this is to be found in the conservation proposals.

It is suggested that the Reeves Collection might form the basis of a future investigation the deleterious effects of copper greens, for the following reasons:

1. Given the size of the Collection and the nature of the subject-matter, there is an abundance of greens. There may be several kinds of copper carbonates, chlorides and acetates present.
2. The brown discolouration on the verso is not universal. This may be due to the use of different copper compounds, different binders, variation in the levels of light exposure, or to other factors.
3. A limited examination of the verso of the drawings on Chinese papers (where these have become detached), would seem to indicate that these have not been adversely affected by copper-based paints. This may be attributable to a protective effect of alum, either mixed with the pigment or in the paper size. Alternatively, there may be other explanations.
4. Smith and Clark have observed that 'If the blackening of lead white pigment is largely attributable to reaction with metabolic by-products of bio-organisms, then it is possible that [the] biocidal property of copper salts protects those pigments from conversion to black CuS'. This, in their view, would account for the selective darkening of lead white noticed on watercolours and illuminated manuscripts but 'no data yet exist to validate it' (Smith and Clark, 2002 p.104). It is suggested that because both phenomena are abundantly apparent on the large pictures in the Collection, they might usefully form the basis for future research in this area.

5. How might the information gained from an understanding of this Collection be of more general application?

Previous research had indicated that the usual time-span between the date of countermarked western papers and the date of painting of export art pictures varies between 2 and 12 years. As part of the exercise to reconstruct Reeves' original painting order, a record was made of the countermarks on the numbered drawings. These are included in the list in Appendix IV, from which it will be seen that the timescale generally holds good for this Collection. It is suggested that no general conclusions should necessarily be drawn from this; it might be that this Collection simply reflects the working methods of John Reeves. Equally, it might indicate that the 2-12 year period is a reasonable generalization.

The references to regular imports of Prussian blue in the East India Company records, coupled with the documentary evidence for the existence of a Prussian blue factory in Canton, would

seem to indicate that this pigment may have been ubiquitous in Canton in the early part of the nineteenth century. It is, therefore, perhaps not surprising that it was identified in the Reeves Collection. The scant references to the colour in conservation literature relating to nineteenth century Chinese paper objects is unaccountable. Three possibilities suggest themselves; firstly, that the Chinese artists were reluctant to use the pigment, perhaps due to cost; secondly, that the imported and later Chinese-manufactured Prussian blue never reached the domestic market, but was exclusively used for the contamination of tea and as a lucrative export commodity to Japan; and thirdly, that conservators have failed to identify a pigment which they were not expecting to find. It would now seem that Prussian blue may have been widely available in Canton from the early part of the century and conservators should be aware of this.

In the introduction to this thesis, it was stated that John Reeves was not the only collector of plants and paintings in Canton. Indeed, collections of botanical drawings drawn by local artists had been made in the 1690s by James Cunningham, a Company surgeon. Similar collections were made by John Bradby Blake, a supercargo at the Canton Factory, James Main, William Kerr (who collected for Kew) and others. The majority of the pictures originally collected for Joseph Banks (for Kew Gardens), and the East India Company botanical pictures, are now housed at RBG Kew where they are classified according to plant genera. Although the pictures may be looked at individually, the names of the original collectors have often become disassociated from them, and the original collections can no longer be viewed as a whole. It is hoped that future researchers into these collections, which are not as well-documented as the Royal Horticultural Society's Reeves Collection, may be assisted by the information which has come to light as a result of this research. The information gained from this research, particularly into pigments, binders and Chinese papers, has already been of assistance to archivists at RBG Kew and will be used to inform the Reeves drawings held at the British Museum (Natural History).

Conclusion

It is submitted that the original aims for the research project have been met and the research questions answered. However, the volume of documentary material surrounding this sizeable Collection makes it exceptional and there is clearly scope for further conservation and art historical research.

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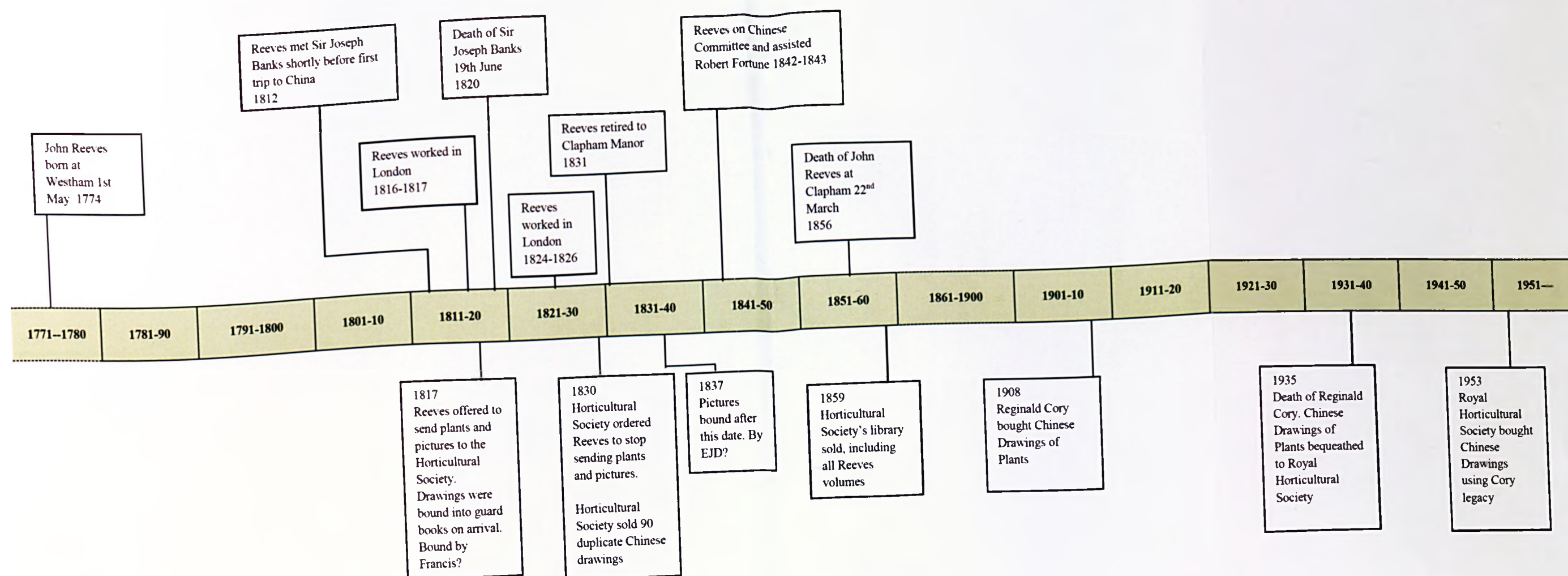
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JOHN REEVES AND THE REEVES COLLECTION TIMELINE

JOHN REEVES



THE REEVES COLLECTION

GLOSSARY OF CHINESE TERMS

APPENDIX II

Historically, many systems of transliteration have been used, including Wade-Giles which dates from 1859, Pinyin (perfected in 1958) and personal systems such as that adopted by John Reeves. The term in the left hand column may derive from any of these sources; Pinyin is shown in the middle column. This glossary includes a few words derived from Portuguese commonly in use in Canton in the nineteenth century.

