



Trading Paintings and Painters' Materials 1550–1800

CATS Proceedings, IV, 2018

Edited by Anne Haack Christensen and Angela Jager

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Back cover illustrations: (top left) Victor Wolfvoet (II) or circle, *The Horrors of War*, after 1636, oil on copper, 55.9 × 49.5 cm, private collection, Denmark (photo: Frida Gregersen); (top right) Philippe-Jacques de Loutherbourg, *Landscape with Horse and Oxen Cart*, 1770–80, oil on panel, 31.8 × 47.6 cm, Yale Center of British Art, New Haven, inv. no. B1981.25.220 (photo © the Yale Center for British Art, Paul Mellon Collection); (bottom left) Workshop of Jacob de Wet, *Christ and the Woman Taken in Adultery*, oil on panel, c.50 × 93 cm, private collection, Denmark (photo: Frida Gregersen); (bottom right) Freti Danici or Sundt accuratiss Delineatio (Kronborg Castle and the Sound) in G. Braun and F. Hogenberg, *Civitates orbis terrarum / Georgius Bruin et Franciscus Hogenbergius. – Coloniae Aprippinae: Godofridum Kempensem, 1577–1588, Book 4, Plate 26* (32 × 47 cm) Det Kgl. Bibliotek/Royal Danish Library.

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CONTENTS

<i>Foreword</i>	vii
Painting in a wider world: developments in the trade in painters' materials <i>Jo Kirby</i>	1
Flemish dealers and a thriving transatlantic art trade during the 17th century <i>Sandra van Ginhoven</i>	15
Quantity over quality? Dutch and Flemish paintings in a Danish private collection <i>Angela Jager</i>	26
The trade in painters' supplies in 17th-century Denmark <i>Anne Haack Christensen</i>	39
Jens Juel and the business of portrait painting <i>Tine Louise Slotsgaard</i>	50
Smudges, sponges and 17th-century Dutch painting <i>Rozemarijn Landsman</i>	63
Found in translation: exploring Dutch influence on 18th-century British landscape painting <i>Kari S. Rayner</i>	77
London, 1600–1800: trading artists' materials with Europe and worldwide <i>Jacob Simon</i>	88
The market of art materials in Quebec at the end of the 18th century: a study of Canadian artist François Baillaigé's <i>Journal</i> (1784–1800) <i>Pierre-Olivier Ouellet</i>	99
Archaeological evidence of Venetian trade in colouring materials: the case of the Gnalić shipwreck <i>Katarina Batur and Irena Radić Rossi</i>	111
<i>Efficienza e unione</i> : practical considerations for using coloured grounds in 16th-century Italy <i>Moorea Hall-Aquitania</i>	121
'Che altri che lui non lo fa': making ultramarine blue in grand ducal Florence <i>Sheila Barker</i>	130
An unusual pigment in 16th-century Ferrara: 'Egyptian blue' in Garofalo's <i>Adoration of the Magi</i> and Ortolano's <i>St Margaret</i> <i>Giulia Sara de Vivo, Annelies van Loon, Petria Noble, Airi Hirayama, Yoshinari Abe, Izumi Nakai and Duncan Bull</i>	136
The polychrome wooden sculptures of the Jesuit reductions in Paraguay: a technical study <i>Julia Brandt, Corinna Gramatke and Isabel Wagner</i>	149

FOREWORD

The fourth international CATS conference, *Trading Paintings and Painters' Materials 1550–1800*, took place at the National Museum of Denmark 21 and 22 June 2018. The conference focused on the emerging international markets and their implications for artistic production in early modern Europe (1550–1800), in particular in relation to the trade in paintings and artists' materials. The successful conference involved 18 enlightening and innovative presentations, including two keynote lectures by Dr Sandra van Ginhoven (Getty Research Institute) and Dr Jo Kirby Atkinson (emerita NG, London).

Under the most competent editorial management of Dr Anne Haack Christensen and Dr Angela Jager, this volume presents 14 lavishly illustrated contributions on various aspects of the trade in artworks and artists' materials in the early modern period. Whether based on art-historical interests or studies of our material culture, this book will be of interest to academic scholars and students as well as museum professionals, curators, conservators, art historians and conservation scientists.

We hope that you will find the fourth volume of the CATS conference proceedings stimulating and enjoyable as well as inspiring for further studies. As with the previous three volumes in the series, this volume is available as a paperback book from Archetype Publications.

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PAINTING IN A WIDER WORLD: DEVELOPMENTS IN THE TRADE IN PAINTERS' MATERIALS

Jo Kirby

ABSTRACT The supply of materials used by artists in Europe developed between the 16th and the 18th century. Even in earlier centuries, the trade in painters' materials had been international as many, from the Near East and Southeast Asia, were traded as spices. With the discovery of the Americas, new materials such as cochineal, and new sources for familiar materials such as indigo, became available. These and other sources of dyestuffs were important commercial items for Spain and Portugal, but much of the international trade was subsequently taken over by the Netherlands and England. The materials passing through 1690s London provide a good example of those that were available. Certain cities, such as Venice, where there was a demand for paintings and a thriving population of well-trained painters to supply them, had always been known for the availability of good quality artists' materials and specialist suppliers, such as colour merchants, were established here earlier than elsewhere. These merchants took over the trade from the apothecaries and grocers who had previously supplied painters' materials. By 1800, some of the suppliers who became household names in the 19th century, such as the precursors of the Paris company Lefranc, were already in existence.

Introduction

The materials used by European artists were obtained from sources across the known world, some relatively local, others from further afield; this was as true around 1500 as it had been centuries earlier. Many of the pigments, gums, oils and resins used in paints and varnishes were supplied from local mines, quarries or plant sources. However, sandarac resin came to Europe from Northwest Africa, gum arabic and gum tragacanth from the Near East, and lac and sappanwood – sources of red dye used in pigments and inks as well as for dyeing – from India and Southeast Asia. Badakhshan in northern Afghanistan was the source of lapis lazuli ultramarine. The wood for panels and the linen for canvases came mainly from within Europe.

Shortly before 1500, this pattern changed. The loss of the city of Constantinople to the Ottoman Turks in 1453 disrupted international trade between Europe and countries to the east. As time went by, however, attempts were made to find alternative routes to obtain the spices, textiles and other goods needed for the European market. These routes were just as significant for the import of artists' supplies as several important materials, including the sources of red dye and ultramarine mentioned above, arrived in Europe from the

Near East, India and Southeast Asia. It should also be borne in mind that historically, 'spices' was a very broad heading that included substances used as drugs, pigments and other products that would now be considered grocery commodities or chemicals.

Trade between continents

In 1492, Christopher Columbus set off to find a route to Asia and its riches by travelling west, rather than east. As is well known, he succeeded in discovering, not Asia, but the Caribbean Islands and parts of South and Central America in this and later expeditions. In the early decades of the 16th century, Hernán Cortés and other Spanish explorers capitalised on this success, conquering Mexico and Central America and extending Spain's possessions into the northern parts of South America.

Meanwhile, an extensive period of Portuguese exploration of the eastern Atlantic Ocean and the west coast of Africa had been taking place with the primary aim of accessing the mineral wealth of Africa, particularly gold, more easily. A few years after Columbus had sailed west, Vasco da Gama set sail

Table 1 Cochineal imports into Spain in the 16th and 18th centuries.

Time period	Average amount exported per year (<i>arrobas</i>)	Average amount exported per year (kg)	Total amount exported in stated period (<i>arrobas</i>)	Total amount – equivalent in tonnes
1556–65	2,132.45	24,523.18	21,324.5	245.23
1566–75	6,434.3	73,994.45	64,343	739.94
1576–85	8,335.8	95,861.7	83,358	958.62
1586–95	6,749.4	77,618.1	67,494	776.18
1596–1600	7,500	86,250	37,500	431.25
1717–20	9,366.5	107,714.75	37,466	430.86
1721–30	7,886.45	90,694.18	78,864.5	906.94
1731–38	8,850.13	101,776.44	70,801	814.21
1747–50	17,926.75	206,157.63	71,707	824.63
1756–65	15,980.15	183,771.73	159,801.5	1,837.72
1766–70	18,769	215,843.5	93,845	1,079.22
1771–78	28,432.66	326,975.59	227,461.3	2,615.81

Note: 1 *arroba* (Spain) = 11.5 kg

down the African west coast, around the southern Cape of Good Hope and across the Indian Ocean to Calicut in India. By 1520, Portuguese ships, following this route and travelling east, had reached Malacca on the Malay Peninsula, the Spice Islands (the Moluccas, Indonesia) and Guangzhou in southern China, while Ferdinand Magellan, leading a Spanish expedition sailing west from the Americas across the Pacific Ocean, also reached the Spice Islands and the Philippines.¹ No longer were Venice and the Italian city states the principal players in eastern trade, as had been the case a century earlier.

Within 20 or 30 years, the world had become a very much larger place with a hitherto unimagined range of resources to be exploited. Spain acquired an empire and fleets of Spanish ships crossed the Atlantic laden with the riches of the New World and Portugal set up trading posts in India and the Far East and, later, colonised Brazil.² However, it became impossible to maintain all these activities in such a widespread empire, as the countries of northern Europe began to play a more active role in commerce in the 17th century.³ Early in the 16th century, Antwerp in Flanders benefited from its trading connections with Portugal and Spain, supplying much of Europe with sugar, dyes and other goods from the New World. This was not to last: after the sack of the city by the Spanish in 1576 and its fall after a year-long siege in 1585, commercial interests moved north to Amsterdam.⁴

The Netherlands and England established their own colonies and trading bases in the Caribbean and North America, India and Southeast Asia, interests that were pursued aggressively as well as actively. Dutch trade from the Americas was in the hands of the West India Company (West-Indische Compagnie, WIC), while that to and from Southeast Asia and India was controlled by the East India Company (Vereenigde Oostindische Compagnie, VOC), both founded early in the 17th century. Batavia (present-day Central Jakarta), on the north coast of Java, established in 1619, became the capital of the Dutch East Indies.⁵ The English East India Company, which received its royal charter in 1600, set up trading posts in India and, later, China, becoming ambitious and powerful in its territorial ambitions in the 18th century.⁶ As France gained colonies in the New World, French merchant trade also expanded considerably from the mid-17th century.⁷

New materials and new sources for old materials

Although artists' materials formed a very small proportion of the goods traded within Europe and between Europe and the rest of the world, the colour industries taken in a wider sense were an important market. Some textile dyes were also used in the production of artists' pigments: the red dyes kermes, madder and the soluble redwoods (sappanwood, brazilwood), the blue dye indigo and yellow dyes, including weld. Another group of expensive insect red dyes obtained from a different family of crimson-dyeing scale insects, incorrectly known as Old World 'cochineals', were rarely used for pigment preparation.⁸

By the early 16th century, the Spanish conquistadors had observed the use of a source of red dye very similar to the kermes insect they knew in Spain, but much richer in dye: cochineal. In 1523 Emperor Charles V of Spain wrote to Cortés asking about reports of the *grana* found in Mexico and if it was worth importing. The first consignments appear to have arrived in Seville in 1526.⁹ Within a short space of time, Seville became the central point from which goods from the Spanish Empire were re-exported: cochineal, for example, was supplied to Antwerp, Rouen and Livorno, from Livorno on to Florence and Venice, and from Antwerp across Europe.¹⁰ Lodovico Guicciardini, writing in 1567, described the cochineal sent from Spain to Antwerp that was then exported to Ancona, Venice and Milan in Italy, and France.¹¹ At that time Antwerp was also the source of Spanish and Portuguese brazilwood, supplied to countries in northern Europe.

Cochineal became one of the most valuable and substantial items of trade for Spain from the second half of the 16th century (the period from which figures exist) until late in the 18th century. Its production, centred in Oaxaca, Mexico, was a Spanish monopoly throughout this period; it was not until the breakup of the Spanish Empire in the 19th century that other South American countries started to profit from the cochineal trade. Spain also established a successful and profitable cochineal production in the Canary Islands: the amount exported varied from year to year, depending partly on local



Fig. 1 Diego Velázquez, *Portrait of Archbishop Fernando de Valdés*, 1640–1645, oil on canvas, 63.5 × 59.6 cm, The National Gallery London, inv. no. NG6380. Cochineal lake was used for the curtain. (Photo © The National Gallery, London.)

conditions, but by the 18th century the quantities traded were quite considerable (Table 1).¹²

Cochineal's value was due to the considerable amount of dye it contained – about 20% of the mass of the body of the insect. In practice, this translated into the fact that a quantity of cochineal equivalent to 7% of the weight of wool cloth to be dyed would give a scarlet colour requiring at least 71.5% of this weight of kermes insects,¹³ or to put it another way, 1 kg of cochineal would dye over 14 kg of wool cloth for which over 10 kg of kermes would be needed. This economy and efficiency in use more than compensated for the cost of purchasing the insects. In the 16th century, red lake pigments containing expensive scale insect dyes such as kermes were made from clippings or shearings of dyed fabric rather than from the insects themselves. As cochineal came into use by European dyers, first on silk and later on wool, lake pigments containing cochineal dye were made in the same way. Cochineal was used for dyeing in Venice around 1543 or shortly after, and by the later 1540s, cochineal lake pigments were being employed by Titian and Lorenzo Lotto. By the 1570s crimson lakes named

as such – *laca di cremese*, for example – were appearing in accounts for the purchase of materials.¹⁴ Thereafter cochineal lakes became the most widely used red lake pigment well into the 19th century (Fig. 1).

Cochineal was also significant technologically in a way that no other natural dyestuff had been: the substantial quantity of dyestuff present, chemically almost entirely carminic acid, led to the development of carmine, a pigment that was essentially the precipitated dyestuff. While this process appears to have been studied during the earlier 17th century in Italy, the method to produce the extremely richly coloured pigment seems to have been developed in France. By the 1670s French manuals on painting practice mention the pigment for use in watercolour; by the time Pierre Pomet described the pigment in 1694, he added that it was 'pour faire ces belles Draperies rouges, que nous voyons aux tableaux de conséquence' (to make these beautiful red draperies that we see in picture of consequence).¹⁵ Following the discovery that the use of tin-containing mordants while dyeing wool with cochineal gave a brilliant scarlet colour, recipes using solutions of tin in

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Amsterdam mit 64 Stueck; und
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mit 64 Stueck; und
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97. 36

Fig. 2 Entry recording the passage of Clas Jansen Dass, sailing from Amsterdam through the Sound to Danzig, 26 October 1728. His cargo includes 50 lb vermilion. (Sound Toll Registers Online record 586582, image 192_0203. Sound Toll Registers Online by the Soundtoll-project is licensed under a Creative Commons Attribution-NonCommercial 3.0 Unported License.)

aqua regia (giving tin(IV) chloride) to precipitate carmine from cochineal solutions were developed in the 18th century. The bright red, tin-containing pigments formed became extremely popular in 19th-century French painting practice.¹⁶

Other dyeing materials were also found in Central and South America and the Caribbean islands: redwoods and indigo, logwood, the yellow wood fustic and the orange dye annatto. Indigo was already known in Europe as it had long been imported from India and the east, and before 1500 was probably used more as a pigment, its use as a dye (particularly on wool) being restricted by the powerful woad industry. The Spanish introduced the Asian indigo plant (*Indigofera tinctoria* L.) into Central America during the 16th century and cultivated this and native American species in Guatemala and other parts of Central America and the Caribbean. The French, British and Dutch also established indigo plantations in the West Indies and the southern states of North America. Like the sugar industry, however, what was to become an enormous industry was heavily dependent on the import of slave labour from the west coast of Africa.¹⁷ As more and

more indigo entered Europe from India and the Americas, the European woad industry could no longer compete and gradually declined.¹⁸ As an example, Spanish colonies exported 11,250 pounds of indigo (5,180.63 kg) from America in 1576; 20 years later, in 1595, they exported 116,150 pounds (53,487 kg).¹⁹

The soluble redwood sappanwood, the source of a brilliant red dye, had been imported into Europe from India and Southeast Asia for several centuries before 1500. As its dye was easily extracted into water, and the colour could be manipulated by the use of vinegar or alkalis for the extraction, it was widely used for making inks and pigments.²⁰ It was also an important textile dye, despite the fact that, as the colour was known to be fugitive, its use was restricted. The discovery of vast supplies of woods with the same properties – by the Portuguese in Brazil and the Spanish in Honduras, Cuba and other Caribbean countries – made these woods extremely valuable commercially and they soon appeared in Europe. It is a well-known fact that prisoners in late 16th- and 17th-century Amsterdam were put to work rasping the wood for use in the prison known as the Rasphuis.²¹ Logwood, a related species that gives blue, grey and black dyes, was a new discovery – far more significant as a textile dye than as a painting material. Its use for purplish washes in watercolour, on prints or maps for example, was suggested by some 17th- and 18th-century authors, but it was not popular as the colour reverted to red quite quickly.

