

## Introduction

### *Searching for its real substance*

The substance of painting in China is the focus of this investigation. This book is a report of the factors that were involved in the research, and of the process of the investigation. At the beginning of this research, in 1999, my first goal was to find a solid starting point that I could use as touchstone. I had to find a fixed marker in time and place that could serve as a reference for the long and complicated history of paint in China.

After long deliberation, it was obvious to me that the Murals in the Qianling Tombs of the Tang dynasty fell within the parameters I desired, and that they would well serve my purpose. At that point, I had to explore the possibility of actually using these 8<sup>th</sup> century tomb murals as the indisputable marker of time and materials of Chinese painting technique. The greatly-appreciated cooperation of the staff of the Shaanxi History Museum contributed more than I could ever have hoped for when I started this investigation. The paintings of three 8<sup>th</sup> century Tombs thus comprise the vital primary source of solid evidence about the paint. Technical art studies of the chosen works of art are the main approach in this study. I wanted to investigate the technique and method of painting, and therefore, enchanting as the paintings are, the parts that I am looking for are those that are least beautiful, most damaged, and even broken up. From these parts, samples of paint and of the underlying structure were taken to be examined in the laboratory. With the use of sample analysis they deliver conclusive evidence about the nature and complexity of paint in China in the Tang dynasty. In art history, the most-studied topics have been iconography and questions of historical and social context, but this relatively new field of technical art studies attracts more and more attention.

The secondary focus is an approach from another angle: the information contained in the written texts of roughly the same period and later dates. This corpus of texts also serves as primary source in my discourse on the subject of painting.

### *Questions on material aspects*

A number of questions are raised about the substances and techniques used in the murals and in other works of art of the same era. The most important are:

Firstly, what is the nature of the paint: the physical substances and materials of which the mural is made?

Paint is a colouring matter that is composed of a colourant, which can either be of mineral or organic nature, and a binder. This binder or medium is the vehicle that carries the pigment or dye. For example, in oil painting the binder is some kind of oil, and in tempera painting gelatine or egg yoke. What ingredients, therefore, are used to make the paint?

Secondly, pigments have to be ground and diluted in suspension. How are these ingredients mixed and prepared?

Thirdly, a painting needs a support that has a suitable surface on which to paint, such as paper, silk or a wall. Each of these supports needs to be prepared and smoothed in a specific way. How are the walls in these tombs constructed and prepared to accept the paint? How are the paper and silk supports prepared?

All these questions steer the investigation into two directions:

To begin with, there is the question of physical substance of the paintings, which is explored throughout the study; in general terms in Chapter 1, and specifically and in more detail in Chapters 3, 4 and 5.

In addition, there are relevant literary references, which are covered (to the extent deemed necessary) in Chapters 2 and 3.

### *The Location of the Paintings*

In the first chapter, a clear distinction has to be made between the murals in the storeroom of the Shaanxi History Museum, which form the focus of my attention and will be marked with [S], and the murals still in situ in the tomb, which will be marked with [T]. There are only very few examples left of the paintings in this early period besides the murals. Paintings on silk and paper are few and scattered around the world. They are much more fragile than the murals, and not available for examination. This was the reason to incorporate data from paintings of a later period that could be tested, or had accessible records of test-results.

Therefore some sections in the chapters relate to paintings of different periods and techniques, such as paintings on silk and paper in the collection of the Freer Gallery of Art, Smithsonian Institution, Washington D.C. (USA); these will be clearly marked as such in the text.

In all chapters, whenever I give a description of some part of the examined paintings the description will only extend so far as it contributes to a better understanding of the materials and techniques involved in the creation of these paintings. To be more explicit: it will never be an iconographical or art-historical description, and the availability of sample evidence of the materials involved is the only reason for the inclusion of these specific pieces in this study. For reasons of preservation of the art works, many parts of the paintings can and will not be discussed, despite their interest, simply because their surface cannot be touched or examined closely enough.

This is a hybrid study, which touches the fields of sinology, conservation studies, fine art and technical art studies. This poses a number of problems in the writing style of the book, because each field has its own rules and standard for presenting the questions, the research and the results. Many times it felt like juggling 4 or 5 balls at the same time, and compromises had to be made in all directions to balance the end result. I hope the interested reader will bear with me through the parts that lay beyond their interest.