Transliteration as it appears in the text	Pinyin Transliteration	English Translation
<i>A-chiao</i>	<i>A-qiao</i>	Animal glue; black asses glue.
<i>An-ming-fan</i>	<i>An ming fan</i>	Ammonia alum.
<i>Bai e</i>	<i>Bai e</i>	Calcium carbonate white.
<i>Bencao Gangmu</i>	<i>Bencao Gangmu</i>	<i>Basic Network of Roots and Herbs</i> . A famous <i>material medica</i> written by Li Shizhen (1518-1598).
<i>Bencao yuanshi</i>	<i>Bencao yuanshi</i>	Compendium containing information about <i>material medica</i> written by Li Zhongli (1598).
<i>Baiqing</i>	<i>Baiqing</i>	Light or clear blue.
<i>Bianqing</i>	<i>Bianqing</i>	Flat blue; a variety of mineral blue.
<i>Catty</i>	<i>Catty</i>	Unit of mass used for weighing goods in shops equal to 605 grams (approx.). 100 catties=1 picul.
<i>Cengqing</i>	<i>Cengqing</i>	Layered blue; a variety of mineral blue.
<i>Ch'an Tsung</i>	<i>Chan zong</i>	A Chinese form of Buddhism established in the 7 th century (Zen in Japanese).
<i>Chang tan</i>	<i>Chang tan</i>	An early name for red lead.
<i>Chê huang</i>	<i>Zhe huang</i>	Yellow ochre.
<i>Chê shih</i>	<i>Che shi</i>	Umber.

<i>Ch'eng Hsin T'ang</i>	<i>Cheng Xin Tang</i>	'Paper from the Pure Heart Hall' a fine, thin, smooth paper said to be popular with the best artists of the Sung and Yuan periods .
<i>Ch'I</i>	<i>Qi</i>	Force which harmonizes yin and yang; spirit or presence of <i>Tao</i> in a painting.
<i>Chieh Tzū Yüan Hua Chuan</i>	<i>Jieziyuan Huazhuan</i>	The Mustard Seed Painting Manual
<i>Chia-ming-fan</i>	<i>Jia ming fan</i>	Potash or common alum.
<i>Ch'ien fēn</i>	<i>Qian fen</i>	Lead white.
<i>Chih</i>	<i>Shi</i>	General term for paper.
<i>Chih hua</i>	<i>Zi hua</i>	A vine <i>Mirabilis jalapa</i> , a source of rouge.
<i>Ch'ih shih chih</i>	<i>Chi shi zhi</i>	'Red stone fat', a mixture of red ochre and clay; red ochre.
<i>Ch'ing fen</i>	<i>Qing fen</i>	Azurite.
<i>Ch'ing lu shan shui</i>	<i>Qing lu shan shui</i>	Traditional blue and green landscape paintings.
<i>Ching mien kuang</i>	<i>Jing mian guang</i>	'Mirror smooth' paper.
<i>Chiu Huang Bencao</i>	<i>Jiu Huang Bencao</i>	<i>Herbal for the Relief of Famine</i> , written by Prince Hsiao between 1382 and 1400.
<i>Cihuang</i>	<i>Cihuang</i>	Hen yellow, probably orpiment.
<i>Chop (boat)</i>		Small vessel for carrying passengers and goods.
<i>Chu paio</i>	<i>Zhu biao</i>	Satsuma red or 'red banner': a type of vermilion used for painting garments.
<i>Chu sha</i>	<i>Zhu sha</i>	Vermilion.
<i>Co-hong</i>		Syndicate of about a dozen <i>Hong</i> merchants who owned the <i>hongs</i> and acted as guarantors for western merchants.
<i>Compradore</i>		A victualler for a ship or for the <i>hongs</i> .

<i>Congee</i>		Rice water.
<i>Daqian</i>	<i>Daqian</i>	Type of writing paper.
<i>Erh ch'ing</i>	<i>Er qing</i>	Second blue; a variety of mineral blue.
<i>Ēhr lu</i>	<i>Er lu</i>	Second green; a variety of mineral green.
<i>Erh Ya</i>	<i>Er ya</i>	<i>The Literary Expositor</i> , an early herbal dating from the second century BC.
<i>Fa Tee</i>	<i>Fa Tee</i>	'Flower Land' or 'Flowery land', the nursery gardens lying opposite the Factories on Honam Island, Canton.
<i>Fan</i>	<i>Fan</i>	Alum.
<i>Fan Kwai</i>	<i>Fan Quai</i>	'Foreign devils', a derogatory name given to westerners by the Cantonese.
<i>Fang chieh</i>	<i>Fang jie</i>	An early name for calcite.
<i>Fên hsi</i>	<i>Fen xi</i>	An early name for lead white.
<i>Fên-lin or fên t'a</i>	<i>Fen lin or fen ta</i>	Calquing.
<i>Fu fên</i>	<i>Fu fen</i>	Oyster or clam white.
<i>Fen-pen</i>	<i>Fen pen</i>	Powder copy (pouncing).
<i>Gao Song huapu</i>	<i>Gao Song huapu</i>	<i>Gao Song's Painting Collection</i> , published in the mid-1500s.
<i>Gu Huapu</i>	<i>Gu Huapu</i>	<i>Mr. Gu's Painting Collection</i> , published around 1600.
<i>Ha fen</i>	<i>Ha fen</i>	Shell white.
<i>Hai-ts'ai</i>	<i>Hai cai</i>	Agar-agar.
<i>Han shui shih</i>	<i>Han shui shih</i>	An early name for calcite.