Fustic, an important dye for brownish-yellows and browns on textiles, was used less in painting and decorative techniques. It too had a European analogue, which looked similar and gave similar results. As a consequence, the new wood was given a similar name – *palo fustete* in Spanish and old fustic in English – to its botanically unrelated European equivalent. Annatto, obtained from the fleshy coats of the seeds of the shrub *Bixa orellana*, was new to Europe. It was little used in painting, although recipes for making cochineal pigments, including carmine, sometimes utilised it to offset the tendency for the crimson pigments to turn purple.²² Robert Dossie, writing in 1758, gave a recipe for cochineal lake using two ounces of cochineal and half an ounce of ‘the best annatto’, commenting that ‘This lake will be very fine if luckily managed, and will stand extremely well: it will also be very scarlet if the cochineal and annatto be good.’ In addition, he provided a recipe for an orange lake, although he admitted that the colour was fugitive.²³

International trade in practice

The movements of materials, the comings and goings of barrels of oil, bales of madder and hundredweights of ochres and dyewoods through any particular port were recorded. It is often possible to follow the large-scale traffic of goods but it is far harder to track down the movements of small amounts of materials of the type often used as artists' pigments.

An interesting example is provided by the Sound Toll Registers. These are extensive records of the tolls levied at

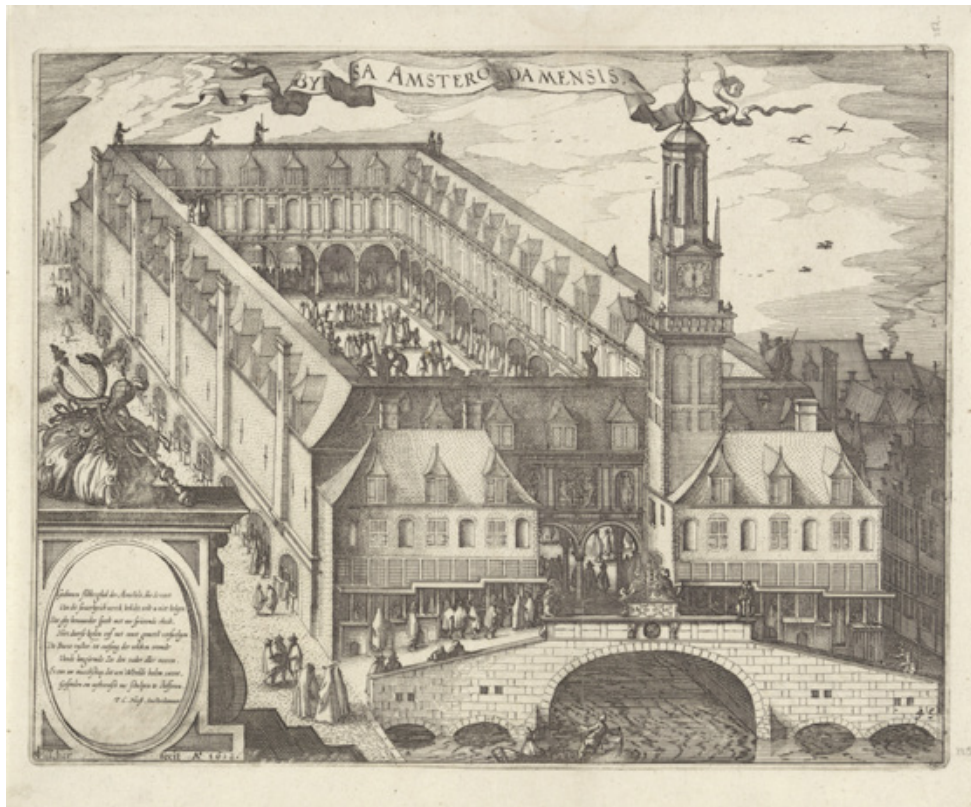


Fig. 3 Claes Jansz. Visscher (II), *Byrsa Amsterodamensis: Birds' Eye View of the Beurs* by Hendrik de Keyser, Amsterdam, 1612–1648, etching/engraving on paper, 256 × 326 mm, Rijksmuseum, Amsterdam, inv. no. RP-P-1880-A-3841.

Elsinore on behalf of the king of Denmark on shipping passing through the Sound between Denmark and Sweden. They were maintained from 1497 until the toll was abolished in 1857 and are almost complete after 1574. In principle, the data recorded include the date, the shipmaster's name and home town, the ports of departure and (after the mid-1660s) destination, and, most importantly, the composition of the cargo and the toll. Movements of goods to and from ports around the Baltic Sea can therefore be examined. To take two examples from the vast amount of data available, on 31 May 1750, the shipmaster Johan Rosinsky from Danzig (Gdańsk), sailing from Bordeaux to Danzig, with a cargo including 1220 pounds of indigo and 313 pounds of verdigris, passed through the Sound.²⁴ Similarly, on 26 October 1728, Clas Jansen Dass from Amsterdam, sailing from Amsterdam to Danzig, paid tolls on a cargo including 50 pounds of vermilion (Fig. 2).²⁵ These entries are typical of trade records of this type in that they document the movements of materials such as dyewoods, cochineal, smalt, ochres, resins, lead white and linseed oil: goods traded in relatively large amounts and in some cases also quite expensive. Small amounts of material, such as a packet of lake pigment or ultramarine, are unlikely to be recorded in this type of document.

The goods brought into Amsterdam from the Dutch East Indies by the VOC and those from the Americas all found their way to the commodity market, the handsome Amsterdam Beurs built by the city architect Hendrick de Keyser (1565–1621) (Fig. 3). Amsterdam developed its role as an *entrepôt* – an international commodities market – when

many people with commercial interests moved north from Antwerp after 1585. The earliest extant list of commodities dates from 1585, and even though Amsterdam's role as a commodities market for high value goods that were not bulky (spices, for example), as well as lower value, high volume goods (wood, grain), was in its infancy, indigo, cochineal, verdigris and vermilion are listed along with '*bresille ho[n]t Fernabock*' (fernambuco or pernambuco wood).²⁶ These lists appeared intermittently until 1609. Prices for the most important goods were then published weekly as *prijscouranten* (lists of current prices) until 1796, then twice a week until 1813. An example of a *prijscourant* dated 3 March 1636 includes Mestique and common cochineal (Mestique being higher quality and more expensive), indigo from Guatemala, fernambuco wood (brazilwood), other dyewoods including fustic and logwood, and woad.²⁷ The information provided by these lists also shows that, for example, both pernambuco or fernambuco wood from South America and sappanwood from India and Southeast Asia were imported: brazilwood is recorded as being imported from 1609 until 1813; sappanwood from 1640 to 1703, then sappanwood specifically from Siam (Thailand) from 1703 to 1797.²⁸ Sappanwood was usually the cheaper of the two throughout the period, but either could have been employed for dyeing and for making the brazilwood lake pigments used throughout the period; the colouring matter, brazilein, is the same in both woods.²⁹

Goods imported and exported through English ports and the duties paid on them were recorded throughout the medieval and modern periods in several different types of

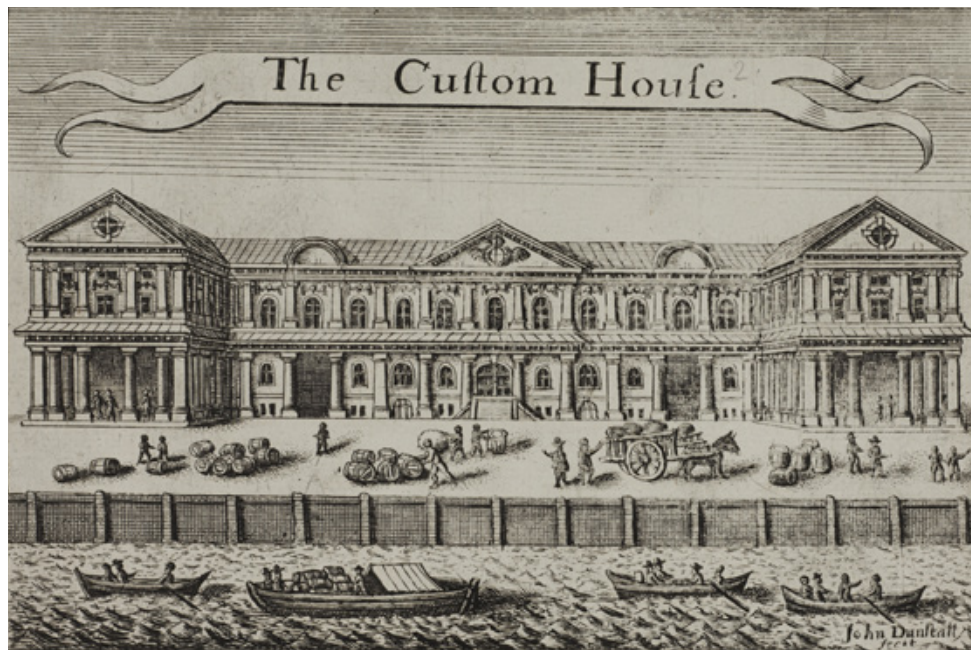


Fig. 4 John Dunstall, *View of the Custom House, London, from the River Thames*, c.1670, engraving. Here all cargo was unloaded and could be collected by the importer on payment of the customs duty. This building, designed by Sir Christopher Wren, stood from 1671 until 1715 when it was damaged by fire and replaced by another on the same site. Collage no. 2875. (Photo © London Metropolitan Archives.)

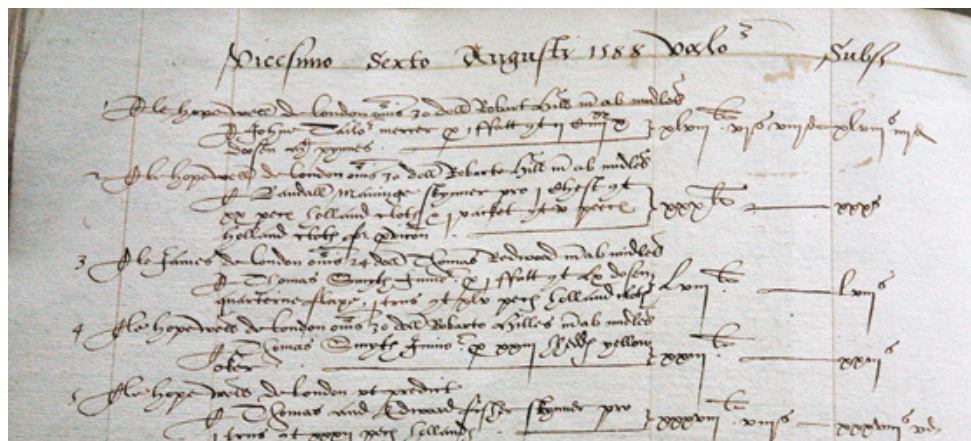


Fig. 5 Entry recording the import of yellow ochre by Thomas Smyth, 26 August 1588, in the London port book for Easter to Michaelmas, 1588, recording petty customs paid on imported goods. The National Archives, Kew, ref. E190/8/1 f. 72v. (Photo: Jo Kirby.)

document, including exchequer records noting customs duties, the goods imported or exported and supporting information, and, from 1565, port books. These were issued to all English ports and were maintained until 1799, although for many ports their sequence stops long before that: none exist for London after 1697. The port books usually recorded the date duty was paid; the name and home port of the ship; its destination; the name of the master; the names of the merchants (and often, in the case of London, guild affiliation) and whether or not they were foreigners (in which case they paid a higher customs duty); the cargoes shipped and the duty payable (Fig. 4).³⁰ London was the most important English port as far as the volume of trade and variety of goods were concerned, although other ports, such as Bristol, grew in significance, particularly in the 18th century. Examples

of materials that could be used in painting and dyeing can be found throughout 16th- and 17th-century London port books. On 26 August 1588, for example, Thomas Smyth paid duty on a quantity of yellow ochre (Fig. 5),³¹ while on 18 April 1638, Edmond Mannyng paid duty on nine pipes of linseed oil (a pipe or butt is equivalent to 475–480 litres).³² Similar records can be found for most years.

After 1697 and until 1780, ledgers were compiled annually for the port of London and the other English ports (known as Outports) containing a summary of goods imported from and exported to the rest of the world. A distinction was made between goods carried in English and those in foreign ships and, for exports, those manufactured in England and goods originally imported from abroad. By taking one year, Michaelmas (29 September) 1697 to Michaelmas 1698

Table 2 Painting and related materials imported into London, Michaelmas 1697–Michaelmas 1698.