#### *Classical Chinese sources on the matter of painting*

Most of the written sources on painting are used in Chapter 2 to recover traces of earlier thinking on the subject of painting. Such written thoughts and contemplations on painting in the Chinese texts may shed some light on the contemporary perception of painting. In addition, and this is even more important for this study, I hope they will reveal something of the practical and physical side of painting: the conception and creation of paintings. For the discussion of the perspective of the painter Guo Xi (1020 – 1090) in Chapter 1, I have used an edition of his *Essay on landscape painting (Lin-chuan Gaoji ji)*, edited by Zhang Anzhi, *Shanghai Renmin Meishu Chubanshe*, 1959, and a Netherlands publication, *Het Chinese Landschap*, Jan Poortenaar, Amsterdam, 1936.

At the start of the study, a new edition of a series on Chinese texts about art had just been published; the translations of several texts are based on two of the books in this series: *Discourse on painting of the Tang and Five dynasties (Tang Wudai Hualun)*, 1997 [Xiao 1], and *Discourse on painting and calligraphy of the Han and Wei Dynasties and the Six States*

(*Han Wei Liuchao Shuhualun*), 1997 [Xiao 2], both published by *Hunan Meishu Chubanshe, Changsha*. The publication is in simplified characters, and its limitations became obvious when I encountered some simplified characters replacing rarely-used characters. In the earlier publications using the traditional more complicated form of the characters, this problem would not have occurred, although we must assume that most texts are corrupted over time. For the problematic parts I have used another version of the texts that were in Yu Jianhua's *Various texts on painting in China (Zhongguo Hualun Leijun)*, of which several editions were published subsequently in 1957, and which was revised in 1973 [Yu Jianhua 1] and again in 1986.

For the *Famous Painters of all Dynasties (Lidai minghuaqi)* a very nice scientific edition with an index was published in Japan, the text of which is based on four Ming and Qing editions of Zhang Yanyuan's text. This Japanese edition was used for the translation of the parts I have taken from Zhang Yanyuan's book *Lidai minghuaqi: Rekidai Meigaki*, Taniguchi, Tokyo, 1981. [Zhang Yanyuan 2]

In searching for a specific kind of information about painting, for historical and philosophical information I would like to refer the reader to the relevant publications. For example: the *Lidai minghuaqi* has been translated and annotated in overwhelming detail by W. B. Acker in his books *Some Tang and pre-Tang texts on Chinese Painting*. [Acker 1, 2, 3]

In both primary sources, the texts and the empirical research, I encountered substances with a variety of names and properties, that needed to be indentified. A discussion of all the substances involved, such as mineral pigments and vegetable dyes, forms the basis of Chapter 3. This section is not, and cannot be, fully complete at this point in time, and this topic remains a main theme for further study. The chapter is arranged in two sections because of the (often unclear) division between two types of material: the mineral and the organic colourants.

The mineral paint of China is dominated by local minerals like cinnabar, red earth, malachite, azurite, realgar, orpiment, china clay, chalk and such. They are found locally or are imported from other areas in China; some areas have an abundance of these mineral ores. Apart from

the more commonly-known minerals and colour names, there are some others of a more dubious nature. Mica, for one, is a mineral that is rarely mentioned in art-historical books. An important source for Chapter 3 is a book by Yu Fei'an: *The research of Chinese Painting Colours (Zhongguo huihua yanse de yanjiu)* [Yu Fei'an 1]. The book by Yu Fei'an was translated in English by Jerome Silbergeld and Amy McNair in 1997. I have translated Yu's book in Dutch for my MA thesis in 1997, and used parts of it for comparison with my knowledge of western painting materials. For this book it was also necessary to use my own translation in view of the specific technical nature requiring a painter's knowledge rather than a literary approach.

One of the least-researched areas of painting technique in China is the use of vegetable dyes and other organic materials. Although some textile experts and archaeologists have worked on this subject, so far its connections with painting have largely been ignored. In this section I argue that vegetable dyes comprise a genuine paint material. I combine the knowledge from the fifth century farmer's handbook *Techniques essential for the subsistence of common people (Qimin yaoshu)* [Jia Sixie 1], with examples of paint in which, as proven by scientific methods, a vegetable dye has been used. The 17th century *Chinese Technology in the Seventeenth Century (Tiangong kaiwu)* by Song Yingxing and the 20th century *Wang Xu and Textile Archaeology in China* by Zhao Feng are among the books that I will use for reference in this chapter. Finally, yet importantly, I will show from the evidence presented by the analysis of several samples of artworks, that these vegetable components are sometimes mixed with another vegetable dye or, even more surprisingly for China, with a mineral component.