<i>Heizhishi</i>	<i>Heizhishi</i>	Manganese ochre or umber.
<i>Hong</i>	<i>Hong</i>	Any place of business and signified a row of buildings; a Factory or warehouse.
<i>Hong merchants</i>		Principal Chinese merchants through whom trade was conducted at Canton.
<i>Honghua</i>	<i>Honghua</i>	Safflower.
<i>Hongqian</i>	<i>Hongqian</i>	Red lead.
<i>Hoppo</i>		Chinese customs officer who controlled imports and exports at Canton.
<i>Hsiang-t'a</i>	<i>Xiang ta</i>	Tracing with a light source.
<i>Hsiao shan hua pu</i>	<i>Xiao shan hua pu</i>	<i>Methods of Painting and Description of Flowers</i> , written by Chou I-kwei [Zhou yi kui] (1686-1720)
<i>Hsiao shih hui</i>	<i>Xiao shi hui</i>	An early name for calcite.
<i>Hsieh-I or Hsieh-Yi</i>	<i>Xie yi</i>	Style of painting described as 'simplified' or free-hand. March translates <i>Hsieh i</i> as 'free sketch, spontaneous expression' (March, 1935 p.18).
<i>Hsiung huang</i>	<i>Xiong huang</i>	Cock yellow derived from orpiment.
<i>Hsüan chih</i>	<i>Xuan shi</i>	A fine white paper manufactured principally from bamboo pulp.
<i>Hu fên</i>	<i>Hu fen</i>	An early name for lead white.
<i>Hua ch'ing</i>	<i>Hua qing</i>	Flower blue or indigo.
<i>Huai-mi</i>	<i>Huai mi</i>	Sophora yellow.
<i>Huangdan</i>	<i>Huangdan</i>	Literally, 'yellow red' or 'yellow cinnabar', possibly litharge and massicot (lead monoxide).
<i>Huang tan</i>	<i>Huang tan</i>	An early name for red lead.

<i>Hui (blue)</i>	<i>Hui (blue)</i>	Moslem blue.
<i>Hung hua</i>	<i>Hong hua</i>	Safflower (<i>Carthamus tinctorius</i>), a source of rouge.
<i>Hung-tan</i>	<i>Hong tan</i>	Deep red, possibly red lead.
<i>Jiaofanshui</i>	<i>Jiaofanshui</i>	A mixture of animal glue and alum, used as a sizing agent.
<i>Jieziyuan huazhuan</i>	<i>Jieziyuan huazhan</i>	<i>Mustard Seed Garden Painting Manual</i> by Wang, G, Wang, N and Wang, S arranged 1679-1701.
<i>Kêng hua</i>	<i>Geng hua</i>	Chinese scholar tree (<i>Sophora japonica</i>), a source of rouge.
<i>K'o fên</i>	<i>Ke fen</i>	Shell white.
<i>Kongqing</i>	<i>Konqing</i>	Hollow blue; a variety of mineral blue.
<i>Koon or Kuan</i>	<i>Guan</i>	Possibly the origin of the suffix <i>Kua</i> , although this is contested.
<i>Kung Pi</i>	<i>Gong Pi</i>	Style of painting translated as 'fine style' or detailed.
<i>Lamei</i>	<i>Lamei</i>	Wintersweet, <i>Chimonanthus praecox</i> (L).
<i>Lao lu</i>	<i>Lao lu</i>	Old green.
<i>Liao-lan</i>	<i>Liao lan</i>	An indigo-producing plant, <i>Polygonum tinctorium</i> .
<i>Lin</i>	<i>Lin</i>	Free-hand copying.
<i>Lu-chiao</i>	<i>Lu qiao</i>	Deer glue; deer horn glue.
<i>Lü chhing</i>	<i>Lu qing</i>	An early name for malachite.
<i>Mo</i>	<i>Mo</i>	Chinese ink.
<i>Mo-Ku</i>	<i>Mo Gu</i>	A style of painting translated as 'without bone' or 'boneless' in which colours are used without an outline and without linear definition.

<i>Mu</i>	<i>Mu</i>	Tracing.
<i>Mu fang</i>	<i>Mu fang</i>	An exact copy.
<i>Mu ku</i>	<i>Mu gu</i>	Boneless painting i.e. without outline.
<i>Mu tan hung</i>	<i>Mu dan hong</i>	Peony red derived from rouge.
<i>Neng lu</i>	<i>Neng lu</i>	Intense green.
<i>Ni Ku Lu</i>	<i>Ni Ku Lu</i>	<i>Notes on Ancient Household Arts for Maidservants</i> , a work attributed to Chen Ji Ru (late Ming period).
<i>Nun lu</i>	<i>Nun lu</i>	Young or fresh green. A variety of vegetation green.
<i>O chiao</i>	<i>O jiao</i>	Glue made by boiling animal hides (usually donkey).
<i>Pa-Ku</i>	<i>Pa Gu</i>	Painting within outlines i.e. 'with bone'. Opposite of <i>Mo Gu</i> .
<i>Pecul</i> or <i>Picul</i>		Unit of weight equal to 60·5 Kg (approx.).
<i>P' iáo chiāo</i>	<i>Piao qiao</i>	Fish glue.
<i>Po miao</i>	<i>Bo miao</i>	Drawing with contour.
<i>Qua</i>	<i>Qua</i>	Suffix attached to a person's name e.g. Lamqua, said to denote status similar to 'Esquire'.
<i>Qi min yao shu</i>	<i>Qi min yao shu</i>	<i>Important Arts for the Peoples Welfare</i> , a work by Jia Sixie written in the 6 th century AD.
<i>Qiancao</i>	<i>Qiancao</i>	Madder.
<i>Qiandan</i>	<i>Qiandan</i>	Red lead.
<i>Saqing</i>	<i>Saqing</i>	Great blue; a variety of mineral blue.
<i>San ch'ing</i>	<i>San qing</i>	Third blue; a variety of mineral blue.