Material	From	Quantity or value	Metric equivalent (approx.) in kg
Dragonsblood	East India	390 lb	177.1
Earth red	East India	10 tons	10,169.6
	Turkey	492 lb	223.4
Gamboge (<i>Gambogium</i>)	East India	3,386 lb	1,537.2
Lamp black	Germany	89 cwt 0 qr 2 lb	4,526.4
	Holland	9 cwt 3 qr 10 lb	500.3
Smalt	Germany	111,686 lb	50,705.4
	Holland	1,965 lb	892.1
Verdigris	France	1,740 lb	790.0
	Holland	1,161 lb	527.1
	Italy	1,667 lb	756.8
Vermilion	Holland	2,466 lb	1,119.6
Linseed oil	Holland	75 tuns 3 hogsheads 26 gal	72,350 litres approx
Walnut oil	Germany	5 cases	
	Holland	98 lb	44.5
Turpentine oil	France	6,108 lb	2,773.0
	Germany	70 lb	31.8
	Holland	1,033 lb	469.0
	Italy	4,747 lb	2,155.1
	Barbados	101 lb	45.9
Mastic, white	Turkey	39 lb	17.7
Rosin	France	886 cwt 3 qr	45,089.5
	Ireland	9 cwt	457.6
	Russia	54 cwt	2,745.8
	Guernsey	3 cwt 1 qr	165.3
	Carolina	150 cwt	7,627.2
	New England	398 cwt 3 qr	20,275.6
Gum lac*	East India	25,245 lb	11,461.2
	Venice	25 lb	11.4
Shellac	East India	4,474 lb	2,031.2
	Holland	returned 354 lb	160.72
Stick lac*	East India	5,467 lb	2,482.0
Turpentine	France	339 cwt	17,237.5
	Germany	9 cwt	457.6
	Turkey	35 lb	15.9
	Barbados	10 cwt	508.5
	New England	3,279 cwt 0 qr 9 lb	166,734.7
	New York	819 cwt 3 qr	41,682.7
Turpentine, German	Holland	31 cwt	1,576.3
Venice turpentine	Germany	2137 lb	970.2
Varnish, common	New England	533 cwt 2 qr	27,127.4
Gum arabic	Africa	129 cwt 2 qr	6,584.8
	Italy	40 cwt	2,033.9
Gum tragacanth	Turkey	3,900 lb	1,770.6
Painters' colours	Holland	£112 5s 0d	
<i>Pencills</i> (fine brushes)	Holland	1 case	
Bristles (dressed and undressed)	East Country	1757 doz 1½ lb	9,572.6
	Holland	678½ doz	3,696.5
Bristles, hogs	Germany	1,308 doz 10 lb	7,130.5
	Russia	6,567 doz 2 lb	35,777.9
Pictures	France	23	
	Italy	115	
	Spain	1	
	Venice	104	
	Bermuda	11	
Pictures, China	East India	134	
Pictures and frames	Flanders	£43 15s 0d	
Pictures and cases	Holland	£38 5s 8d	

Notes: Units given for quantities are as used in the original record. Conversion factors used:

1 pound (lb) = 0.454 kg; 1 quarter (qr) = 28 lb; 1 hundredweight (cwt) = 4 quarters = 112 lb; however, for some goods, including annatto, indigo and verdigris, the hundredweight was equivalent to 100 lb.³⁴ 1 ton = 20 cwt. Dozen (12), cited without a unit, indicates a dozen pounds. All metric conversions made using pounds to kilograms for consistency; slightly different results will be obtained using the generally suggested factor for hundredweights to kilograms (50.802 kg). Oil gallon: for convenience it is assumed that 1 oil gallon is equivalent to 3.785 litres (1707 value), a tun (*sic*) for oil is equivalent to 252 gallons and there are 63 gallons to the hogshead, measures in force from 1688 to 1803. The oil gallon conformed to the specifications for the wine gallon, standardised in 1707 to a value of 231 cubic inches, equivalent to 3.785 litres. Before this, its capacity could vary between 224 cubic inches (3.671 litres) and 282 cubic inches (4.621 litres).³⁵ The metric equivalent for the volume of oil imported could thus have been between 70,170 and 88,330 litres. For pictures and painters' colours, like other items listed in the records as 'Goods at value', the value (in pounds, shillings and pence) is given.

* Lac insects were the source of both red lac dye and shellac. Stick lac consisted of the hard, brownish, resin-like material secreted by lac insects clustered on the twigs of a host tree as a protective coating, encasing the insects themselves. This was exported either still on the twigs or as pieces broken from the twigs, but otherwise untreated. Forms in which the dye had been extracted to a greater or lesser extent and the residue dried were also available; gum lac may have been one of these. One possibility was seed lac, which contained little dye.³⁶ The spirit-soluble resin-like component, shellac, was by then widely used as a varnish or coating material and shellac itself is also listed as imported from India.

Table 3 Dyes imported into London, Michaelmas 1697–Michaelmas 1698.

Material	From	Quantity	Metric equivalent (approx.) in kg
Annatto	Spain	400 lb	181.6
	Jamaica	2,725 lb	1,237.2
	Nevis	40 lb	18.2
	New England	62 lb	28.2
	Pennsylvania	3,963 lb	1,799.2
Cochineal	Canary Islands	568 lb	257.9
	East India	19 lb	8.6
	Holland	234 lb	106.2
	Italy	75 lb	34.1
	Turkey	570 lb	258.8
	Spain	32,435 lb	14,725.5
	Jamaica	360 lb	163.4
<i>Grana tinctorum</i> (probably kermes)	Italy	108 lb	49.0
	Turkey	180 lb	81.7
Fustic wood*	Italy	7 tons 9 cwt	7,576.4
	Turkey	2 tons 17 cwt	2,898.3
	Venice	4 tons 6 cwt	4,372.9
Fustic*	Jamaica	89 tons 11 cwt 1 qr	91,081.5
	New England	35 tons 4 cwt 3 qr	35,835.1
Indigo	East India	1,999 lb	907.6
	Spain	18,289 lb	8,303.2
	Antigua	464 lb	210.7
	Barbados	1,281 lb	581.6
	Bermuda	1,284 lb	582.9
	Carolina	956 lb	434.0
	Jamaica	277,294 lb	125,891.5
	Montserrat	8,389 lb	3,808.6
	Nevis	693 lb	314.6
	New England	1,306 lb**	66,407.5
	New York	5,602 lb	2,543.3
	Virginia & Maryland	3,400 lb	1,543.6
Lac: gum lac*	East India	25,245 lb	11,461.2
	Venice	25 lb	11.4
Lac: stick lac*	East India	5,467 lb	2,482.0
Logwood	Canaries	73 tons 17 cwt 2 qr	75,127.9
	Barbados	3 cwt 3 qr	190.7
	Bermuda	520 cwt 3 qr	26,479.1
	Carolina	60 cwt	3,050.9
	Hudson Bay	25 tons	25,424
	Jamaica	782 tons 6 cwt 2 qr 13 lb	795,599.1
	New York	1 ton 14 cwt	1,728.8
	New England	92 tons 18 cwt 3 qr	94,513.7
	Virginia & Maryland	10 cwt 2 qr	533.9
Madder	Germany	crop: 110 cwt	5,593.3
	Holland	bale: 3,029 cwt 2 qr 10 lb; mull: 1,910 cwt 1 qr 14 lb	bale 103,200.6; mull 97,138.8
Orchil	Flanders	1 cwt 2 qr	76.3
	Holland	973 cwt 3 qr 20 lb	49,522.3
Braziletto	Barbados	322 cwt 1 qr	16,385.8
	Bermuda	333 cwt	16,932.4
	Carolina	158 cwt 3 qr	8,072.1
	Jamaica	38 cwt 2 qr	1,957.7
	Nevis	328 cwt 0 qrs 14 lb	16,684.5
	New England	220 tons 17 cwt 3 qr	224,633.8
	New York	420 cwt 2 qr	21,381.6
	Virginia & Maryland	33 cwt	1,678.0
Brazilwood	Portugal	40 tons 15 cwt 0 qr 14 lb	41,447.5
Nicaragua (<i>Nicorago</i>) wood	Barbados	8 cwt	406.8
Redwood	Barbados	4 cwt 2 qr	228.8
	Jamaica	1 ton 19 cwt	1,983.1
Sanders red	East India	1,249 cwt 0 qr 6 lb	63,511.9
Safflower	Flanders	600 lb	272.4
	Germany	11,310 lb	5,134.7
	Holland	6,964 lb	3,161.7
	Spain	22 lb	10.0
Sumac (<i>shomack, shumack</i>)	Portugal	10,403 cwt 0 qr 7 lb	528,974.9
Turnsole (<i>tornsall</i>)	Italy	513 lb	232.9

* The European species, *Cotinus coggygia* Scop., known as young fustic, and the American species, *Maclura tinctoria* (L.) D. Don ex Steud., old fustic, look very similar and have very similar dyeing properties. It is likely that the ‘fustic wood’ imported from Italy and Turkey was indeed the European species – the other is clearly the New World species – but this is not certain.

** The amount imported appears to be listed as 1306 cwt, but the value for the amount imported indicates that the correct listing is 1306 lb.

As lac was the source of dye as well as shellac and it is unclear how the gum lac had been processed before its export, both gum lac and stick lac are listed as potential sources of dye, although only unprocessed stick lac would certainly have contained dye.

Table 4 Materials of English manufacture (or source) exported from London, Michaelmas 1697–Michaelmas 1698.

Material	To	Quantity or value	Metric equivalent (approx.) in kg
Chalk	Denmark and Norway	16 tons	16,271.4
	East Country	74 tons	75,255.0
	France	10 tons	10,169.6
	Germany	190 tons	193,222.4
	Holland	122 tons	124,169.1
	Ireland	30 tons	30,508.8
	Russia	20 tons	20,339.2
	Scotland	130 tons	132,204.8
Earth, brown, etc	Sweden	895 tons	910,179.2
	Holland	£42 0s 0d	
Lead, red	Germany	286 cwt	14,542.5
	Ireland	58 cwt	2,949.2
	Portugal	25 cwt	1,271.2
	Spain	573 cwt	29,135.9
	Straits (Malacca)	668 cwt	33,966.5
	Barbados	£1 10s 0d	
	New York	£19 17s 0d	
	Virginia & Maryland	£2 5s 0d	
Lead white and red lead	Scotland	£13 10s 0d	
Lead white	Ireland	£16 11s 3d	
	Spain	30 cwt	1,525.4
Ochre (<i>Oaker</i>), unspecified	Straits (Malacca)	£57 0s 0d	
	New England	30 cwt	1,525.4
Ochre, red	Africa	20 lb	9.1
Ochre, yellow	Flanders	23 cwt	1,169.5
Vermilion	Carolina	£3 6s 0d	
Whiting*	Germany	2 casks	
	New England	£1 0s 0d	
Indigo	Ireland	£735 17s 4d	
	Scotland	£16 5s 0d	
Stone blue (indigo in lumps)**	Portugal	50 lb (value £2 1s 8d)	22.7
Saffron	Flanders	36 lb	16.3
	Pennsylvania	0.5 lb (38s a lb)	0.2
Weld	Scotland	129 cwt	6,559.4
Weld seed	Ireland	£15 16s 0d	
Woad	Portugal	29 cwt	1,474.6
	Scotland	231 cwt	11,745.9
Linseed oil	Ireland	12 gal	45.42 litres
Painters' colours	Flanders	£209 7s 0d	
	France	£85 0s 0d	
	Holland	£8 0s 0d	
	Ireland	£15 0s 0d	
	Portugal	£12 5s 0d	
	Scotland	£1 0s 0d	
	Spain	22 cwt (valued at £18)	1,118.7
	Straits (Malacca)	13 cwt (valued at £80)	661.0
	Antigua	£2 0s 0d	
	Jamaica	£10 0s 0d	
	New England	£4 0s 0d	
	Pennsylvania	£4 0s 0d	
	Virginia & Maryland	£27 3s 2d	
Brushes (type unspecified)	Germany	£3 5s 0d	
	Turkey	12 value 11s 0d	
	Jamaica	£49 16s 4d	
Pictures	East India	1 qr	12.7
	East India	£2 0s 0d	
	Flanders	£8 1s 0d	
	France	11 valued at £22 10s	
	Germany	2 qr	25.4
	Germany	£55 10s 0d	
	Ireland	2 cwt	101.7
	Madeira	£11 3s 0d	
	Scotland	2 qr 7 lb	28.6
	Scotland	£359 18s 3d	
	Spain	1 valued at £6 0s 0d	
	Straits (Malacca)	1 valued at £2 0s 0d	
	Turkey	2 valued at £1 10s 0d	
	Barbados	£195 15s 2d	
	Carolina	2 qr	25.4
	Carolina	£22 2s 0d	
	Jamaica	5 cwt	254.2
	New England	2 qr	25.4
	New England	£110 10s 0d	
	Virginia and Maryland	£1 0s 0d	
Pictures and cases	Portugal	10 valued at £110	
Pictures and frames	Ireland	£73 10s 0d	
Picture frames	Germany	£61 9s 9d	

* Probably finely ground chalk.

** Stone blue was a name used for indigo which is thought to derive from a corruption of the 17th-century 'rich indigo', good quality, purified indigo used by painters, to 'rock indigo' and thus stone blue. Although apparently an 18th-century corruption, this may not be accurate: it seems to be earlier or it may have another origin. Whatever its origin, if this is a correct identification it does imply a degree of processing of the indigo, perhaps sieving or washing, before re-exporting.³⁷

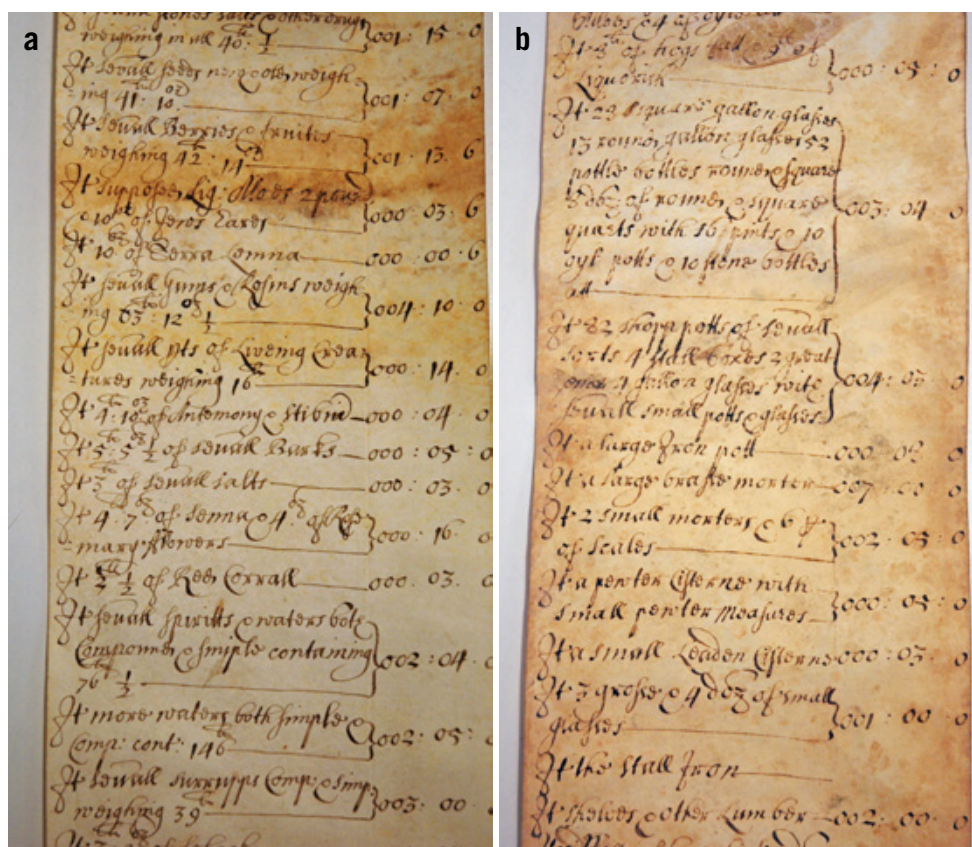


Fig. 6 Two details of the post-mortem inventory of the London apothecary William Hardy dated 9 April 1673, showing (a) some of the stock, including gums and resins and (b) equipment including bottles, small boxes, brass mortars and scales. London Metropolitan Archives, CLA/002/02/01/0840. (Photo: Jo Kirby, reproduced courtesy of the London Metropolitan Archives, City of London.)

as an example in London alone, a picture is obtained of the movement of goods at the very end of the 17th century, at a time when England's role in the world was gaining in importance and London itself had developed from a city that was something of a backwater from the architectural and artistic point of view (Tables 2–4).³³ Over the years that followed, the number of countries and 'English Plantacions [sic]' with which trade was carried out, the volume of trade and the variety of products listed all increased, but there was little change in the range of artists' materials traded.