#### *Secondary Western sources on the matter of Chinese painting*

The encyclopedic work *Science and Civilization in China* initiated by Joseph Needham is generally recognized as an important source for research connected to the field of Chinese science or the history of Chinese science. It is divided in volumes dealing with a specific field, for example: *Volume V, Chemistry and chemical technology*. Each volume is divided into parts, and most parts of the series were written in collaboration with specialists of a specific field of interest: *Volume V, Chemistry and chemical technology. Part 1, Paper and Printing*

(1985) is written with the collaboration Tien Tsien-hsui, and *Volume VI, Biology and Biological Technology, Part 2, Agriculture* (1984) with the collaboration of Francesca Bray. However, because there is no specific volume or part in the series that is dealing with the technical aspects of painting or painting materials, Needham's work consequently has to be considered as a secondary source for the present research project. References to Needham are limited to the entries where they provide extra information to my test results of the primary sources: the paintings and the samples.

Later in this study I discuss the problem of taking Needham as the only source in this kind of scientific research with the example of recent research by P. J. Gibbs and K. R. Seddon published in 1998: '*Huangbo* and berberine'. Based on a statement in Needham volume 5, part 1, p 74-75, they applied scientific analysis to the raw materials, with an unclear result. As they state: 'Needham's series... is considered the authoritative source... : this enforces the belief, but still does not prove that *huangbo* is the origin of the Diamond Sutra's [868 CE] coloration.' I argue that the problem with this approach results from the fact that western researchers in this field are chemists and are not trained to read the original Chinese source, in order to correct possible mistakes by Joseph Needham and collaborators.

An important source I have used in this study is the translated series *Chinese Materia Medica*, a project that was started in the nineteen-twenties by a group of western scholars translating Li Shizhen's classic book on Chinese medicine: *Bencao gangmu*. Each specific field was worked by a scientist of a related western field, resulting in a series of books each with a specific type of material such as 'Dragon and snake drugs', 'Aviation drugs' and 'Animal drugs'. The section of the book I have used 'Compendium of minerals and stones' was first published in 1928 by B. E. Read and C. Pak. The writers consulted many Chinese editions to collect elaborate listings of the various names for each mineral and stone in Chinese characters. Some names of the substances are also known in connection with painting, and provide a tool for further research. For this reason they are incorporated in chapter 3, to each list I have added the pinyin transcription, my English translation and photographs of the mineral. In this manner they provide a basic set of terms for raw materials. For cross reference of these names and other terms the index at the end of this book can serve as a key to both pinyin-term and translation.

The seventeenth century *Tiangong kaiwu*, by Song Yingxing is another important source on Chinese materials and technical matters. For each relevant citation in my study I have compared the original Chinese text with the English translation by E-tu Zensun 'Chinese technique in the seventeenth century', and decided to adapt Zensun's reliable translation. If necessary I have replaced transcription systems in the citations of these books with pinyin transcription.

### *The use of original samples*

The samples taken from three Tombs of the Qianling Mausoleum form the core topic of Chapters 4 and 5. The samples are presented and put into the context of contemporary Chinese research in this field. The processing of the samples for analysis is reported in two ways. Firstly, the general steps in the research process are described, to give an overall view of the factors involved. Secondly, a specific sample, ZQX1, was followed through the whole process of investigation. This sample serves as an example for the various steps of analysis, in order to give a detailed account of exactly how samples were handled. Finally, the results that are discussed in previous chapters are displayed with the use of graphs, figures, photographs and tables.

### *The need for information*

The need for the restoration and conservation of works of art fires constant development in the scientific research into art and the technical aspects of works. In the Shaanxi History Museum, a group of scientists is working closely with restorers, painters and curators. Zhang Qunxi, a chemist working on the research of conservation techniques, has undertaken a study on the fading of colours under local circumstances. He compared three groups of samples of traditional paint on paper: one group was placed in the storeroom of the Museum; the second group was placed in the dark, protected against light but not against environmental influences such as air pollution; and the third group was placed in his laboratory without any specific protection from the local environment. He measured the spectra of the samples and compared them with those made after a period of six months. He showed me the results, which indicate

the influence of air pollution and dirt. For some substances, this influence is much greater than for others. Iron oxide is relatively stable, and gold is completely undisturbed. Vermilion was disturbed by moisture, which produced little black spots on the sample; silver is seriously disturbed and turns partly black, whereas sap green is relatively stable.

This kind of research is conducted to raise the level of understanding of the behaviour of different substances under various circumstances. It is directed towards the specific practical use of the results of research in conservation practice. Aside from this kind of practically-driven research, the study of the substances in a wider scientific context is of the utmost importance. In this book I hope to deliver my part to the canon of knowledge: a small addition to the understanding of the materials and substance of paint.