<i>San lu</i>	<i>San lu</i>	Third green; a variety of mineral green.
<i>Shao fēn</i>	<i>Shao fen</i>	An early name for lead white.
<i>Shaqing</i>	<i>Shaqing</i>	Granulated blue; a variety of mineral blue.
<i>Shēn lu</i>	<i>Shen lu</i>	Deep green.
<i>Shih huang</i>	<i>Shi huang</i>	Mineral yellow, possibly derived from orpiment .
<i>Shih lu</i>	<i>Shi lu</i>	Mineral green (malachite).
<i>Shih ch'ing</i>	<i>Shi jing</i>	Mineral blue (azurite); variations include: <i>t'ou ch'ing</i> , <i>erh ch'ing</i> , <i>san ch'ing</i> , <i>siquing</i> , <i>bianquing</i> , <i>cengquing</i> , <i>shaquing</i> , <i>kongqing</i> and <i>saqing</i> .
<i>Shih huang</i>	<i>Shi huang</i>	Mineral yellow; probably orpiment.
<i>Shih Tze</i>	<i>Shi Ze</i>	The 'Four Knowings' in <i>Hsiao shan hua pu</i> ; namely, <i>ze tian</i> (four seasons), <i>ze di</i> (geography), <i>ze ren</i> (man) and <i>ze wu</i> (botany).
<i>Shizhuzhai shuhua pu</i>	<i>Shizhuzhai shuhua pu</i>	<i>Ten Bamboo Studio Collection of Painting and Calligraphy</i> , published 1643.
<i>Shu shih hui</i>	<i>Shu shi hui</i>	An early name for calcite.
<i>Shuanggou</i>	<i>Shanggou</i>	Double stroke or bone method of painting.
<i>Shuang-kao</i>	<i>Shuang gou</i>	Copying by a combination of tracing and freehand.
<i>Shui fēn</i>	<i>Shui fen</i>	An early name for lead white.
<i>Siqing</i>	<i>Siqing</i>	Fourth blue; a variety of mineral blue.
<i>Su yuan shipu</i>	<i>Su yuan shipu</i>	<i>Plain Garden Rock Manual</i> , a painting manual.
<i>Sung-lan</i>	<i>Song lan</i>	An indigo-producing plant, <i>Isatis tinctoria</i> .
<i>Sung yen mo</i>	<i>Sung yen mo</i>	Pine soot ink.

<i>Swanpan</i>	<i>Suanpan</i>	Abacus.
<i>Ta-ch'ing mu-lan</i>	<i>Da qing mu lan</i>	An indigo-producing plant, <i>Indigofera tinctoria</i> .
<i>Ta-ch'ing</i>	<i>Da qing</i>	Smalt
<i>Tael</i>		Unit of mass equivalent to one sixteenth of a catty.
<i>Tan sha</i>	<i>Dan sha</i>	Finely ground cinnabar producing the same colour as manufactured vermilion.
<i>Taoye Tushuo</i>	<i>Taoye Tushuo</i>	<i>Illustrated Description of Ceramic Making</i> , a book commissioned in 1743 by Emperor Qing Qianlong.
<i>Tchin</i> , also known as <i>Hsien</i>	<i>Xian</i>	The 8 deities or immortals were a superior class of human beings living on mountain peaks.
<i>T'êng huang</i>	<i>Teng huang</i>	Gamboge, also known as rattan yellow.
<i>Thien Kung Khai Wu</i> or <i>Tian gong kai wu</i>	<i>Dian Gong Gai Wu</i>	<i>The Exploitation of the Works of Nature</i> , or <i>On Using the Products of Nature</i> , an encyclopaedia published in 1637 by Song Ying-Xing.
<i>Tien hua</i>	<i>Dian hua</i>	Indigo.
<i>T'ou ch'ing</i>	<i>Tou qing</i>	First blue; a variety of mineral blue.
<i>T'ou lu</i>	<i>Tou lu</i>	First green; a variety of mineral green.
<i>Tsao chüeh</i>	<i>Zao jue</i>	Soap bean glue made from <i>Gleditschia sinensis</i> .
<i>Ts'ao lu</i>	<i>Cao lu</i>	Grass or vegetation green.
<i>Tu Huang</i>	<i>Tu Huang</i>	Yellow ochre.
<i>Wen Jen</i>	<i>Wen Jen</i>	Scholar - painters or literati.
<i>Wen-Jen Hwa</i>	<i>Wen ren hua</i>	Literary Style, a free painting style associated with the <i>Wen Jen</i> .
<i>Wu</i>	<i>Wu</i>	Void. Important concept in Taoism.

<i>Wutong</i>	<i>Wutong</i>	Chinese Parasol Tree, <i>Firmiana simplex</i> (L).
<i>Xiao shan hua pa</i>	<i>Xiao shan hua pa</i>	<i>Painting Manual of Xiaoshan</i> , dated 1740.
<i>Xiesheng</i>	<i>Xiesheng</i>	Used in painting to describe work that is 'true to life'.
<i>Xionghuang</i>	<i>Xionghuang</i>	Cock yellow; (probably) realgar.
<i>Xuan</i>	<i>Xuan</i>	Paper commonly used for painting and calligraphy.
<i>Ya-lan-sê</i>	<i>Ya lan se</i>	Carmine.
<i>Yan zhi</i>	<i>Yan zhi</i>	Rouge.
<i>Yang</i>	<i>Yang</i>	Positive element. Male principle representing light and relating to heaven and the sun.
<i>Yanghong</i>	<i>Yanghong</i>	Foreign red, western red or carmine.
<i>Yang-lan</i>	<i>Yang lan</i>	Prussian blue.
<i>Yen chih</i>	<i>Yan zhi</i>	Rouge.
<i>Yenshi</i>	<i>Yan shi</i>	Rouge.
<i>Yeung-tin-ch'ong</i>	<i>Yong ting hong</i>	Prussian blue factory
<i>Yigong</i>	<i>yigong</i>	Ant ore (lac)
<i>Yin</i>	<i>Yin</i>	Negative element. Female principle representing darkness and relating to the earth and the moon.
<i>Yin chu</i>	<i>Yin zhu</i>	Deep vermilion.
<i>Yü-chiao</i>	<i>Yu qiao</i>	Fish glue; isinglass.
<i>Yu mo</i>	<i>Yu mo</i>	Literally 'oily ink', an inferior ink made from oil.
<i>Yu ti mian hua tu</i>	<i>Yu ti mian hua tu</i>	<i>Imperial Comments on Illustrations of Cotton Culture</i> , published in 1765.

<i>Yu tsu</i>	<i>You zi</i>	Oily residue from the preparation of azurite.
<i>Yuan Hwa Pai</i>	<i>Yuan hua bai</i>	Academic Style of painting adopted by court painters.
<i>Yuzhi Gengzhi Tu</i>	<i>Yuzhi Gengzhi Tu</i>	<i>Pictures of Tilling and Weaving</i> , published in 1696.
<i>Zheshi</i>	<i>Zheshi</i>	Red ochre.
<i>Zicaorong</i>	<i>Zicaorong</i>	Purple shoots (lac).
<i>Zigeng</i>	<i>Zigeng</i>	Purple stem (lac).
<i>Zigong</i>	<i>Zigong</i>	Purple ore (lac).

CHINESE DYNASTIES

APPENDIX III

This chronological table has been adapted from Yan, M (2009).