Table 2 lists goods that could be used in painting including some pigments, oils, gums and resins. However, it does not include wood that might be used as a support for panel painting, or canvas and linens, imported primarily from France, Holland and eastern Europe (East Countries in the records). The bristles imported would not necessarily have been suitable for artists' brushes with the exception of the hogs' bristles. Hairs (squirrel and others), possibly used for finer brushes, were imported from Russia and other regions, but have not been included here. It should be remembered that some materials had uses in professions other than painting: smalt, for example, was utilised as a laundry blue and in paper manufacture. Resinous materials such as rosin and shellac were employed in varnishes and coatings for frames, furniture, musical instruments and other purposes. The entry for 'common varnish', imported from New England, is interesting in this context as this is not easy to identify, but it might

be an ordinary pine resin varnish. Pictures, a large proportion from Italy, form a noteworthy category, particularly a large number imported from East India (that is, India), but qualified by the word 'China'. 'Painters' colours' imported from Holland form an intriguing entry. They are not identified and we do not know if they were in pigment form or ready prepared with a binding medium, but it is under a heading like this that the lake pigments, expensive blue pigments and perhaps pigments such as lead-tin or lead antimonate yellows might have entered the country.

The dyes listed in Table 3 are included as some – such as cochineal, brazilwood and indigo – were used in artists' pigments, although most played a far greater role in the textile industry. The value of the West Indies, particularly Jamaica, and the Americas to England as sources of colouring materials becomes immediately obvious. Cochineal was effectively a Spanish monopoly and most therefore came from Spain (the Canary Islands were a Spanish colony); that from other countries was presumably re-exported.

That year, London exported many goods that were not of English origin, including earth pigments and umber, lamp black, red and white lead, smalt, verdigris, verditer (type unspecified), vermilion, linseed oil and turpentine, also some painters' colours valued at £36 re-exported to Holland. These exports were not in particularly large quantities. More interesting are the goods that are English in their source or manufacture (Table 4). This suggests that, although England

was importing red lead and lead white, these pigments were also being made in England, as was vermilion. England had long been a source of earth pigments and chalk, not all of which would have been used in painting. It is extraordinary that pictures were exported in bulk, by weight, principally to India and the American colonies, but also to Germany, Scotland and, in particularly large quantity, Ireland. These were valued at a standard amount of 30 shillings (£1 10s) a hundredweight, which suggests that they were small and perhaps not particularly fine works of art: they may have been on paper and may also have included prints. If ledgers for later years are examined, Christmas 1734 to Christmas 1735, for example, there is a more explicit entry in the lists: 'Pictures and prints'.³⁸

Most interesting of all are the 'Painters' colours', again unidentified and, like those imported from Holland (Table 2), mostly traded at value. Those exported to Spain were traded by weight, 22 hundredweight (over a metric ton) of colours for the price of £18, which seems extremely cheap; it would be interesting to know what they were. More significantly, by the end of the 17th century, London, like Holland, was in a position to export locally produced painters' colours – not only to colonies abroad but also to France, Flanders and other parts of Europe. This, too, is reproduced in 1734–35: London exported painters' colours to Flanders, Germany, Holland, Italy, Portugal and Venice (always listed separately), as well as to the colonies, sometimes to quite high values.

The rise of the colour merchant

Most of the materials used by painters had traditionally been traded as spices. Many were also drugs, which came under the category of spices, so it is not surprising to find that pigments could be bought from apothecaries or pharmacists in 16th- and 17th-century Europe, as had been the case in earlier times. The author of a book on limning, printed in London in 1573, listed the materials that might be needed, adding that most could be obtained at the apothecary's shop.³⁹ This is supported by the *Taxae*, statutory price lists for materials sold by German apothecaries, which were legally required to be compiled and made available from the 13th century, surviving in printed form from the 16th century.⁴⁰ Spices also included all the substances used to make food interesting and palatable, such as pepper, nutmeg, mace and cinnamon, creating a strong link between those selling medicinal products and those selling groceries, also seen at the level of guild membership in many cities. By the 15th century the two trades were separating and by the 16th, while both apothecaries and grocers might belong to the same guild, as in London and Paris, they usually carried rather different stock, although there was some overlap. However, both apothecaries and grocers might supply materials that could be used by painters.⁴¹

While 17th-century German *Taxae* often reveal the possibility of a very full stock of materials painters could use, this was not necessarily the case in practice or elsewhere. The inventories of two 17th-century Rouen apothecaries,

Jacob Congnard (1682–83) and Jacques Le Chandelier (1688) reveal that Congnard, at least, had a very large stock of drugs, but only sold a few materials useful to artists, including lead white, yellow masticot (lead-tin yellow), cinnabar, verdet (perhaps verdigris) and various gums.⁴² Many inventories concentrate more on the balances, mortars, bottles and jars that made up the apothecary's shop than on the stock itself, as can be seen from the inventory of the property of the London apothecary William Hardy, dated 9 April 1673 (Fig. 6). Some 17th-century London grocers also stocked materials that could be used by artists: the inventory made of the property of the grocer John Mucklowe for the recovery of debt in 1620–21 listed verdigris, vermilion and oil of turpentine in his stock, among the fenugreek and fennel seeds, cardamom, syrup of violets and other spices.⁴³ By this time, however, shopkeepers who may have started off as apothecaries or grocers were beginning to specialise in response to the requirements of the market.

The establishment of colour merchants' shops was stimulated by an active need: the presence of a significant group of people who required materials for colouring, whether for glass, ceramics, textiles or painting. Venice is the prime example of a city where this was already the case in the late 15th century. The city had the additional advantage that for several hundred years it had been the hub where luxury goods, textiles and exotic products from the east arrived and were then traded on. It is therefore no surprise that specialist colour merchants set up shop there before elsewhere, even Florence. Venice was also famed for the manufacture of certain pigments such as lead white: the anonymous author of the treatise on limning mentions *Vennys cerius* (ceruse) and in his list of pigments Claude Boutet recommended both *blanc de ceruse de Venize* and *laque de Venize*.⁴⁴ Venice was not the only city to have a reputation for particular pigments: famed as a centre for dyeing, Florence also gained the reputation for making high quality red lake pigments, acknowledged in the name Florentine lake. Antwerp and then Amsterdam were known for the manufacture of vermilion.⁴⁵ In all these cases, manufacturers depended on the supply of necessary raw materials and some of those working in the colour trades were also suppliers of raw materials. The development of these industries was accompanied by a degree of quality control, competition and choice for consumers. By the time the inventory of the property of the Venetian colour merchant Jacopo de' Benedetti was drawn up in 1594 there were neighbourhoods teeming with colour merchants in the city.⁴⁶ The conditions for the development of the colour merchant's trade – people who could sell the required materials, a sophisticated and demanding clientele, a large regular market and access to international trade – also existed in 16th-century Antwerp and in the late 1580s, the city boasted four named colour merchants.⁴⁷

The apothecary's shop was not the only possible route by which the trade of colour merchant might develop: materials were also bought and sold at the regular large trade fairs and markets, such as those at Frankfurt am Main and Antwerp. The painter Lucas Cranach (I) (1472–1553), who ran a large workshop, was given permission to set up a pharmacy in Wittenberg, which allowed him to purchase pigments and

ÉTAT & détail des principales marchandises & autres
objets relatifs aux trois arts traités dans l'ouvrage du
sieur WATIN, qui se fabriquent dans sa nouvelle ma-
nufacture, sur le Boulevard; où elles se trouvent par
affrètements considérables dans son magasin, à Paris,
carré de la porte Saint-Martin, à la Renommée.
(Cet état se distribue gratis.)

ART DU PEINTRE.

	<i>l. f.</i>		<i>l. f.</i>
<i>Instruments du peintre.</i>			
Grandes & petites pierres à broyer avec leur mallette & le couteau.			
Broffes à quartier pour blanchir les plafonds,			
— Ditto, demi-quartier,			
— De trois onces pour lambris & treillages,			
— Ditto, de deux onces,			
— Ditto, pour faire des filers, ou pour rechampir,			
— Ditto, de Lyon, afforties,			
Finceaux à tableaux,			
— Ditto, à l'ornement,			
— Ditto, à la miniature,			
— Ditto, pour les marbres,			
Palettes selon les grandeurs,			
Courceaux à palette.			
Fincelier.			
<i>Matières qui donnent les couleurs.</i>			
N. B. Les couleurs désignées en grains, ou trochiques, sont celles qui			
		sont broyées avec beaucoup de préparations, & qu'on relève pour les beaux ouvrages.	
		<i>Blanc.</i>	
	1	Blanc de crème en Autriche,	3
	15	Blanc de plomb en écailles,	12
	12	— Ditto, broyé à l'huile,	1
	8	— Ditto, en grains,	2
		— Ditto, sur-fin de la miniature,	4
	3	Blanc de céruse en pierre,	8
	5	— Ditto, broyé à l'huile,	10
	2	— Ditto, broyé sur-fin, pour les plus beaux ouvrages,	12
	2	— Ditto, en grains,	16
	2	Blanc de Bougival, dit d'Espagne, le pain, de craie de Champagne, la livre,	4
		<i>Rouge.</i>	
		Ocre de Berri en pierre,	2
		Ocre en poudre,	4
		— Ditto, broyé à l'huile,	8
		— Ditto, en grains,	1

Ocre de rue en pierre,	7	— Ditto, broyé à l'hui-	1
— Ditto, en poudre,	8	le,	3
— Ditto, broyé à l'hui-	3	— Ditto, cristallisé,	3
le,	8	Verd de vessie,	4
— Ditto, en grains,	1	4 Terre verte en pierre,	1
Rouge de Prusse en pou-	4	— Ditto, de Veronne,	4
dre,	10	Verd de montagne en	4
— brun d'Angleterre,	6	poudre,	4
Mine de plomb rouge,	8	Cendres vertes en pou-	6
ou minium,	6	dre,	6
Cinnabre en aiguille,	10	Brun.	
— Ditto, en grains,	6	Terre d'ombre en pierre,	
Vermillon fin,	10	— Ditto, en poudre,	
— Autre,	6	— Ditto, broyé à l'hui-	
Orpin rouge fin,	12	le,	
— Autre,	4	— Ditto, calciné,	1
Laque plate en pierre,	3	10 Terre d'Italie,	1
— Ditto, belle plate,	4	Terre de Cologne en	2
Jaune.		poudre,	2
Ocre jaune en pierre,	2	— Ditto, en grains,	4
— Ditto, en poudre,	4	4 Bistre en grain, ramé,	4
— Ditto, broyé à l'hui-	8	Noir.	
le,	1	4 Noir de composition	
— Ditto, en grains,	2	pour les beaux gris ar-	
Jaune de Naples en na-	4	gentins,	1
ture,	2	4 Noir d'os en pierre,	1
— Ditto, en grains,	4	4 Noir de pêche,	3
Jaune royal en poudre,	4	4 Noir d'ivoire,	2
Orpin jaune sur-fin, en	12	4 Noir de charbon,	
grains,		— Ditto, fin,	4
— Ditto, à 2, 4 & 6 l.	1	4 Noir de vignes,	4
Mastic blanc, ou cerufe	1	4 4 Noir de fumée de Paris,	1
calcinée,	2	— Ditto, d'Allemagne,	1
Graine d'Avignon,	2	Liquides pour broyer &	
— Ditto, nouvelle,	2	décrémper les couleurs.	
Terra merita,	2	8 Huile de lin pure d'A-	
Safranum,	2	niens,	
Bleu.		10 — Ditto, de Hollande,	
Azur,	1	10 Huile de noix pure,	
Email des quatre feux en	1	10 Huile d'aillet pure très-	
poudre,	10	blanche,	
Cendre bleue en poudre,	12	Essence de térébenthine	
Indigo en pierre,		bien rectifiée,	
Bleu de Prusse, ci-après.		Vernis gras pour décré-	
Verd.		per les couleurs,	
Verd-de-gris sec en pierre	2	— blanc commun pour	
— Ditto, en poudre,	15	le même sujet,	

Fig. 7 Catalogue of stock sold by Jean-Félix Watin (*L'art du peintre, doreur, vernisseur*, 3rd edn, Paris 1776, pp. 346–347, private collection).

other materials at the trade fairs in Leipzig and Frankfurt am Main at a competitive price;⁴⁸ others may have followed suit. It is very likely that most of those who traded in artists' materials had some additional form of livelihood, particularly in the early days of the trade. Some 17th-century artists in both the Southern and Northern Netherlands were also picture dealers, and some dealers sold artists' materials as well. The Delft dealer, Frans Tobiasz. van den Bosch, traded in colours, and in 1643 Leendert Hendricks Volmarijn asked the Leiden city officials for permission to open a shop dealing in artists' materials and pictures as the city did not have one.⁴⁹ A similar pattern is seen in 17th-century London.⁵⁰

The colourman's trade developed and expanded across Europe during the 18th century. Specialist manufacturers who concentrated on one or a few products, such as the lead white manufacturers in Venice, were also established elsewhere: Louis Berger in England, for example, concentrated on the manufacture of Prussian blue and cochineal lakes.⁵¹ Companies which were to become household names in the 19th and 20th centuries, such as Thomas Reeves and James Newman in London, came into existence. In Paris,

in 1720, apothecary Charles Laclef set up as a *marchand de couleurs* in the rue Princesse, handing the business on to Jean-Baptiste Laclef in 1749. This shop, trading under the sign *La Clef d'Argent*, was to become the Lefranc company in the following century.⁵² In 1670s Paris it was possible to purchase ready ground pigments from a M. Foubert at the sign of the *Cornemuse d'Outre-mer* (bagpipes of ultramarine).⁵³ A century later, the catalogues of the Parisian colour merchant Jean-Félix Watin, who also prepared his own materials, demonstrate the variety that could be purchased – not simply different pigments, such as those listed in *A Very Proper Treatise*, but in different grades and as powders or ground in oil, ready for use (Fig. 7). Watin also sold inks, varnishes and their ingredients, painting equipment and, harking back to an earlier era, even assorted *épiceries* (groceries), including chocolate.⁵⁴ The Laclef business later passed to Jules and Alphonse Lefranc probably traded in a similar way. Carl Anton Venino's company in Würzburg, Germany, operational by 1716, sold a similar range of pigments, resins and so forth to Watin. By the end of the century the stock included a range of artistic and

craft materials, together with exotic items such as coral that would find a home in a client's *Kunstammer* or personal collection. By 1800, the Venino company was at the centre of a huge network of suppliers across Europe,⁵⁵ a clear indication that the trade in painters' materials was becoming a mature commercial enterprise across Europe.

Conclusions

Following the discovery of the Americas, new materials such as cochineal and new sources for familiar products became available across Europe. As these resources and their properties became more familiar, new artists' materials, such as carmine, were developed. The marketing of the paints, varnishes and other products became more specialised over time, resulting in the development of colour merchants, first in Venice and, from the 16th century onwards, in towns and cities across Europe. By 1800 colour merchants had contacts across Europe and some were beginning to build international reputations. The colour trade had come of age.

