



Figure 1: Detail of the top of the 18th century marquetry toilette and writing table by Leleu. (No. F110; The Wallace Collection, London, UK)

Coloured Woods on Eighteenth-Century Furniture

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ABSTRACT: Marquetry has long been used as a mean of decorating furniture and wooden artefacts. Widely used in Europe from the 15th century onwards, marquetry involved the use of various materials such as wood, metals, stones, shells, and animal derivatives. To date no reference has been found on the dyeing techniques and ingredients used at the time.

The pictorial technique employing colourful woods became particularly popular in the 18th century as “Painting in wood.” Craftsmen employed colourful woods to achieve realistic effects. Where the natural colours of the materials available failed to offer the desired range of colours, artificial colouring was successfully carried out by many artists and cabinet makers. The results of experiments with various dyes and woods offered an alternative to more expensive, rare and naturally coloured woods.

Recipes developed depending on the local availability of colouring ingredients, which included a great variety of both natural and artificial ingredients, leading to extensive variations in formulations and manufacture in different areas. Such recipes, often borrowed from the textile industry, were kept secret but details can be found in many historical references of the period, such as *L'art du Menuisier* by J.A. Roubo and *L'Encyclopédie ou Dictionnaire Raisonné des Sciences des Arts et des Métiers* by Diderot and D'Alembert, both printed in the second half of the 18th century.

There seem to be similarities between most recipes. In England Salmon, in 1685, suggested a mixture of indigo and urine to dye blue wood which had been previously boiled in alum water; and a mixture of copper filings and nitric acid to dye wood in green. In 1796 Dossie, suggested either copper or indigo as blue dyes for wood; and a mixture of verdigris and vinegar, or crystals of verdigris and water, to dye wood green. In France Roubo, in 1774, reported on a mixture of indigo and sulphuric acid to dye wood in blue; and a mixture of indigo and yellow, or a blue dye on a yellow wood, to dye wood in green. In Italy Bonanni, in 1786, suggested a mixture of quicksilver, sulphur and ammonium chloride to stain wood in blue; and a mixture of verdigris, litharge, quicksilver and urine to stain wood in green.

The techniques and materials used in the past produced different colours, some of which can still be admired today on period wooden artefacts decorated with marquetry.

Conservators should have an insight and understanding of the processes to carry out analysis aimed at the identification of the materials used and at the preservation of the surviving examples.

Introduction

IN 1996 I WAS EMPLOYED BY THE WALLACE Collection, a national museum in London, to carry out the conservation of an 18th century toilette and writing table (Philp 1997). The table (*fig. 1*) is decorated on the sides with geometric patterned marquetry achieved with woods such as natural tulipwood and green-stained sycamore. On the top a combination of natural and artificially coloured woods was used to achieve a colourful and realistic decoration consisting of a basket of flowers.

Unfortunately the colours have faded or changed to shades of beige, brown and black producing a misleading monochromatic effect, thus obscuring some of the finer decorative engravings. This motivated me to carry out further research into the colorants used during the 18th century to better understand the original intent of these elaborate designs and to trace the manufacture and development of recipes for the dyeing and staining of woods.

Historical references

Marquetry and coloured woods have been used all over the world for centuries as means for decorating furniture and wooden artefacts. The Egyptian, Greek and Roman craftsmen were said to have tested various materials and techniques to colour woods to replace more expensive, rare and natural coloured ones.

The art of colouring woods, refined through the centuries, reached its peak in the Renaissance period in Italy and later, in the 17th and 18th centuries, in Holland, Germany and France.

In the 18th century, under the rule of Louis XV and subsequently Louis XVI, France became a centre for the arts. Foreign artists were employed by the court and the aristocracy to work alongside some of the best local craftsmen in the production of works of art of outstanding quality. Cabinet-makers working for the court and aristocracy made extensive use of colour and precious materials to express opulence and wealth. They competed with each other in the production of elaborate patterns which still can be admired in museums all over the world.