PREHISTORY-XIA	C. 21 st Century BC-17 th Century BC
SHANG	C. 17 th Century BC-11 th Century BC
WESTERN ZHOU	1046 BC-771 BC
EASTERN ZHOU	770 BC-256 BC
QIN	221 BC-206 BC
WESTERN HAN	202- 9 AD
XIN	8 AD-23 AD
EASTERN HAN	25-220
THREE KINGDOMS	184-280
WESTERN JIN	265-316
EASTERN JIN	317-420
FIVE HU'S AND S SIXTEEN KINGDOMS	504-439
SOUTHERN DYNASTIES	420-589
NORTHERN DYNASTIES	386-581
NORTHERN ZHOU	507-556
SUI	581-618
TANG	618-907
FIVE DYNASTIES AND TEN STATES	907-979
NORTHERN SONG	960-1127
SOUTHERN SONG	1127-1279
WESTERN XIA	1038-1271

YUAN	1271-1368 (Mongol)
MING	1368-1644
SHUN	1644-1646
QING	1644-1912 (Manchu)
REPUBLIC	1912-

APPENDIX IV

LIST OF PLANT DRAWINGS AND COUNTERMARKS ON WESTERN PAPERS

NB. The plant names have been taken from a typed list headed 'REEVES, John' held at RHS Lindley Library.

KEY

N/c= no cartouche, but clear number (These pictures may belong to a separate series)

Pc= number has been partly cut away

?= query e.g. handwriting not clear

N/d= no date on paper

N/w= no watermark

EJD= pencilled number added on the verso by EJD (a bookbinder?)

x by JR= number crossed out by Reeves

S.= Small Volume L.=Large Volume

Reeves no.	Volume / page	Plant name	Paper
1	S.1: 58	Hibiscus rosa-sinensis	J WHATMAN 1805
2 N/c	S.2: 9	Photinia pustulata	N/w
3	S.3: 22	Lawsonia inerma	J WHATMAN 1805
4	S.1: 65	Hibiscus rosa-sinensis	J WHATMAN 1805
5?	S.1: 14	Magnolia coco	J WHATMAN N/d
5 P/c	S.2: 69	Bauhinia acuminate	J WHATMAN 1805
5?	S.2: 58	Sophora japonica	J WHATMAN 1826
6?	S.1: 15	Michelia champaca	J WHATMAN 1805
8	S.2: 40	Rosa chinensis	J WHATMAN 1804
9	S.4: 12	Rhododendron	J WHATMAN N/d
11 N/c	S.4: 17	Enkianthus chinensis (separate series?)	N/ w
12	S.1: 86	Punica granatum	J WHATMAN N/d
13(?) B?	S.4: 109	Ficus superba	M&J LAY 1817

13	S.2: 76	<i>Senna auriculata</i>	J WHATMAN N/d
14?	S.1: 36	<i>Sterculia rubiginosa</i>	J WHATMAN N/d
15	L.2: 33	<i>Chrysanthemum indicum</i>	MOUNTED
16	L.2: 45	<i>Chrysanthemum indicum</i>	MOUNTED
17	S.2: 97	<i>Aglaia odorata</i>	J WHATMAN N/d
18	L.2: 24a & b	<i>Chrysanthemum indicum</i>	MOUNTED
19	L.2: 22a & b	<i>Chrysanthemum indicum</i>	MOUNTED
20	L.2: 50	<i>Chrysanthemum indicum</i>	MOUNTED
20 N/c	L.3: 25 a & b	<i>Paeonia suffruticosa</i>	MOUNTED
21	L.2: 44	<i>Chrysanthemum indicum</i>	MOUNTED
22	S.1: 53	<i>Hibiscus mutabilis</i>	J WHATMAN 1805
23	L.3: 12	<i>Chrysanthemum indicum</i>	MOUNTED
24	L.2: 40	<i>Chrysanthemum indicum</i>	MOUNTED
EJD 24?	S.4: 36	<i>Solanum giganteum</i>	M&J LAY 1817
25	L.2: 34	<i>Chrysanthemum indicum</i>	MOUNTED
26 N/c	S.2: 85	<i>Nephelium</i> spp (separate series?)	N/w
26	L.2: 35	<i>Chrysanthemum indicum</i>	MOUNTED
27 N/c	S.3: 99	<i>Cerbera manghas</i> (separate series?)	N/w
28	L.3: 14	<i>Chrysanthemum indicum</i>	MOUNTED
29	L.3: 13	<i>Chrysanthemum indicum</i>	MOUNTED
30	L.2: 42	<i>Chrysanthemum indicum</i>	MOUNTED
31	L.1: 13	<i>Camellia japonica</i>	MOUNTED
32	L.1: 24	<i>Camellia japonica</i>	MOUNTED
33	L.1: 30	<i>Camellia japonica</i>	MOUNTED
34	L.1: 29	<i>Camellia japonica</i>	MOUNTED
3(5?)	S.4: 105	<i>Daphne odora</i>	J WHATMAN 1805
36	L.1: 3	<i>Camellia</i> (1 of 2 flower heads)	ADHERED
37	L.1: 21	<i>Camellia japonica</i>	MOUNTED

38	L.1: 3	Camellia (1 of 2 flower heads)	ADHERED
39	S.3: 82	Rubia akane	J WHATMAN 182?
40	L.1: 12	Camellia japonica	MOUNTED
42?	S.4: 34	Primula sinensis	J WHATMAN N/d
42 N/c	L.3: 27 a & b	Paeonia lactifolia	MOUNTED
43	L.3: 23	Paeonia suffruticosa	MOUNTED
44	L.3: 24	Paeonia suffruticosa	MOUNTED
45	S.5: 38	Dendrobium sp	J WHATMAN N/d
46?	S.1: 23	Nelumbo nucelifera	J WHATMAN 1805
47	S.2: 70	Bauhinia scandens	J WHATMAN N/d
48	S.1: 66	Hibiscus rosa-sinensis	J WHATMAN 1805
49	S.4: 129	Jatropha multifida	J WHATMAN N/d
54	S.4: 82	Clerodendrum squamatum	J WHATMAN 1805
55	S.3: 25	Lagerstroemia indica	N/w
56	S.3: 26	Lagerstroemia speciosa	J WHATMAN N/d
57	S.4: 81	Clerodendrum wallichii	J WHATMAN N/d
60	S.1: 62	Hibiscus rosa-sinensis	ADHERED
62	S.1: 90	Melastoma sanguineum	J WHATMAN 1805
64	L.2: 39 a & b	Chrysanthemum indicum	MOUNTED
65	L.3: 6 a & b	Chrysanthemum indicum	MOUNTED
65? 67? 45?	S.2: 62	Derris fordii	J WHATMAN 1826
66	L.3: 30 a & b	Chrysanthemum indicum	MOUNTED
67	L.2: 19 a & b	Chrysanthemum indicum	MOUNTED
68	L.3: 8 a & b	Chrysanthemum indicum	MOUNTED
69	L.2: 21a & b	Chrysanthemum indicum	MOUNTED
70	L.2: 18 a & b	Chrysanthemum indicum	MOUNTED
71	S.5: 51	Lycoris aurea	J WHATMAN 1805
73	L.1: 35	Camellia japonica	MOUNTED