Notes

1. P. Frankopan, *The Silk Roads: A New History of the World*, London/New York, Bloomsbury Publishing, 2015, pp. 198–231.
2. C. Rahn Phillips, 'The growth and composition of trade in the Iberian empires, 1450–1750', in J.D. Tracy (ed.), *The Rise of Merchant Empires: Long-Distance Trade in the Early Modern World, 1350–1750*, Cambridge, Cambridge University Press, 1993, pp. 34–101.
3. Frankopan 2015 (cited in note 1), pp. 243–279.
4. J.I. Israel, *The Dutch Republic: Its Rise, Greatness and Fall 1477–1806*, Oxford, Clarendon Press, 1998, pp. 216–219.
5. Israel 1998 (cited in note 4), pp. 318–328, 934–956.
6. N. Steensgaard, 'The growth and composition of the long-distance trade of England and the Dutch Republic before 1750', in Tracy 1993 (cited in note 2), pp. 102–152.
7. P. Butel, 'France, the Antilles, and Europe in the seventeenth and eighteenth centuries: renewals of foreign trade', in Tracy 1993 (cited in note 2), pp. 153–173.
8. J. Kirby, '"One of the most beautiful reds": cochineal in European painting', in C. Padilla and B. Anderson (eds), *A Red Like No Other: How Cochineal Colored the World*, New York, Skira Rizzoli, 2015, pp. 174–183, 311–312.
9. R.L. Lee, 'American cochineal in European commerce, 1526–1625', *Journal of Modern History* 23, 1951, pp. 205–224; Kirby 2015 (cited in note 8), p. 174.
10. C. Marichal Salinas, 'Mexican cochineal, local technologies and the rise of global trade from the sixteenth to the nineteenth centuries', in M. Perez Garcia and L. de Sousa (eds), *Global History and New Polycentric Approaches*, London/New York, Palgrave Macmillan, 2018, pp. 255–273. Available at <https://link.springer.com/book/10.1007%2F978-981-10-4053-5> (accessed 4 November 2018).
11. L. Guicciardini, *Descrittione di M. Lodovico Guicciardini patritio fiorentino, di tutti i paesi bassi, altrimenti detti Germania inferiore*, Antwerp, Guglielmo Silvio, 1567, pp. 119–126.
12. Phillips 1993 (cited in note 2), pp. 80–81 and the source of information in Table 1. One Spanish *arroba* was equivalent to 11.5 kg, one Spanish pound to 0.4505 kg.
13. D. Cardon, *Natural Dyes: Sources, Tradition, Technology and Science*, London, Archetype Publications, 2007, p. 628.
14. R.E. Spear, 'A century of pigment prices: seventeenth-century Italy', in J. Kirby, S. Nash and J. Cannon (eds), *Trade in Artists' Materials: Markets and Commerce in Europe to 1700*, London, Archetype Publications, 2010, pp. 275–293; p. 281; J. Dunkerton, M. Spring *et al.*, 'Titian after 1540: technique and style in his later works', *National Gallery Technical Bulletin (Titian's Painting Technique from 1540)*, 36, 2015, pp. 6–39, 124–136; cat. no. 1, 40–51: pp. 21–23, 49; Kirby 2015 (cited in note 8), pp. 176–178, 311–312.
15. C. Boutet, *Traité de mignature, pour apprendre aisément à peindre sans maistre ...*, 3rd edn, Paris, chez Christophe Ballard, 1678, pp. 1–13, 139–141; P. Pomet, *Histoire générale des drogues*, Paris, sold by Jean-Baptiste Loyson and Augustin Pillon, and Estienne Ducastin, 1694, p. 34; J. Kirby, M. Spring and C. Higgitt, 'The technology of eighteenth- and nineteenth-century red lake pigments', *National Gallery Technical Bulletin* 28, 2007, pp. 69–95; pp. 70–73.
16. Kirby *et al.* 2007 (cited in note 15).
17. J. Balfour-Paul, *Indigo*, London, British Museum Press, 2000, pp. 60–70.
18. Cardon 2007 (cited in note 13), pp. 364–366.
19. E.L. Sanz, *Comercio de España con América en la época de Felipe II* (2 vols), vol. 1, *Los mercaderes y el tráfico indiano*, Valladolid, Servicio de Publicaciones de la Diputación Provincial de Valladolid, 1979, pp. 598–599.
20. D. Peggie and J. Kirby, 'The use and identification of brazilwood lake pigments in paintings by Rembrandt', in A. Roy and M. Spring (eds), *Rembrandt Now: Technical Practice, Conservation and Research*, London, Archetype Publications (in press).
21. E. Hermens and A. Wallert, 'The Pekstok Papers: lake pigments, prisons and paint-mills', in E. Hermens (ed.), *Looking through Paintings: The Study of Painting Techniques and Materials in Support of Art Historical Research*, London, Archetype Publications, 1998, pp. 269–295.
22. Boutet 1678 (cited in note 15), pp. 139–141.
23. R. Dossie, *The Handmaid to the Arts* (2 vols), vol 1, London, printed for J. Nourse, 1758, pp. 60, 111.
24. Sound Toll Registers Online, record 573293, 31 May 1750. Available at <http://www.soundtoll.nl/index.php/en/over-het-project/sonttol-registers> (accessed 20 June 2018).
25. Sound Toll Registers online (cited in note 24), record 586582, 26 October 1728.
26. Image observed online at <http://vbm-bedrijfshistorie.nl/leden/nederlands-economisch-historisch-archief-neha/> (accessed 13 November 2018).
27. A. Wallert, 'Unpublished 17th-century documents relevant to the production of artists' pigments', in S. Eyb-Green, J.H. Townsend, S. Kroustallis, K. Pilz and I. van Leeuwen (eds), *Sources on Art Technology: Back to Basics*, London, Archetype Publications, 2016, pp. 133–137. The *Cours van Negotie*, Amsterdam, 3 March 1636 is in the collection of *Prijscouranten* held by the Nederlands Economisch Historisch Archief (NEHA), International Institute of Social History, Amsterdam; <http://vbm-bedrijfshistorie.nl/leden/nederlands-economisch-historisch-archief-neha/> (accessed 18 June 2018). See also <https://socialhistory.org/en/collections/netherlands-archives> (accessed 13 November 2018).
28. N.W. Posthumus, *Nederlandsche Prijsgeschiedenis*, vol. 1, *Goederenprijzen op de Beurs van Amsterdam, 1585–1914; Wisselkoersen te Amsterdam, 1609–1914*, Leiden, Brill, 1943. MEMDB, Medieval and Early Modern Data Bank, Database:

- Price (Posthumus), http://www2.scc.rutgers.edu/memdb/about_postpr.html (accessed 13 November 2018).
29. Peggie and Kirby, in press (cited in note 20).
 30. B. Dietz (ed.), *The Port and Trade of Early Elizabethan London: Documents*, London, London Record Society, 1972, pp. ix–xx; J. Kirby, 'Trade in painters' materials in sixteenth-century London', in Kirby *et al.* 2010 (cited in note 14), pp. 339–355.
 31. TNA E190/8/1. 1588. The Port of London. Port: London Official: [Collector of Petty Customs] Overseas inwards. Easter 1588–Michaelmas 1588, f. 72 v. The National Archives, Kew.
 32. TNA E190/41/5. 1637–8. The Port of London. Port: London Official: Waiters Overseas inwards. December 1637–December 1638, f. 73 r. The National Archives, Kew.
 33. TNA CUST/3/1. 1697–8. Ledgers of Imports and Exports, showing the nature and quantity of goods imported and exported at the Port of London and the Outports, Michaelmas 1697 to Michaelmas 1698. The National Archives, Kew; D. Keene, 'Material London in time and space', in L. Cowen Orlin (ed.), *Material London, ca.1600*, Philadelphia, University of Pennsylvania Press, 2000, pp. 55–74.
 34. R.E. Zupko, *A Dictionary of Weights and Measures for the British Isles: The Middle Ages to the Twentieth Century*, Philadelphia, American Philosophical Society, 1985, pp. 190–197.
 35. Zupko 1985 (cited in note 34), p. 165; University of Nottingham, Manuscripts and Special Collections, Weights and Measures. Available at <https://www.nottingham.ac.uk/manuscriptsandspecialcollections/researchguidance/weightsandmeasures/volumes.aspx> (accessed 10 November 2018).
 36. J. Stalker and G. Parker, *A Treatise of Japaning and Varnishing*, Oxford, printed and sold by the authors, 1688, p. 3; Pommet 1694 (cited in note 15), pp. 273–274.
 37. R.D. Harley, *Artists' Pigments c.1600–1835: A Study in English Documentary Sources*, 2nd edn, London, Butterworths, 1982, pp. 68–69.
 38. TNA CUST/3/35/1. 1734–5. Ledgers of Imports and Exports, showing the nature and quantity of goods imported and exported at the Port of London and the Outports, Christmas 1734 to Christmas 1735. The National Archives, Kew.
 39. *A Very Proper Treatise, wherein is briefly sett forth the Arte of Limming*, London, printed by Richard Tottill, 1573, f. xii.
 40. A. Burmester, U. Haller and C. Krekel, 'Pigmenta et Colores: the artist's palette in pharmacy price lists from Liegnitz (Silesia)', in Kirby *et al.* 2010 (cited in note 14), pp. 314–324.
 41. Kirby 2010 (cited in note 30).
 42. O. Lafont and C. Van Robaeys, 'La pratique de l'art de l'apothicaire au XVII^e siècle: information fournie pas deux inventaires après décès', *Revue d'histoire de la pharmacie*, 80(295), 1992, pp. 453–465.
 43. TNA C/239/88/33. 1620–21. Chancery. Extent for debts. Series II. 24th March 1620–23rd March 1621, document 33. The National Archives, Kew.
 44. *A Very Proper Treatise* 1573 (cited in note 39), ff. ii, vi vso., xii; Boutet 1678 (cited in note 15), pp. 12–13.
 45. F. Vermeylen, 'The colour of money: dealing in pigments in sixteenth-century Antwerp', in Kirby *et al.* 2010 (cited in note 14), pp. 356–365.
 46. R. Krischel, 'Zur Geschichte des Venezianischen Pigmenthandels – das Sortiment des Jacobus de Benedictis À Coloribus', *Wallraf-Richartz-Jahrbuch* 63, 2002, pp. 93–158; L. Matthew and B. Berrie, '"Memoria de colori che bisognino torre a vinetia": Venice as a centre for the purchase of painters' colours', in Kirby *et al.* 2010 (cited in note 14), pp. 245–252.
 47. J. Kirby, 'The painter's trade in the seventeenth century: theory and practice', *National Gallery Technical Bulletin* 20, 1999, pp. 5–49; pp. 33–34; Vermeylen 2010 (cited in note 45).
 48. G. Heydenreich, *Lucas Cranach the Elder: Painting Materials, Techniques and Workshop Practice*, Amsterdam, Amsterdam University Press, 2007, pp. 131, 418.
 49. W. Martin, '"Een kunsthandel" in een klappermanswachthuis', *Oud Holland* 19, 1901, pp. 86–88; J.M. Montias, *Artists and Artisans in Delft: A Socio-economic Study of the Seventeenth Century*, Princeton, Princeton University Press, 1982, pp. 206–207; Kirby 1999 (cited in note 47), pp. 34–35.
 50. J. Simon, 'London, 1600–1800: trading artists' materials with Europe and worldwide', in this volume, pp. 88–98.
 51. Kirby *et al.* 2007 (cited in note 15), p. 72.
 52. P. Labreuche, *Guide Labreuche: guide historique des fournisseurs de matériel pour artistes*. Available at: <https://www.labreuche-fournisseurs-artistes-paris.fr/> (accessed 20 October 2018).
 53. Boutet 1678 (cited in note 15), p. 13.
 54. J.-F. Watin, *L'art du peintre, doreur, vernisseur*, 2nd edn, Paris, sold by Grangé, Durand and the author, 1773, also 3rd edn, 1776. In the 1773 edition, the catalogue of products for painting, gilding and varnishing was a four-page list added at the end of the book, with a long list of pigments and paints ordered by colour. The chocolate is mentioned on p. 4. By 1776, the most expensive pigments, ultramarine and carmine, and manufactured pigments, including red and yellow lakes and Prussian blue, had been taken out of the main list (which began on p. 346) and were listed under 'Articles de fabrique pour la palette', on p. 351.
 55. S. Correll, *Farbwarenhandel um 1800 – die Würzburger Kaufleute Venino*, Munich, Siegl, 2012.

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FLEMISH DEALERS AND A THRIVING TRANSATLANTIC ART TRADE DURING THE 17TH CENTURY

Sandra van Ginhoven

ABSTRACT The many 17th-century Flemish paintings now found throughout Europe and Latin America testify to the expanse of the circulation of artworks from the Low Countries. This widespread dissemination of Flemish art was due in no small part to dealers and their networks for trade and information exchange. The painter, furniture maker and art dealer Guiliam Forchondt (I), active in Antwerp between 1632 and his death in 1678, was one such agent whose professional dealings extended throughout Europe, reaching as far as the Americas. Archival documents preserved in Antwerp indicate that the majority of paintings produced by the Antwerp and Mechelen workshops under this dealer's supervision were intended not only for local buyers, but also – and in staggering quantities – for purchasers located as far away as the Spanish territories in the Americas, which is the focus of this paper. This case testifies to a cultural production that cannot be identified solely by its place of manufacture or discussed without taking into account the role agents and their information networks played as mediators. Furthermore, cross-cultural relations extended beyond the realm of painting to the interdependence between various artistic traditions locally as well as continents. Art production, trade infrastructure, networks for exchange and art flows were intertwined in artistic relations of this sort.

Introduction: Flemish paintings in the New World

The relationship between Flemish and Latin American painting during the early modern period has traditionally been studied either through Flemish painters who settled in the Americas or print reproductions of Flemish paintings arriving in the Hispanic world.¹ But mounting evidence shows that the impact of Flemish painting in Latin America was not limited to an influx of foreign artists and prints or the reproduction of known models that took place exclusively at the receiving end.

As an illustration, a little known set of paintings on copper supports, some bearing the signature of the Antwerp painter, furniture maker and art dealer Guiliam Forchondt (I) (1608–1678), hangs on the pilasters along the nave of the former Jesuit church of Saint Peter Martyr in Juli, Peru. Eleven paintings survive out of what would have been a series of 12. The extant paintings bring together six episodes from the Passion of Christ (*The Arrest of Christ*; *Christ being Dragged through the Brook Cedron after his Arrest*; *The Mocking of Christ*; *Ecce Homo*; *Christ Falls on the Way to Calvary with Veronica*; *The Crucifixion*), three events from the life of Mary (*The Marriage of the Virgin*; *The Adoration of the Shepherds*; *The*

Adoration of the Magi), one episode from the public life of Christ (*The Miraculous Draught of Fishes*, illustrated in Fig. 1), and one story from the Old Testament (*The Continence of Scipio Africanus*).² Despite Forchondt's autograph in nine of the paintings, several hands can be detected in the series,³ probably subcontracted painters. Archival records show that Forchondt assembled paintings by different artists of a specific narrative sequence which, in common with other dealers, he then sold as a series.⁴ Through the mediation of dealers, several hands collaborated directly or indirectly in series or cycles that were sold as part of a unified group despite differences in execution. Needless to say, working with a handful of painters was advantageous for a dealer such as Forchondt because it reduced the time required to fulfil the orders to be shipped.

Forchondt modelled *Christ being Dragged through the Brook Cedron after his Arrest* and *The Crucifixion* on works by Frans Francken II (1581–1642) of the Passion of Christ, and *The Miraculous Draught of Fishes* faithfully follows the design by Peter Paul Rubens (1577–1640) (Fig. 2). Such paintings were produced in Antwerp on a large scale, often by unidentified painters. They spread throughout Europe in response to a demand for this type of work, which in turn further disseminated the Flemish visual tradition



Fig. 1 Guiliam Forchondt (I), *The Miraculous Draught of Fishes*, oil on copper, c.57 × 73 cm, Church of Saint Peter Martyr, Juli, Peru.



Fig. 2 Schelte Adamsz. Bolswert (after Peter Paul Rubens), *The Miraculous Draught of Fishes*, before 1659, engraving, Rijksmuseum, Amsterdam.

abroad. In the case of the Juli series, all but *Christ being Dragged through the Brook Cedron after his Arrest* and *The Miraculous Draught of Fishes* carry Forchondt's signature, as do the exact versions of *The Crucifixion* and the *Adoration of the Magi* now in La Rioja, Spain.⁵ Given the different hands detected in the Juli and La Rioja paintings, Forchondt's signature, rather than asserting authorship, was perhaps a device intended to unify the series and certify the paintings' Flemish character while in the hands of commercial agents and their intermediaries and in the spaces they were destined to inhabit.