Among the most famous cabinetmakers were Oeben and Riesener, both of German origins, who in the second half of the 18th century produced intricate marquetry panels to decorate furniture (*fig. 2*). Marquetry allowed the imitation, in wood, of paintings, hence the name “painting in wood” for such technique. Craftsmen sought specific colours, such as greens and blues, which are not found naturally in woods. Unfortunately most craftsmen were very secretive about their knowledge, especially those involved with the colouring of woods. This is not surprising considering the secret practice of most early guilds.

The 18th century, referred to as the century of enlightenment, saw an increase in published scientific writing. In order to increase and preserve the high standards of technology, the Royal Academy of Science in Paris set standards for scientific writings and approved them for publication. Because their creators closely held most recipes, many were lost with the death of their user and such practice slowed down the development of techniques. However, publications such as *L'Encyclopedie* by Diderot and D'Alembert, and *L'Art du Menuisier* by Roubo, both published in the second half of the 18th century, report on similar processes of colouring woods and on recipes used to achieve various colours.

Most certainly Roubo's formulas for stains and dyes derived from a knowledge acquired from German and Flemish cabinet-makers in Paris, and from the master dyers working in the textile industry. In the 3rd section of the 3rd part of his *L'Art du Menuisier* (written in 1774), he mentions the five primary colours of woods: yellow, black, red, brown and blue, with the last being the only colour naturally unavailable on wood; and the secondary colours, or mixed colours, resulting from mixing primary colours, with green also naturally unavailable. According to Roubo's observations on dyeing, blue woods can be produced by treating light-coloured woods, such as sycamore and boxwood, with a mixture of sulphuric acid and a blue dye, such as indigo. Green woods can be produced by dyeing the same woods with a yellow dye, such as that from the plant weld (*Reseda luteola*), mixed with indigo, or by using indigo on its own on a yellow wood such as barberry. A third method



Figure 2: Detail of the top of the 18th-century marquetry table by Oeben (No. 71.DA.103; The J.P. Getty Museum, Los Angeles, CA)

reported by Roubo consists of using verdigris pigment and vinegar on light coloured woods.

Veneers, usually 3-4 mm thick, would first be soaked in water for about three days, and alum (aluminium potassium sulphate) often added as a mordant for dyes. The temperature of both the soaking water and the dyeing mixture is important. Cold baths, rather than hot, are often recommended; some dyes cannot be heated, and a long cold bath insures that the dye better penetrates the wood, without damaging its fibres. A soaking time of fifteen days to one month is often required, but this depends on the hardness and thickness of the woods as well as on the type of the dye. Thin and medium hard woods can be soaked for only one or two days. Roubo also mentions that tests carried out regularly secure better results, as even woods of the same type but from different batches or part of the tree can absorb the dye less uniformly and produce different shades of colour.

In the 18th century others in Europe were inter-

ested in the dyeing techniques and materials. In 1764 the English Dossie, in his *Handmaid to the Arts*, mentions indigo as a dye to colour woods green, with a dyeing process very similar to that described by Roubo.

In 1786 the Italian Bonanni, influenced by the amount of exciting new information spreading quickly over the borders, wrote the *Trattato sopra la Vernice*. In this book he reports on ingredients such as quicksilver (mercury), litharge (yellow lead oxide) and sal ammoniac (ammonium chloride) being occasionally added to dyeing mixtures. The role of such ingredients is currently uncertain, although we can guess that they served as mordants for specific dyes.

As previously mentioned, craftsmen kept their recipes secret, preventing others from becoming familiar with the dyeing processes and at the same time preventing their development and improvement. Furthermore, when the information was released this was often either incomplete or inaccurate and undoubtedly of little help to others. Factors such



Figure 3: View of the 18th century marquetry roll-top desk by Riesener. (No. F102; The Wallace Collection, London, UK)

as the following undoubtedly affected the results: quality and quantity of ingredients involved in the dyeing processes; quality of woods to be dyed and dimensions of pieces; preparation procedures and times; duration of the dyeing processes; and any additional requirement, such as heating up the dye or boiling woods in it, turning the woods over periodically, stirring the mixture, carrying out several dyeing processes alternated with mordant baths or drying periods. This information doesn't often appear in texts, and if it does, it is incomplete and rather confused.