74	S.2: 109	Kum Kwat	J WHATMAN 1805
EJD 75	S.1: 49	Malvaceae	M&J LAY 1817
75? 78?	S.2: 110	Citrus reticulata	J WHATMAN 1805
7(6?)	S.2: 113	Citrus reticulata	J WHATMAN 1805
EJD 77	S.1: 13	Annona squamosa	J WHATMAN 1805
7(7?)	S.2: 114	Citrus sinensis chang	J WHATMAN 1805
7(8?)	S.2: 115	Citrus sinensis	J WHATMAN 1805
80	L.3: 16	Paeonia suffruticosa	MOUNTED
81? 21? 31?	S.2: 33	Rosa banksiae	J WHATMAN 1805
82	L.1: 43	Camellia japonica	MOUNTED
84	S.2: 42	Rosa chinensis	J WHATMAN 1805
85	S.4: 4	Rhododendron simsii	J WHATMAN 1805
87	S.4: 16	Rhododendron simsii	J WHATMAN 1805
EJD 88	S.4: 138	Cunninghamia lanceolata	J WHATMAN N/d
88	S.2: 22	Prunus dulcis	J WHATMAN 1805
89	S.2: 37	Rosa chinensis	J WHATMAN 1794
91	S.2: 43	Rosa chinensis	J WHATMAN 1805
93	S.1: 16	Magnolia denudate	J WHATMAN 1805
94	S.4: 14	Rhododendron simsii	J WHATMAN 1805
95	S.3: 76	Pavetta indica	J WHATMAN 1805
EJD 95	S.1: 33	Impatiens balsaminia	M& J LAY 1817
97	S.5: 3	Lilium concolor	J WHATMAN 1805
EJD 97	S.2: 19	Prunus armeniaca	J WHATMAN 1805
98?	s.1: 28	Nandina domestica	J WHATMAN 1805
100	S.4: 120	Aleurites mollucana	J WHATMAN 1805
EJD 100	S.2: 15	Pyrus pyrifolia	J WHATMAN 1805
103	S.1: 38	Sterculia balanghas	J WHATMAN 1805
105	L.2: 16b	Chrysanthemum indicum	MOUNTED

106	L.2: 26 a & b	<i>Chrysanthemum indicum</i>	MOUNTED
EJD 106	S.4: 77	<i>Limnophila sessiliflora</i>	M&J LAY 1817
107	L.2: 23 a & b	<i>Chrysanthemum indicum</i>	MOUNTED
108	L.2: 38 a & b	<i>Chrysanthemum indicum</i>	MOUNTED
EJD 108	S.3: 8	<i>Hovenia dulcis</i>	J WHATMAN N/d
109	L.3: 10 a & b	<i>Chrysanthemum indicum</i>	MOUNTED
110	S.2: 121	<i>Citrus medica</i> var <i>sarcodactyla</i>	J WHATMAN 1805
111	L.1: 19	<i>Camellia japonica</i>	MOUNTED
112	S.2: 23	<i>Prunus japonica</i>	J WHATMAN 1805
113	S.5: 35	<i>Dendrobium moniliforme</i>	J WHATMAN 1805
114	L.3: 17	<i>Paeonia suffruticosa</i>	MOUNTED
115	S.5: 26	<i>Cymbidium sinense</i>	J WHATMAN 1805
116	S.4: 22	<i>Rhodendron simsii</i>	J WHATMAN 1805
117	S.5: 14	<i>Daiswa polyphylla</i>	J WHATMAN 1805
118	S.2: 41	<i>Rosa roxburghii</i> <i>rosa microphylla</i>	J WHATMAN 1805
119?	S.3: 122	<i>Osmanthus fragrans</i>	J WHATMAN N/d
120?	S.3: 16	<i>Garcinia parvifolia</i>	J WHATMAN N/d
121	S.2: 101	<i>Melia azedarach</i>	J WHATMAN 1805
122	S.5: 39	<i>Vanda</i> sp	J WHATMAN N/d
124	S.1: 22	<i>Nelumbo nucifera</i>	J WHATMAN 1805
126	L.2: 27	<i>Chrysanthemum indicum</i>	MOUNTED
127? 177?	L.1: 23	<i>Camellia japonica</i>	MOUNTED
128	L.1: 6 a & b	<i>Camellia japonica</i> and <i>reticulate</i>	ADHERED
129	L.1: 10 a & b	<i>Camellia reticulate</i>	ADHERED
130	L.1: 38	<i>Camellia japonica</i>	MOUNTED
131	L.1: 5 a, b, & c	<i>Camellia reticulate</i>	ADHERED
132	L.1: 4	<i>Camellia reticulate</i>	ADHERED
133	L.1: 9 a & b	<i>Camellia japonica</i> and <i>C. reticulate</i>	ADHERED