The paintings discussed testify to the extent of Forchondt's activities, the longevity of particularly appealing visual prototypes across the Atlantic, and how an overseas demand for Flemish paintings on copper affected workshop practices back in Antwerp. The cultural significance of these mass-produced paintings and their dissemination has been largely underestimated, as has the agency of art dealers in cross-cultural circulation and exchanges. While extant works provide evidence for this art trade, it should be remembered that this was the result of concerted efforts by painters, dealers and their agents to reach a buyer base elsewhere.⁶ Purchasers abroad

Table 1 Guilliam Forchondt's sales by product, 1643–1678 (in guilders).

	Paintings	Sculpture	Furniture	Frames	Mirrors
Quantity sold	12,852	233	732	659	1650
Total revenues	134,563	1168	108,291	7476	30,177
Revenue per unit	10	5	148	11	18

**Fig. 3** Anonymous 17th-century Antwerp cabinet decorated with mythological paintings by the workshop of Victor Wolfvoet (II), c.1650, 164.5 cm (height) × 113.5 cm (width) × 51 cm (depth), Rijksmuseum, Amsterdam.

had no means of making direct contact with the authors of these works except through dealers who specialised in providing this mediating function. Forchondt's production, sales and overseas activities reveal an intricate connection between art production and consumption on both sides of the Atlantic.

Guilliam Forchondt's business: scope and scale

From 1632 onwards, Guilliam Forchondt headed a painting atelier and furniture workshop in Antwerp. Together with his wife Maria Lemmens and daughter Susanna (1637–1712), Forchondt ran his workshop and supervised commercial dealings in Antwerp. He expanded his activities abroad by establishing business relationships throughout Europe and beyond. His own family played an important role in developing a trade network. Forchondt's sons Melchior (1641–1708), Alexander (1643–1683), Marcus (1651–1706) and Guilliam (II) (1645–1707) settled in Vienna, and from 1668 became established as prominent art dealers for the Habsburg aristocracy. Justo (1647–1709), who started his training as a merchant in Antwerp, moved first to Lisbon and then to Cadiz in 1671 to trade directly with the Americas, while

Andreas (1650–1675) joined Justo early on and Guilliam (II) left Vienna for Cadiz in 1677.⁷

Forchondt's workshop cashbooks and other documents for the period between 1643 and 1678 preserved in the Archives of the City of Antwerp reveal the full extent of the scale of his activities (Table 1).⁸ In the 35 years studied, Forchondt sold 12,852 paintings, 233 works of sculpture, 732 furniture pieces, 659 frames and 1650 mirrors,⁹ as well as luxuries such as tapestries, jewellery, lace and raw materials including wood and pigments. The sale of finished products predominated, with total revenues of 134,536 guilders from paintings, 108,291 guilders from furniture, 30,177 guilders in the case of mirrors and 7,476 guilders for frames. The workshop's activities also extended to retouching, restoring and framing paintings, manufacturing parts for existing cabinets and desks, foiling mirrors, gilding frames and reconditioning furniture.

Forchondt dealt mainly in paintings on canvas, copper and linen supports, managing a diverse visual production that covered a wide range of prices, sizes and quality. While paintings on panel sold for 35 guilders on average, and paintings on canvas for 13 guilders, an old master painting on either support could command a price as high as 500 guilders. Paintings on copper, which were durable and appreciated for their enamel-like finish and their colourful appearance, sold

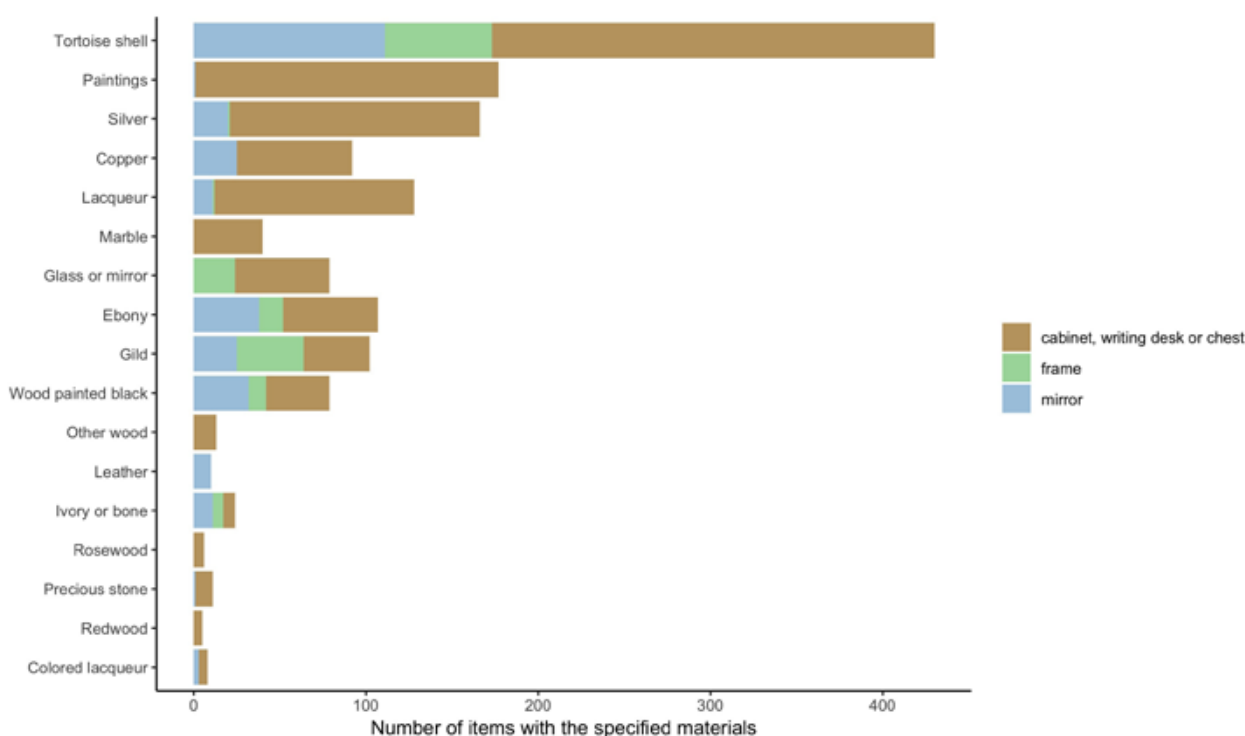


Fig. 4 Most used materials and objects in the decoration of Guiliam Forchondt's furniture, frames and mirrors.

for around 19 guilders. The best and larger paintings fetched more than 50 guilders and were often supplied as part of a series: a set of 12 could represent a total value of around 600 guilders. At the lowest end of the price-quality spectrum were paintings on thin unprepared linen called *watervrfdoecken* (watercolour paintings) costing less than 2 guilders each. These were a specialty of the workshops in Mechelen, located between Antwerp and Brussels.¹⁰ Painters used rabbit skin glue as the medium, which resulted in a much shorter drying time when compared to oil paintings on canvas and copper:¹¹ production was both quick and inexpensive but because margins were slim, profits depended on volume.

The unquestionable luxury product, furniture, generally sold for much higher prices than paintings. Cabinets, writing desks, coffers and tables came in various sizes, with prices that depended on the materials used, the decorative elements included, and the exquisiteness of the design and execution.¹² Margins were high: a cabinet decorated with paintings from Ovid's *Metamorphoses* (of the type following the exemplar shown in Fig. 3), which according to the workshop's cashbook sold for 180 guilders, represented a profit of 120%.¹³

The main advantage of maintaining a furniture and painting workshop was that Forchondt could supervise the production of frames. Furthermore, similar materials or parts were used to make and decorate furniture, mirrors and frames, such as ebony wood, ivory and the tortoiseshell that arrived from as far away as Asia (Fig. 4). Making furniture involved numerous masters, each specialising in a different craft – woodworkers as well as image carvers, painters, silversmiths, turners, gilders and silk embroiderers. They decorated the cabinets, writing desks and chests with mirrors, locks, silver or copper figurines, small copper, marble or ivory pilasters, and small paintings. Tortoiseshell

was used not only in the famous Antwerp cabinet, but also in the most expensive type of frame that Forchondt sold for around 25 guilders. Frames made from ebony cost slightly less, followed by green ebony, with pearwood frames the cheapest;¹⁴ gilding increased their price slightly. So-called 'black' frames, presumably of cheaper woods dyed black, were also very popular. The workshop relied on a steady supply of glass from Venice, as well as the foil and quicksilver necessary for the production of mirrors, which were also sold with frames: either highly ornamented costing as much as 250 guilders or simple and inexpensive.¹⁵ In turn, mirrors also decorated cabinets and writing desks. The virtuosos 'multimedia' craftsmanship and the display of both local and foreign materials that featured in the Antwerp cabinet – which extends to frames and mirrors – positions this luxury product within what scholars have defined as a site of translocal and transcultural intersections.¹⁶

For this enormous and varied production, Forchondt engaged his own workshop, operating on a subcontracting basis with at least 65 painters in Antwerp and 15 workshops in Mechelen. Between 1655 and 1660, he employed on average five woodworkers on a weekly salary. He also purchased parts from a large number of suppliers and was able to engage additional help as necessary. Forchondt was clearly a key figure in the production of luxury and semi-luxurious goods in the Antwerp-Mechelen production area and his business was embedded in the commercial infrastructure through which raw materials and finished goods flowed to and from Antwerp.

While fashions and tastes determined much of the geographical reach of objects, their material properties should not be ignored as they could also present advantages or restrictions to their physical movement. Fig. 5 summarises the number

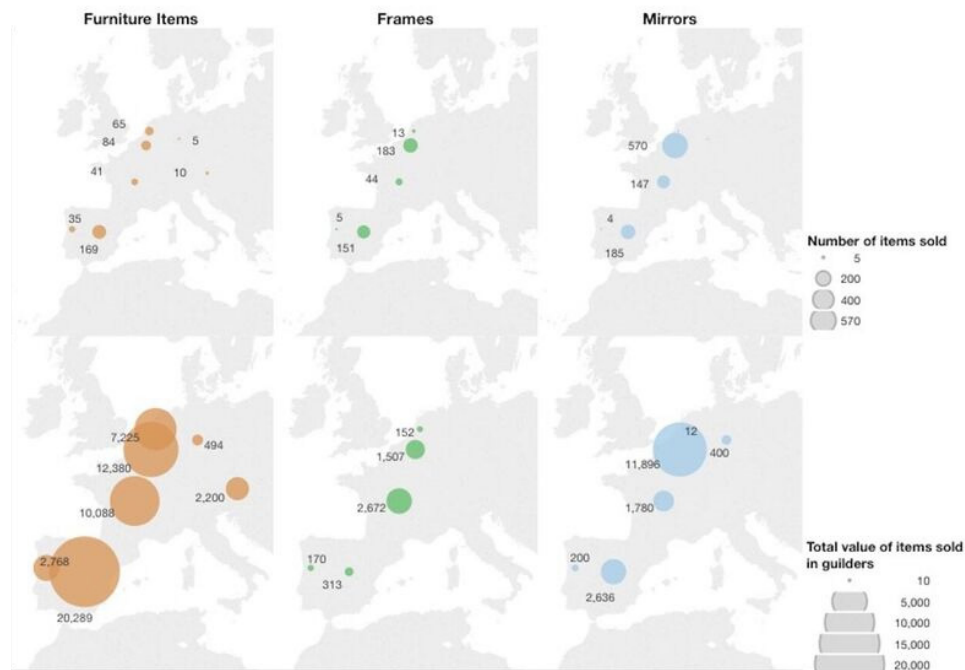


Fig. 5 Known destinations of furniture items, frames and mirrors sold by Guiliam Forchondt (1643–1678): quantities and total revenues.

of furniture items, frames and mirrors that Forchondt sold according to their known destinations and their total value in guilders. A greater number of mirrors, which were at risk of severe damage by weather or road conditions if not packed properly, were sold locally. Local sales also included heavy cabinets, desks and chests, also high risk items and expensive to ship. Although losses on these goods could represent hundreds of guilders for Forchondt, many items were exported to France and the Iberian Peninsula, despite the risks involved: the Antwerp cabinet, for example, was much in demand in Paris, particularly in the mid-1650s. Merchandise sent to the Iberian Peninsula included chests, writing desks and relatively small mirrors, particularly during the late 1660s. The export of such valuable items represented a significant income source for the workshop, at least until the mid-1660s when Forchondt started to cut back on their production to focus even more intensely on the trade in paintings.

In the case of paintings, 75% were sold abroad so their transportable nature and reputation played a determining role.¹⁷ The main export market was the Iberian Peninsula: 31% of all paintings were shipped to Spain and 2% to Portugal. Fig. 6 shows that shipments to the peninsula peaked during the early 1640s, early 1650s and mid-1660s into the early 1670s, particularly to Seville and Cadiz, the main ports of the Americas. Sales to the Habsburg cities of central Europe represented 16% of the total in terms of volume. Forchondt's sons maintained a successful business within Habsburg aristocratic circles centred in Vienna. From 1668, central Europe became an increasingly more important destination than Spain in terms of total value (Fig. 7). This, coupled with the reduced opportunities for profit in the paintings trade with Spain that Forchondt started to experience during the early 1670s (see below), explains why, by the end of his life,

Vienna had totally replaced the Spanish markets as his main destination for Flemish paintings.¹⁸ Overall, this dealer's heightened activity between 1660 and the end of the 1670s, directed particularly to the Iberian Peninsula and central Europe, accords with evidence that at that time the Antwerp workshops were operating at full capacity.¹⁹ Due to the geographical reach of the family firm's branches, Forchondt was able to manage the local supply of paintings, respond to external conditions and opportunities where advantageous, and do his part to sustain the export-oriented production of paintings in Antwerp and Mechelen.

Copper and linen supports are more numerous among Forchondt's shipments of paintings to the Iberian Peninsula. Paintings on copper, in particular, were better able to tolerate the journeys both to Spain and the Americas than those on canvas or linen: this support could withstand conditions such as dampness and humidity that might rot the canvas or linen supports during sea voyages.²⁰ This explains why, for example, 11 out of the 12 paintings on copper in Juli have survived until this day with little loss or damage, unlike the many documented *watervervdoeken*,²¹ none of which has survived. Paintings on copper were neatly packed in cases, one against the other, usually unframed but with a wooden structure nailed on the backside around the edges to prevent them from bending. The packing and shipping costs for copper paintings were therefore considerably higher than those for canvas and linen paintings, which could be exported in rolls of tens or hundreds with their frames packed separately.