It is interesting that neither Roubo nor other craftsmen succeeded in discovering or recreating the secret recipe behind the successful and still well-preserved greens achieved by Riesener, which were the source of great admiration by many. Most recipes mentioned in historical references seem to be very similar to each other, so one can not help wondering about the ingredients used by Riesener to produce beautiful greens displayed on some of

his marquetry furniture. One example is a roll-top desk in the Wallace Collection in London (*fig. 3*). The desk is decorated with rich and complex marquetry panels all over, but the only areas still displaying colour in its pristine condition are the two green medallions at the front of the roll top. Most of the other colours, which would have originally given life to the scenes on the panels, have completely faded. Because of the almost total absence of colour from the decorative marquetry, the green medallions stand out more clearly (*fig. 4*). On close inspection the green colour looks saturated and uniform. It somehow appears different from green coloured woods still surviving on other pieces of marquetry furniture from the same period and displayed in various collections. The green colours visible on other pieces of furniture in comparison, appear almost transparent and, in certain cases, irregularly distributed. No references exist to establish the materials Riesener made use of to achieve such colour, nor enough studies conducted to the same purpose. We can only make some



Figure 4: Detail of one of the medallions on the desk by Riesener. (The Wallace Collection, London, UK)

considerations, which hopefully will offer a new direction for further research. As already mentioned, the green colour on the roll-top desk looks saturated. If we assume that it was produced with a combination of pigments, or of pigments and dyes, maybe the no-colour fastness would be explained. Although this is pure speculation, it might offer a new ground on which to base further studies.

The blue pigment Prussian blue, which was discovered by Diesbach in 1704 in Berlin, Germany, was used throughout the 18th century in various European countries by craftsmen and artists. Pierre Joseph Macquer, who became inspector of the Dye Industry in Paris in 1765, discovered the use of Prussian blue as a dye for silk, which is reported in his *L'Art du teinturier en soie*.

As craftsmen experimented with and tested alternative materials, Prussian blue could have well been another element in the list of ingredients employed in the process of dyeing woods. After all, the particles of Prussian Blue are almost as fine as those of a dye, which accounts for good penetration into the wood grain and good tinting properties, especially when dissolved in mineral acids.

Another important characteristic of this pigment is certainly the fact that it is very little affected by light and air, and this could prove its presence on some pieces of furniture after so many years. However, one reason behind the limited use of Prussian blue pigment could be its cost, although craftsmen and artists working for the court and the aristocracy would have had no problem in getting hold of more expensive and rare materials, especially those imported. For example an alternative to Prussian blue was the verdigris pigment. Verdigris was widely produced in Montpellier, France, in the 18th century, and this certainly would account for its ready availability to craftsmen and for its relatively low cost.

Riesener probably came in contact with and got interested in experimenting with the most recent discoveries of his time in his country through contacts in Germany, and long before the pigment was produced in Paris at the end of the 18th century. At the time De Pierre, a French student of Diesbach, the German inventor of Prussian blue, returned to Paris from Germany and set up a small production of Prussian blue pigment.



Figure 5: Central panel of the front of an 18th-century Dutch cabinet. (The Rijksmuseum, Amsterdam, NL)

Conservation issues

In ancient times craftsmen and artists were aware of the damage caused by light and other environmental conditions, and their effect on the degradation of materials. For this reason tests were often carried out to establish material properties, such as colourfastness. Roubo in the fourth part of his *L'Art du Menuisier* (written in 1775) reports on the degradation of colours of both natural and artificially

coloured woods. As colour was extremely important in marquetry panels executed with the “painting in wood” technique, Roubo recommends treating the surface by applying a white varnish, or “varnish of Venice,” made of a mixture of natural plant resins such as mastic, sandarac, gum elemi, and applied in several coats. This type of finish, according to Roubo, protects the marquetry from handling and the colours from fading. The barrier constituted



Figure 6: Detail of the back of some pieces of marquetry from the lower part of the proper right panel of the 18th century Dutch cabinet. (The Rijksmuseum, Amsterdam, NL)

by the thick layer of varnish prevents contact between the marquetry and oxygen and moisture, therefore allowing colours to be preserved longer. However, with time even the best varnish would show signs of age.