135	L.1: 8 a & b	Camellia japonica and C.reticulate	ADHERED
137	S.5: 4	Lilium longiflorum	J WHATMAN 1794
140	S.2: 127	Clausena lansium (fruit) Cookia punctata	M&J LAY 1817
141	S.3: 79	Mussaenda pubescens	J WHATMAN N/d
141	S.1: 36	Plant name not listed on RHS sheets	J WHATMAN N/d
142	S.5: 28	Cymbidium aloifolium	J WHATMAN N/d
143	S.5: 114a & b	Lilium brownii/Memecylon floribundum	J WHATMAN N/d
144	S.4: 145c	Eleocarpus chin. Adenodus (Chinese)	ADHERED
145	S.2: 67	Erythina variegata	J WHATMAN N/d
147	S.2: 64	Wisteria sinensis	J WHATMAN N/d
148	S.3: 69	Serissa foetida cvs	J WHATMAN N/d
149	S.2: 129	Clausia anisata	ADHERED
150	S.3: 32	Begonia picta	J WHATMAN N/d
151	S.5: 43	Curcuma showing phyllody	J WHATMAN N/d
152	L.2: 41	Chrysanthemum indicum	MOUNTED
153	L.3: 5	Chrysanthemum indicum	MOUNTED
154 N/c	L.3: 7 a & b	Chrysanthemum indicum	MOUNTED
155	L.3: 4 a & b	Chrysanthemum indicum	MOUNTED
156	L.2: 46 a & b	Chrysanthemum indicum	MOUNTED
157	L.2: 49 a & b	Chrysanthemum indicum	MOUNTED
158	L.3: 19 a & b	Chrysanthemum indicum	MOUNTED
159	L.2: 43	Chrysanthemum indicum	MOUNTED
160	S.4: 11	Rhododendron kiyosumense	ADHERED N/w
161	L.1: 7 a, b, & c	Camellia reticulata+ 2 C. japonica	ADHERED
EJD 161	S.5: 17	Hydrocharis dubia	M&J LAY 1817
162	L.3: 26	Page in volume but not on RHS typed list	MOUNTED
EJD 162	S.4: 48	Heliotropum indicum	J WHATMAN N/d
163	S.5: 12	Iris japonica	M&J LAY 1817

164	S.4: 54	<i>Justicia ventricosa</i>	ADHERED
EJD 164	S.5: 32	<i>Dendrobium catenatum</i>	M&J LAY 1817
165	S.2: 10	<i>Photinia villosa</i>	ADHERED
EJD 166	S.3: 90	<i>Strophanthus dichotomus</i>	J WHATMAN 1805
166	S.5: 25	<i>Cymbidium floribundum</i>	ADHERED M&J LAY 1817
168	S.2: 38	<i>Rosa multiflora</i>	M&J LAY 1817
172	S.3: 93	<i>Tabernaemontana divaricata</i>	M&J LAY 1817
173	S.5: 94 a & b	<i>Ailanthus altissima/Erythrina variegata</i>	M&J LAY 1817
174	S.1: 26	<i>Argemone mexicana</i>	ADHERED M&J LAY 1817
175	S.3: 92	<i>Urceola spec</i>	M&J LAY 1817
176	S.2: 84	<i>Nephelium spp</i>	M&J LAY 1817
178	S.1: 96	<i>Gctonia floribunda</i>	M&J LAY 1817
179	S.3: 87	<i>Marsdenia sp</i>	M&J LAY 1817
18? P/c	S.1: 3	<i>Clematis triloba</i>	M&J LAY 1817
181	S.5: 113b	<i>Quisqualis indica</i>	M&J LAY 1817
183	S.5: 46	<i>Alpinia intermedia</i>	M&J LAY 1817
185	S.1: 95	<i>Viburnum plicatum</i>	ADHERED
EJD 186	S.1: 11	<i>Artabotrys hexapetalus</i>	J WHATMAN 1805
186	S.2: 55	<i>Ormosia calavensis</i>	M&J LAY 1817
186 (x by JR)	S.2: 54	<i>Ormosia glauca</i>	M&J LAY 1817
EJD 187?	S.2: 91	<i>Canarium album</i>	M&J LAY 1817
188	S.2: 73	<i>Caesalpinia sappan</i>	M&J LAY 1817
EJD 188	S.2: 87	<i>Litchi chinensis</i>	J WHATMAN 1805
190	S.1: 42	<i>Byttneria herbacea</i>	M&J LAY 1817
191	S.2: 79	<i>Caesalpinia sappan</i>	M&J LAY 1817
192	S.5: 99 a & b	<i>Strychnos nux vomica/Bridelia monoica</i>	M&J LAY 1817

193(x by JR)	S.4: 55	<i>Eranthemum bicolour</i>	M&J LAY 1817
193	S.5: 80 a & b	<i>Milletia speciosa</i> + <i>Camellia sinensis</i> (fruit)	M&J LAY 1817
194	L.1: 22	<i>Camellia reticulate</i>	ADHERED
195?	S.5: 117a & b	<i>Aspidistra elatior</i>	M&J LAY 1817
197	S.4: 122	<i>Aleurites montana</i> + <i>fordii</i>	J WHATMAN N/d
199	S.5: 84a	<i>Ficus benjamina</i>	J WHATMAN 1794
EJD 205	S.3: 101	<i>Plumeria acutifolia</i>	M&J LAY 1817
207	L.2: 48a & b	<i>Chrysanthemum indicum</i>	MOUNTED
208 N/C	L.2: 30	<i>Chrysanthemum indicum</i>	MOUNTED
209	L.2: 25 a & b	<i>Chrysanthemum indicum</i>	MOUNTED
211	S.5: 88(2 pages)	<i>Cotoneaster</i> sp	J WHATMAN 1804
EJD 221	S.5: 66	<i>Pothos chinensis</i>	M&J LAY 1817
EJD 222	S.1: 8	<i>Uvaria littoralis</i>	J WHATMAN 1805
EJD 223	S.1: 10	<i>Polyalthia rumphii</i>	J WHATMAN 1805
EJD 22(4?)	S.1: 12	<i>Artabotrys hexapetalus</i>	M&J LAY 1817
EJD 225	S.4: 53	<i>Aeschynanthus /ceylanica</i>	M&J LAY 1817
EJD 226	S.4: 146	<i>Eleaeocarpus hulletti</i>	M&J LAY 1817
EJD 226	S.3: 9	<i>Euonymus chinensis</i>	M&J LAY 1817
EJD 230	S.3: 6	<i>Salacia prnoides</i>	J WHATMAN N/d
EJD 231	S.2: 6	<i>Skimmia laureola</i>	J WHATMAN N/d
EJD 233	S.3: 42	<i>Disoxylum hongkongensis</i>	M&J LAY 1817
EJD 235	S.1: 5	<i>Clematis florida</i>	M&J LAY 1817
EJD 238	S.4: 142	<i>Lycopodium</i> sp	J WHATMAN N/d
EJD 239	S.3: 64	<i>Gardenia amoena</i>	M&J LAY 1817
EJD 243	S.5: 71	<i>Spinifex littoreus</i>	J WHATMAN N/d
EJD 249	S.2: 108	<i>Gordonia axillaris</i>	M&J LAY 1817
EJD 251	S.4: 37	<i>Solanum lyratum</i>	M&J LAY 1817