As well as the surviving paintings, archival documents are fundamental to the assessment of cross-cultural artistic relations, transfers and transformations. For instance, most Flemish works now on view in Latin American churches and

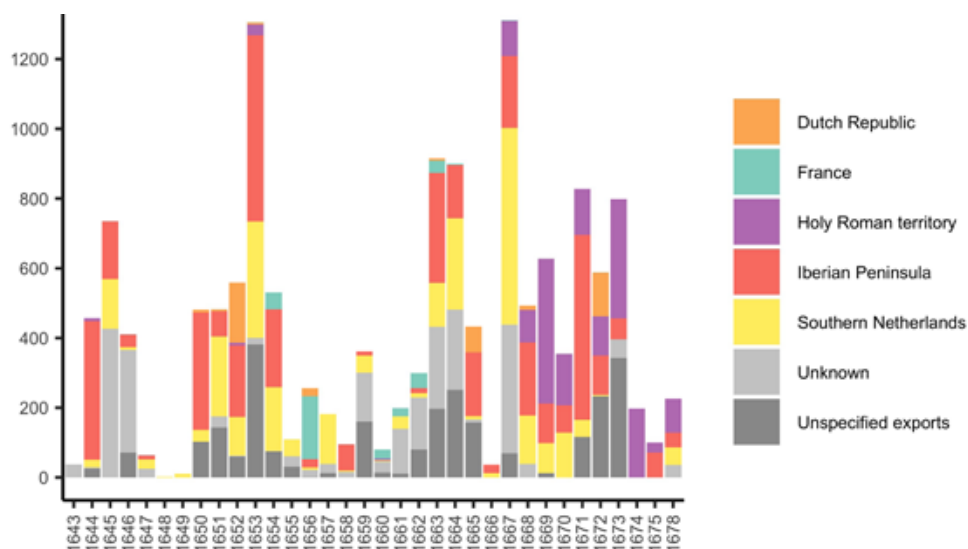


Fig. 6 Number of paintings sold by Guilliam Forchondt per year per destination.

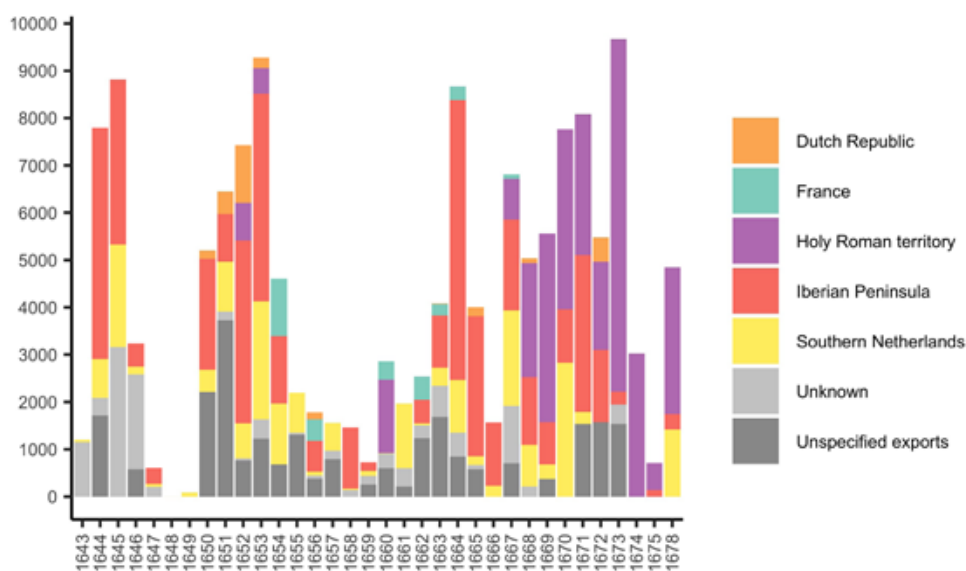


Fig. 7 Total value of paintings sold by Guilliam Forchondt per year per destination (in guilders).

museums tend to be religious paintings, perhaps because they are the best-preserved examples; the absence of paintings on linen is probably due to their material fragility. The market for paintings in the Americas might appear to be solely for religious subjects, but the documented evidence reveals that other genres were also in high demand. Although Forchondt's documents show that religious subject matter predominated in his shipments to Spain, depictions of land or sea battles, hunting scenes, kermises (summer fairs), markets, pleasantries, dance and conversation pieces came close in popularity, followed by decorative works featuring flowers and fruit garlands. For example, in the early 1650s, Forchondt sent a combination of religious series of paintings on copper and battle and hunting scenes in his shipments to his associate Sebastian Fackx (d.1669) in Seville, a practice he continued later to his son in Cadiz.²² This is an aspect that merits future investigation of the history of art production and reception in Spanish America during this period, as well as the painting industry of the Southern Netherlands.

Merely mapping the scale and scope of Forchondt's sales is not enough – although the scale of his activities reveals the extent of his local production, the geographical scope of his activities was made possible by his commercial network. Before 1660, exports to Spain were sent mainly through Oostende and Dunkirk, but during the 1660s and 70s, when Forchondt's workshop and business expanded, all shipments went via Amsterdam, Rotterdam and Middelburg. By the mid-century, Dutch commercial infrastructure was fully established and Amsterdam had become a global trade centre, vital to an export-oriented Antwerp dealer.²³ Furthermore, Dutch shipping played a crucial role in Forchondt's trade not only within Europe but also in his transatlantic activities. However, even after his son Justo had settled in the Iberian Peninsula to head the family operations, Forchondt still had to use Spanish transatlantic agents because the regulations dictated that only Spanish-born or naturalised merchants could trade directly with the Indies.

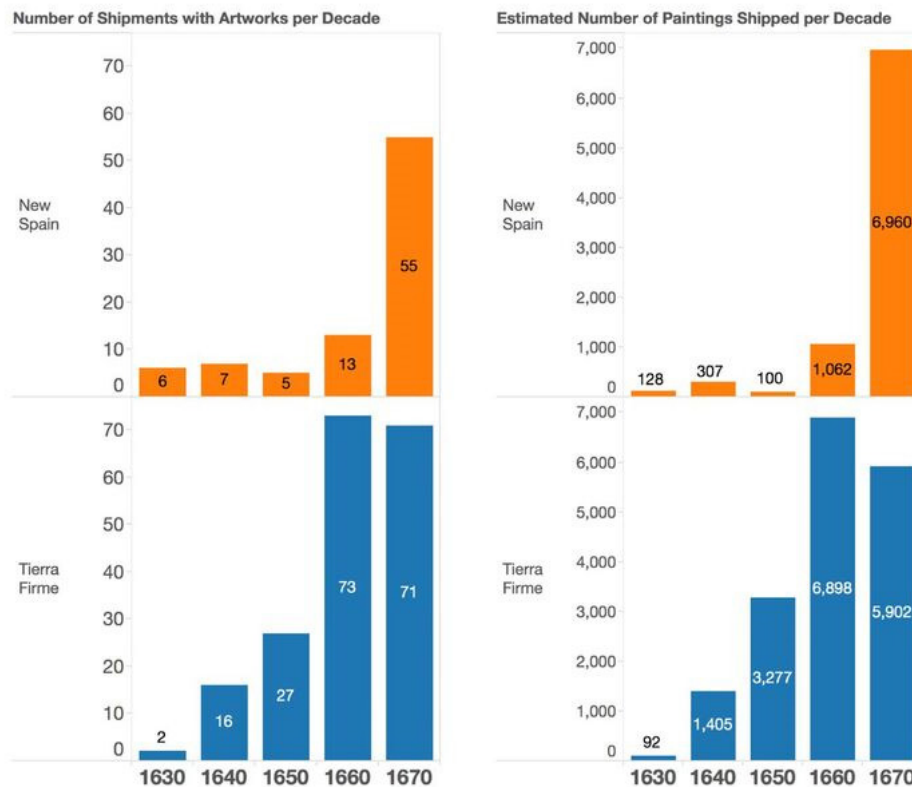


Fig. 8 Art exports to New Spain and Tierra Firme per decade.

Exports of paintings and painters' materials to the New World

Shipping documents are available for the fleets that sailed between 1630 and 1680 to New Spain and Tierra Firme (present-day Mexico and South America respectively). These detail each ship's cargo, the values and export duties that the authorities assigned to the merchandise, and the names of the owners, agents and recipients of the goods.²⁴ A systematic review of 848 documents for the ships in the official convoys that sailed from Spain twice a year resulted in the identification of 295 shipments containing artworks and artists' materials.²⁵ Fig. 8 expands on these results and reveals an overall growth in the export of artworks during the second half of the 17th century even though transatlantic traffic declined markedly from the mid-century on.²⁶ Based on specifications in the documents or an estimation of the number of paintings that would fit into the size of the box or bundle, the total number of paintings exported in the official fleets to New Spain and Tierra Firme between 1630 and 1680 could have amounted to 26,131 paintings (27,632 if those paintings in the occasional fleets to other destinations in Central America and the Caribbean are also included).²⁷ Taken together, the bar charts reveal that the increase in exports to the Americas observed during the overall period can be attributed first to the expansion in art shipments to Tierra Firme (which accelerated during the first four decades), and second to the dramatic growth in art exports to New Spain in the 1670s.

Materials for artists were also included in these shipments: lead white, blue powders, brushes, cord, linseed oil and Spanish canvas. Documents for New Spain, for instance,

list the following main aggregates: 17 barrels of blue powders and 14 of lead white in the 1640s; one barrel of lead white and another of linseed oil in the 1650s; 26 barrels of lead white in the 1660s; two boxes containing brushes and 110 boxes of lead white in the 1670s, and in 1680 another 209 boxes of different sizes containing lead white. The list for Tierra Firme includes 27 barrels of blue powders, one box of linseed oil and one of lead white in the 1650s; 51 boxes of lead white in the 1660s, two barrels in 1672, and 94 boxes or small barrels with the same alongside 32 barrels of blue powders in the 1670s. It is notable that in the last two decades lead white was sent to both New Spain and Tierra Firme, although in greater quantities to the former, and that blue pigments are listed for Tierra Firme with more frequency.²⁸ Although it is clear that these exports responded to a heightened art production at the points of destination, further research is necessary to confirm how these shipments might relate to the activity of local painters and the market for artworks in each locale.

Paintings and artists' materials of varying sorts travelled both ways, bundled together with a wide range of goods (textiles, wine and foodstuffs, construction materials, clothing, haberdashery, books, furniture), depending on the agents involved, as well as silver on the return trips. The same sources cited above indicate that, as part of the observed expansion in the art trade, the number of official agents involved in shipments of artworks and artists' materials more than doubled from 167 identified names before 1660 to 410 between 1660 and 1680. Furthermore, ongoing analysis also reveals the groups of transatlantic dealers, specialising in paintings, who emerged in these last two decades.²⁹



Fig. 9 Anonymous (after Peter Paul Rubens), *The Adoration of the Magi*, 17th-century Flemish, 256.5 × 207.5 cm, oil on canvas, Regional Museum of Guadalajara, Guadalajara, Mexico.

Forchondt in the transatlantic trade of paintings and artists' materials

Forchondt was a participant in these material exchanges across the Atlantic. In October 1665, he sent pigments amounting to 1,212.25 guilders – including umber, vermilion, cassel earth, malachite green, earth green and Spanish green – to Seville, as well as more expensive pigments such as smalt and blue ashes.³⁰ A few months earlier, Forchondt had sent 1330 brushes of different sizes and qualities, over 3000 litres of linseed oil and 2000 copper nails.³¹ This suggests that the materials were intended for the production of paintings in Seville – not only for local consumption but also for the American markets – for which Flemish paintings and techniques served as models and for reproduction.

The Flemish community in Seville and Cadiz was fully involved in the artistic production and transatlantic exchanges. One of Forchondt's main Spanish agents was Antonio Rodríguez Cortés, whose sister had married into a Flemish family of merchants in Seville. He travelled to New Spain in 1660, 1662, 1665, 1668 and 1670, and to Tierra Firme in 1675 and 1678.³² In 1670, he took to Mexico 54 barrels of lead white alongside a variety of goods such as books, hats and wax. His return cargo to Cadiz in 1671, divided between five ships, included cochineal, indigo and staple products such as sugar, vanilla, cacao and silver. These were for the most part products that in turn were shipped to Amsterdam from whence Dutch merchants distributed them throughout Europe, including to Forchondt in Antwerp. In fact, Forchondt purchased indigo and cochineal – as well as wood

and the tortoiseshell essential for the Antwerp furniture industry and the cabinets, frames and mirrors he produced in his workshop – via agents in Amsterdam such as Isaac de Bie.

In 1672, Forchondt shipped 34 paintings to Rodríguez Cortés via Nacquens & Company based in Middelburg. The agent had requested specific scenes ranging from the months of the year and the wonders of the world, to battle, hunting and marine scenes, as well as religious themes related to the life of Mary, which he then sent to New Spain that year.³³ Rodríguez Cortés specified the sizes and prices for the series of paintings on copper of the months of the year, and requested painted flower garlands in the style of tapestries instead of frames, exemplified in an *Adoration of the Magi* after Rubens now in Guadalajara (Fig. 9). This request was no doubt in response to what appealed to buyers in Mexico, confirming that agents such as Rodríguez Cortés were not just middlemen – they were brokers of information on tastes and preferences that they then passed on to Forchondt and other Flemish dealers and painters.

While dealers and their overseas agents often dealt with practical issues such as sizes and prices in their written exchanges, they also discussed thematic, technical and stylistic matters. For example, earlier in 1616, the Mexican agent of another Flemish art dealer, Guillermo Van Immerseel, wrote to advise him to send Flemish linen paintings to New Spain because of the popularity of watercolour paintings (*lienzos al temple*). He also noted that local painters varnished their works with a native oil that produced a very attractive effect and advised Van Immerseel to do the same with the Flemish works destined for Mexico.³⁴ This and similar information



Fig. 10 Anonymous, *Noli me tangere*, Flemish c.1640–1670, oil on copper, 63 × 49 cm, Lima Art Museum, Peru, Donación Memoria Prado.

may have been noted in the Mechelen workshops, thereby influencing the production of watercolour paintings.

Agents would sometimes suggest specific prototypes to follow and provide clear instructions to include or respect particular elements, but workshops and dealers back in Antwerp also displayed initiative, for example, by sending paintings to test and promote certain artists or themes as a way to create and stimulate markets and fashions.³⁵ Fig. 10 provides an example of a religious scene enclosed in a flower garland, similar to that promoted by Forchondt when he wrote in 1653 to the above-mentioned Sebastian Fackx in Seville: ‘you should also expect [to receive] some very nice pieces, very lively and beautiful, of the Holy Mystery of the Eucharist by young new masters at very reasonable prices.’³⁶ This imagery accorded with the tested popularity of the recognisable type after Daniel Seghers (1590–1661) and of flower paintings in general, demand for which continued to stimulate its production well beyond the mid-century by young, new painters in the Southern Netherlands at the initial stages of their careers.

Soon after Forchondt’s son Guiliam arrived in Cadiz in 1677, he advised his father that selling paintings was no longer good business and suggested that he should send other more profitable products such as white lace. As a result, towards the end of the 1670s, the Forchondts in Cadiz slowly abandoned the trade in paintings. It seems that by the end of the decade, the market for Flemish paintings in Spain and the New World had begun to manifest signs of saturation. Imported works were no longer competitive and were starting to lose their edge. This suggests that locally available paintings were able to satisfy local demand for Flemish-like paintings for the

Spanish and American markets. More research is required to assess the nature and strength of the demand for Flemish paintings in the Hispanic world in the last decades of the century. This would help shed light on how exactly developments abroad impacted the lifecycle of the export-oriented painting industry in the Southern Netherlands and the many workshops connected to Forchondt.³⁷

The expansion in art exports to the Americas during the second half of the 17th century is linked to evidence of a heightened activity by local painters in the viceroyalties. Taking into account the export of paintings to New Spain during the 1670s in particular, and that dealers such as Forchondt stimulated the production of paintings in Antwerp because of their popularity in Spanish and American markets, it is not surprising that in Mexico, dealer-led workshops were producing paintings for the buoyant local markets. Painters in Mexico complained about the competition that these workshops represented and, by 1686, they instituted new guild regulations to protect themselves not only from unofficial painters and dealer-entrepreneurs active in Mexico, but also from anonymous imported paintings. These new regulations also introduced the technique of painting on copper into the master painter’s exam. Armed with new regulations, local painters adopted and made this technique their own, and painting on copper became an established local tradition as a result. In the case of Peru, more research is still necessary, particularly with regard to the development of local markets for paintings in active commercial centres such as Lima and especially Cusco, since evidence for other localities and artistic traditions increasingly indicates this topic cannot be assessed in isolation from the transatlantic and global dynamics of trade in general.³⁸ The cycle of Flemish paintings on copper with which this paper began thus represents an important moment in time that antecedes interrelated changes and developments in 18th-century colonial Latin American painting.