Over the centuries oxidation and degradation of finishes have caused restorers and craftsmen to replace the disfigured finishes with new ones to improve the appearance of and provide protection to artefacts. Each time a finish is removed either by chemical or mechanical means, some unavoidable damage is caused to the underlying surface. Through the centuries a piece of furniture might have undergone the process of varnish removal several times and probably lost some of the colours with it.

The toilette and writing table in the Wallace Collection, for example, has been in the collection for about half of its life, and in this time it underwent restoration at least three times, each treatment involving the removal of a non-original and degraded finish and the application of a new

one (Philp 1997). Although the marquetry panels displayed no traces of natural or artificial colour, upon completion of the cleaning, the contrast between the different types of woods was restored, therefore causing an improvement in appearance. An interesting change was however noticed under ultraviolet light. Barberry wood, typically a natural bright yellow wood when first cut, promptly oxidises in air, its colour turning ochre. After cleaning, the pieces of barberry wood veneer present on the marquetry on the table fluoresced bright yellow. No other change was noticed, probably implying that the original colours had either faded completely, leaving no traces, or changed irreversibly into completely different ones.

The Verdigris pigment also changes drastically in colour. Light-coloured woods were often dyed with verdigris to produce different shades of greens to be used for foliage on floral patterned marquetry panels. Verdigris oxidises when in contact with air and exposed to light, turning from bluish green to dark brown. This would explain the dark brown leaves and stems of flowers on several pieces of

marquetry furniture, whereas a green colour would seem more appropriate.

Studies on coloured woods on Dutch marquetry furniture, conducted at the Instituut Collectie Nederland by Wilma Roelofs and Judith Hofenk de Graff, revealed that some of the dyes used on wood were the same used to dye textiles (Roelofs 1994). The tests were carried out in occasion of the treatment of a late 18th-century piece of furniture at the Rijksmuseum in Amsterdam, Holland (*fig. 5*). Due to conservation some marquetry panels were removed, and the original colours appeared on their reverse side. Samples were taken from each coloured wood and analysed with Thin Layer Chromatography (TLC). The results of the analysis identified colouring materials such as indigo (blue), weld (yellow), brasilwood (red), and Persian berries (red) (*fig. 6*).

Although the analysis of organic dyes is nowadays often carried out with HPLC (High Performance Liquid Chromatography) and with GC-MS (Gas Chromatography-Mass Spectrometry), large samples displaying remnants of colouring materials are usually required for both types of analysis. This sets innumerable limitations to the development of research in a field which could certainly benefit from specific information such as that on colouring materials used to dye wood. Non-disruptive analytical methods should be used, when possible, to establish the nature of colouring materials still present on some artefacts. For example, metal compounds, such as verdigris and Prussian blue pigments, and alum (aluminium potassium sulphate) could be identified with FTIR (Fourier Transform Infrared microspectroscopy), and some inorganic elements with SEM-EDS. Also XRF (X-Ray Fluorescence) could be used to identify inorganic materials without the need for sampling.

Conclusions

Research on the manufacture and processes of dyeing veneers in the 18th century, carried out on historical references, can provide invaluable information towards the understanding of a technique popular as “painting in wood.”

Craftsmen who experimented with materials and chemicals, were able to produce ingenious and highly skilled results. Their knowledge derived

from experience and information borrowed from other fields, such as the textile industry, the fine arts, and the scientific field. Many craftsmen were reluctant to pass their knowledge to others, but fortunately some realised the importance of shared information, which has reached us via a considerable amount of sources.

Roubo in the 18th century in his *L'Art du Menuisier* remarks that the techniques and materials used to dye woods cannot become rule to the theory because of their inaccuracy. However, such information can be used today as a starting point for further research aided by current analytical techniques.

An insufficient number of studies have been conducted on artificially coloured woods to justify a casual approach to the subject. Conservators need to increase their knowledge and become familiar with the risks involved in a treatment.

A database of information gained from historical references, together with the results of scientific analysis would help to draw conclusions on colouring materials present in woods. It would also be useful in the investigation of potential chemical reactions between colouring materials and materials used during restoration, therefore providing an invaluable contribution to the field of furniture conservation.

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