EJD 252	S.3: 30	Cotyledon sp.	J WHATMAN N/d
EJD 254	S.2: 60	Cassia sp	M&J LAY 1817
EJD 256	S.3: 83	Psychotria sp	M&J LAY 1817
EJD 259	S.4: 125	Aleurites fordii	M&J LAY 1817
EJD 260	S.4: 24	Aegiceras majus (Pittosporum)	M&J LAY 1817
EJD 270	S.5: 81	Alangium sp	M&J LAY 1817
EJD 271	S.4: 131	Castanea mollissima	J WHATMAN N/d
EJD 277	S.1: 43	Byttneria aspera	M&J LAY 1817
EJD 282	S.3: 47	Loropetalum chinense	M&J LAY 1817
EJD 285	S.1: 74	Memecylon edule	M&J LAY 1817
EJD 287	S.4: 78	Scoparia dulcis	M&J LAY 1817
EJD 29(1?)	S.2: 12	Photinia serratifolia	M&J LAY 1817
EJD 293	S.4: 136	Bischofia javanica	M&J LAY 1817
EJD 317	S.3: 94	Melodinus monogynus	M&J LAY 1817
EJD 321	S.3: 52	Symplocos chinensis	M&J LAY 1817
EJD 331	S.4: 117	Phyllanthus emblica	J WHATMAN 1794
EJD 336	S.5: 42	Cleisostoma paniculatum	J WHATMAN N/d
EJD 339	S.4: 23	Rhododendron simsii	M&J LAY 1817
EJD 342	S.3: 55	Callicarpa rubella	M&J LAY 1817
EJD 343	S.2: 128	Clausena anisata Cookia anisata	M&J LAY 1817
EJD 344	S.3: 53	Symplocos lancifolia	M&J LAY 1817
EJD 345	S.4: 44	Solanum scaforthianum	M&J LAY 1817
EJD 348	S.2: 105	Schima wallichii	J WHATMAN N/d
EJD 353	S.4: 39	Cestrum sp.?	M&J LAY 1817
EJD 355	S.3: 1	Aquilaria chinensis	M&J LAY 1817
EJD 359	S.4: 38	Solanum sp	M&J LAY 1817
EJD 364	S.2: 80	Adenanthera pavonina	M&J LAY 1817
EJD 373	S.4: 66	Lycium chinense	M&J LAY 1817

SAMPLE OF COMPLETED RECORD SHEET

APPENDIX V

Volume Small II	Page 76	Date 29-1-09
Description Full-page drawing of <i>Cassia corymbosa</i>. Accompanied by Chinese characters and transliteration yet: } given by Reeves? Hoey y?ay Kun Ja Beneath Linnaean name - "The Chinese name signifies 'Flower which opens in the Day and shuts in the Evening'. This writing appears to be in same hand as plant name		
Condition <u>Paper</u> - surface dirt - ingrained dirt - cockled on 3 sides - mould staining esp. around page edge. Particularly prevalent top L.H. Side. 2 types: small grey spots and larger pinkish circular staining. - pale brown staining consistent with water damage <u>Painting</u> - loss of green and yellow pigment. Offset onto verso of page 75. Green pigment has lifted from pale and dark green leaf areas. - yellow/orange pigment migrated into surrounding paper. - under-drawing in graphite visible		
Additional Notes - HS stamp bottom RH corner. Reeves number 13 - WHATMAN watermark. No date. (Watermark near edge of page) - English writing is in iron gall ink. - Chinese ink v. black and well preserved. Photos taken of yellow pigment (orpiment?) (x100 Mag) " " " " mould (x100 Mag) RHS have plant listed as <i>Senna auriculata</i>		

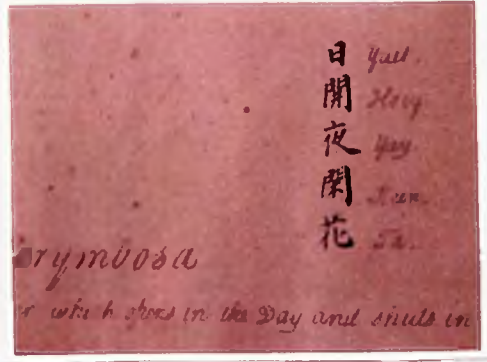
f. 76



page layout



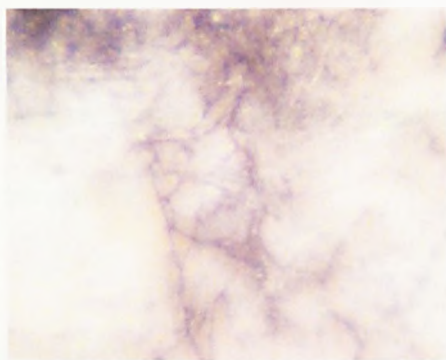
chinese and English writing



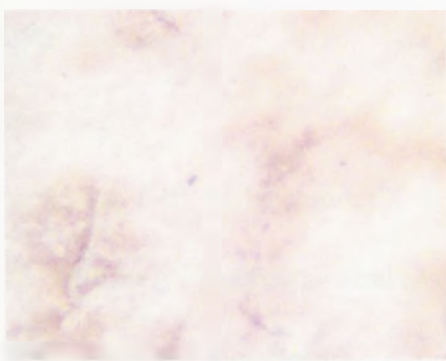
Close-ups of Chinese and English writing



P. 7m



Grey mould sp. x 100 mag

Green mould stain above small chips
of blue pigment - azurite?

x 100 mag Paper lines. white powder.

← azurite stain
autum. stain
yellow pigment

← blue pigment,
or pigment?
flame petal area

EQUIPMENT AND MATERIALS**APPENDIX VI**

Handheld UV light (Preservation Equipment Ltd, Vines Rd, Diss, Norfolk).

ICS-Texicon multilight (Visual inspection chamber with UV inspection facility).

Lumagny 100 x LED handheld microscope.

Messmer micrometer.

Nikon Polarizing microscope-Optiphot-Pol.

Olympus E420 digital camera (used with microscope).

Olympus C-460 Zoom del sol digital camera.

Olympus CX40 Stereo microscope.

Satorius electronic top pan balance (3 Kg- 0.01 gm resolution).

Spectratech Inspect IR Plus (FTIR) with an ATR sampling head (Avatar 360 FT-IR).

VSC-1 Foster and freeman Ltd. (Video spectral comparator).

Heat-set tissue: Preservation Equipment Ltd, Vines Rd, Diss, Norfolk.

Pigments: Man Luen Choon of 2/F, Harvest Bldg, 29 Wing Kut St, Central, Hong Kong.

Apricot kernels: Queenswood Natural Foods Ltd TA6 4AW sourced from
Hailsham Healthfoods, Hailsham, East Sussex BN27 1AF.