Conclusions

Guiliam Forchondt operated on a remarkable scale and scope in both the primary and secondary markets, and within a wide price-quality spectrum. His business was oriented to export markets, and for that reason he played an important mediation role between Antwerp and the Mechelen workshops, and buyers both locally and abroad. Key to these developments was his expertise and access to information on purchasers and their preferences, which he then translated into his own workshop production and that of the painters he subcontracted. Establishing family branches in the 1660s and 70s allowed Forchondt to expand and diversify his business activities and reap the profits from the opportunities he identified in Spain and Spanish America. On the one hand, the increased production of luxury and semi-luxurious goods, including paintings, by Forchondt in the Southern Netherlands, and the expanding transatlantic trade in artworks and artists’ materials on the other, emerge as two

intricately connected developments during the period under study. In this process, dealers such as Forchondt were in fact mediators, creating and acting out in very precise ways what in art-historical terms is considered artistic influence and exchanges.

Notes

1. This paper is based on a larger research project on the 17th-century Flemish art dealer and painter Guiliam Forchondt (I) and his exports of paintings from Antwerp to Spain and the Americas through a data-driven approach: see S. van Ginhoven, *Connecting Art Markets: Guiliam Forchondt's Dealership in Antwerp (c. 1632–78) and the Overseas Paintings Trade*, Leiden and Boston, Brill, 2017. The literature on Flemish and Latin American painting is extensive. Scholarship is increasingly focusing on the global transmission and circulation of objects, as well as on the complexity of artistic transfers across geographies and media: see S. Porras, 'Going viral? Maerten de Vos's *St Michael the Archangel*', *Nederlands Kunsthistorisch Jaarboek* 66, 2016, pp. 54–78; A.M. Hyman, 'Inventing painting: Cristóbal de Villalpando, Juan Correa, and New Spain's transatlantic canon', *The Art Bulletin* 99(2), 2017, pp. 102–135. See also T. DaCosta Kaufmann, C. Dossin and B. Joyeux-Prunel, *Circulations in the Global History of Art*, Farnham, Ashgate, 2015.
2. All 11 surviving paintings are on copper supports (53 × 73 cm).
3. 'Gmo Forchondt fesit' appears in all the paintings with the exception of *Christ being Dragged through the Brook Cedron after his Arrest* and *The Miraculous Draught of Fishes*.
4. Archival material for other dealers such as Chrisostomo Van Immerseel and Matthijs Musson indicates that this was a widespread practice among dealers. A more extensive discussion of dealers commissioning from several workshops can be found in Van Ginhoven 2017 (cited in note 1), pp. 111–116.
5. Anonymous versions of some of the Juli paintings have been found in Lima, Guadalajara, La Rioja and Cadiz including: Anon. 17th-century Flemish, *Christ being Dragged through the Brook Cedron after his Arrest*, oil on copper, 51 × 65 cm, private collection, Lima, Peru; Anon. 17th-century Flemish, *Crucifixion*, oil on copper, 72.5 × 55 cm, Regional Museum of Guadalajara, Guadalajara, Mexico; Anon. 17th-century Flemish, *The Miraculous Draught of Fishes*, oil on copper, 67 × 85 cm, Cadiz Cathedral, Cadiz, Spain; Guiliam Forchondt (I), *The Adoration of the Magi*, oil on copper, 70 × 86 cm, signed 'Gmo Forchondt fesit', Logroño Museum, La Rioja, Spain; Guiliam Forchondt (I), *The Crucifixion*, oil on copper, 70 × 86 cm, signed 'Gmo Forchondt fesit', Logroño Museum, La Rioja, Spain. The museum in La Rioja attributes these paintings to Guiliam Forchondt (II) because of the use of the Spanish name 'G[uillel]mo' in the autograph: see E. Duverger, 'Zeventiende-eeuwse schilderijen met de signatuur van Gilliam en Guilliemo Forchondt uit Antwerpen', *Bulletin – Musées royaux des beaux-arts de Belgique* 38–40, 1989, pp. 303–315. However, there is little evidence that Forchondt (II) was active as a painter while in Cadiz.
6. N. De Marchi, S. van Ginhoven and H.J. Van Miegroet, 'Supply-demand imbalance in the Antwerp paintings market, 1630–1680', in N. De Marchi and S. Raux (eds), *Moving Pictures: The European Trade in Visual Imagery, 1400–1800*, Turnhout, Brepols, 2014, pp. 37–76.
7. Guiliam Forchondt and Maria Lemmens had two daughters and six sons: Susanna (1637–1712), Anna Maria (1639–1711), Melchior (1641–1708), Alexander (1643–1683), Guiliam (II) (1645–1707), Justo (1647–1709), Andreas (1650–1675) and Marcus (1651–1706). Anna Maria married the merchant Frans Vasterhavens, who participated in the family business in Vienna; both resided there for some years.
8. The analysis of the workshop and business is based on the following sources in the Antwerp City Archives (SAA): IB1082 (Kasboek, 1647–50), IB1083 (Kasboek, 1664), IB1043 (Kasboek, 1650–56), IB1044 (Kasboek, 1655–63), IB1046 (Kasboek, 1663–71), IB1103 (Rekeningen van schilderijen, lijsten en platen), IB1045 (Cargasoenboek A, 1669–74), IB1047 (Journaal, 1652–55), and IB1249 (Commissieboek, 1643–48). Accordingly, Figs 4–7 are based on: SAA, IB1043–1047, IB1082–1083 and IB1103.
9. Only 1822 of the paintings sold were described as framed, the cost of the frame being included in the sale price of a painting. Therefore, the category for frames mentioned here refers to frames sold separately, for the most part recorded with prices and some descriptive details in the documents.
10. N. De Marchi and H. Van Miegroet, 'The Antwerp-Mechelen production and export complex', in M. Mochizuki, A. Golahny and L. Vergara (eds), *Essays in Memory of John Michael Montias*, Amsterdam, Amsterdam University Press, 2007, pp. 133–147.
11. Although of higher quality and much larger than those referred to here, the following painting illustrates the technique: Pieter Bruegel (I), *The Adoration of the Kings*, 1556–1562, tempera on linen, 124 × 169 cm, Brussels, Royal Museums of Fine Arts of Belgium (acc. no. 3929).
12. Ria Fabri has superbly established the typology of the Antwerp cabinet industry in which Forchondt played an important role: R. Fabri, *De 17de-eeuwse Antwerpse kunstkast; Kunsthistorische aspecten*, Brussels, Koninklijke Academie voor Wetenschappen, Letteren en Schone Kunsten van België, 1993; R. Fabri, *De 17de-eeuwse Antwerpse kunstkast: typologische en historische aspecten*, Brussels, Paleis der Academiën, 1991; R. Fabri, 'Het archief van de Familie Forchondt als bron voor de studie van de 17de-eeuwse Antwerpse kunstkasten', *Bulletin van de Koninklijk musea voor kunst en geschiedenis* 57, 1986, pp. 43–58.
13. See A. Jager, 'Quantity over quality? Dutch and Flemish paintings in a Danish private collection', in this volume, pp. 26–38 for a further discussion of this cabinet.
14. In the case of cabinets, ebony, rosewood and redwood were the most expensive wood types used.
15. For reference, the most skilled woodworker in Forchondt's workshop earned 1–2 guilders per day.
16. N. Baadj, 'Collaborative craftsmanship and chimeric creation in seventeenth-century Antwerp art cabinets', in S. Burghartz, L. Burkart, and C. Göttler (eds), *Sites of Mediation: Connected Histories of Places, Processes, and Objects in Europe and Beyond, 1450–1650*, Leiden, Brill, 2016, pp. 270–296; see also the Introduction, pp. 1–20.
17. A total of 20% were exports albeit to unknown buyers (indicated in dark grey in the bar charts), another 20%, possibly local sales or exports, were sold to unknown purchasers and destinations (light grey in the bar charts) and 5% were sold locally in the Southern Netherlands.
18. The reduced opportunities for profit in the paintings trade with Spain that Forchondt started to experience during the early 1670s contrasts with the value and volume of sales of paintings to Habsburg aristocratic circles centred in Vienna.
19. De Marchi *et al.* 2014 (cited in note 6). On art production and markets in the Southern Netherlands see D. Lyna, Dries, F. Vermeylen and H. Vlieghe (eds), *Art Auctions and Dealers: The Dissemination of Netherlandish Art during the Ancien Régime*, Turnhout, Brepols, 2009; N. De Marchi and H. Van Miegroet

- (eds), *Mapping Markets for Paintings in Europe, 1450–1750*, Turnhout, Brepols, 2006; F. Vermeylen, *Painting for the Market: Commercialization of Art in Antwerp's Golden Age*, Turnhout, Brepols, 2003.
20. For a description of the hardships of shipping paintings overseas see L. Kata, "'With the most diligence possible': Francisco de Zurbarán and the overseas art trade in the seventeenth century', *Hispanic Research Journal* 12(5), 2011, pp. 387–396.
 21. Antwerp paintings on copper are explored in J. Wadum, 'The Spanish connection: the making and trade of Antwerp paintings on copper in the 17th century', in L. Fuster López (ed.), *Paintings on Copper and other Metal Plates: Production, Degradation and Conservation Issues/La pintura sobre cobre y otras planchas metálicas: Producción, degradación y conservación*, Valencia, La Eliana, 2017, pp. 27–42. See also: M. Komanecky (ed.), *Copper as Canvas: Two Centuries of Masterpiece Painting on Copper, 1575–1775*, exh. cat. Phoenix, Phoenix Art Museum, 1998; M. Komanecky, I. Horovitz and N. Eastaugh, 'Antwerp artists and the practice of painting on copper', *Studies in Conservation* 43, suppl. 1, 1998, pp. 136–139.
 22. In 1671, Forchondt sent 12 landscapes and 51 still lifes to his son in Cadiz, which he then sold or consigned to agents travelling to the Americas: SAA, IB1043–1047, IB 1082–1083 and IB1103. See also: S. van Ginhoven, 'Exports of Flemish imagery to the New World: Guiliam Forchondt and his commercial network in the Iberian Peninsula and New Spain, 1644–1678', *Jaarboek Koninklijk Museum voor Schone Kunsten*, 2011, pp. 119–144.
 23. C. Lesger, *The Rise of the Amsterdam Market and Information Exchange: Merchants, Commercial Expansion and Change in Spatial Economy of the Low Countries, c. 1550–1630*, Aldershot, Ashgate, 2006; F. Vermeylen and C. Rasterhoff, 'The Zeeland connection: the art trade between the Northern and Southern Netherlands during the seventeenth century', in N. De Marchi and S. Raux (eds), *Moving Pictures: The European Trade in Visual Imagery, 1400–1800*, Turnhout, Brepols, 2014, pp. 123–150.
 24. The period was chosen specifically to situate Forchondt's activities in a wider context. More archival work is necessary to extend the period of analysis to cover the entire century.
 25. Documents in the Archivo General de Indias in Seville (AGI): Contratación, 1178 to 1235 (Registros de ida a Nueva España and Registros de ida a Tierra Firme). Fig. 8 is based on these sources.
 26. P. Chaunu, *Séville et l'Amérique aux XVIe et XVIIe siècles*, Paris, Flammarion, 1977; L. García Fuentes, *El comercio español con América, 1650–1700*, Seville, Escuela de Estudios Hispano-Americanos, Consejo Superior de Investigaciones Científicas, 1980.
 27. Estimates based on the number of paintings specified in the documents or, if unspecified, using the benchmark of 100 rolled canvases per large box or trunk following: D.T. Kinkead, 'Juan de Luzón and the Sevillian painting trade with the New World in the second half of the seventeenth century', *The Art Bulletin* 66, 1984, pp. 303–312; Van Ginhoven 2017 (cited in note 1), p. 52.
 28. Blue powders probably refer to azurite. The development and use of local blue in Mexico may explain its local availability and therefore less need for importation. See: D. Magaloni Kerpel, *The Colors of the New World: Artists, Materials, and the Creation of the Florentine Codex*, Los Angeles, Getty Research Institute, 2014; S. Nash, J. Cannon and J. Kirby (eds), *Trade in Artists' Materials: Markets and Commerce in Europe to 1700*, London, Archetype Publications, 2010.
 29. Ongoing research by the author based on Van Ginhoven 2017 (cited in note 1), pp. 55–72.
 30. SAA, IB1046, ff. 37v, 39v, 46v, 52v.
 31. Ibid.
 32. For details of his trips and return cargoes, see AGI, Contratación 676B, No. 5 (Papeles de carga, 1670–79).
 33. Specifically: 12 big laminas of the months of the year; 8 large paintings of the wonders of the world; 2 big religious paintings; 8 marine paintings, battle and hunting scenes; and 4 religious themes related to the life of Mary. All were shipped to New Spain via Domingo de Cantabrana. The request further reads (author's translation): '12 paintings representing the twelve months of the year, under half a vara tall and two varas wide, which should come without frames and instead of [frames] should instead be flower garlands in the style of those in tapestries, and should not cost more than 22 to 24 guildens ... and should come in a box marked as shown and arrive in Spain before March in time to load on the fleet, consigned to Don Anthonio Rodrigues Cortes on account and risk of Captain Domingo de Cantabrana'; SAA, IB1218, under 'Naamloos (schilderijen)', not foliated.
 34. 'aga V[uestra]M[erced] hazer unos lienços al temple de buena mano/ gastense aqui mucho e visto que le dan un vernis con un[c]ytte de Betto [?] que pienso/ que llaman ycholi y dan esto por ensima y par el lienço aloyo es muy buena/ ynbención y ansy pueden venir de flandes'. 'Ycholi' could refer to achiote, a plant native to the Americas, a red natural pigment also used in cooking: SAA, IB275, f. 269v (letter from Pedro Chavez in Mexico City to Guillermo Van Immerseel, 30 June 1616).
 35. Forchondt employed a similar strategy to test the Parisian market: in 1661, he travelled to Paris with a few paintings to sell at the fair of St Germain-des-Pres: SAA, IB1091 (letter from Maria Lemmens in Antwerp to Guiliam Forchondt in Paris, 24 February 1661).
 36. SAA, IB1082/1, ff. 54r–54v (letter from Guiliam Forchondt in Antwerp to Sebastian Fackx in Seville, 13 May 1653). According to related documents, the artists promoted here were Jan van Kessel (1626–1679) and Jan van Balen (1611–1654).
 37. For an approach to study the lifecycles of creative industries in the early modern period see C. Rasterhoff, *Painting and Publishing as Cultural Industries: The Fabric of Creativity in the Dutch Republic, 1580–1800*, Amsterdam, Amsterdam University Press, 2017.
 38. For a more extensive discussion see M. North (ed.), *Artistic and Cultural Exchanges between Europe and Asia, 1400–1900: Rethinking Markets, Workshops and Collections*, London, Routledge, 2016.

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QUANTITY OVER QUALITY? DUTCH AND FLEMISH PAINTINGS IN A DANISH PRIVATE COLLECTION

Angela Jager

ABSTRACT This paper explores the unusually high availability of Dutch and Flemish old master paintings in Denmark, and investigates this dispersal especially in the low-quality segment. The focus lies on one private collection comprising hundreds of undocumented and unstudied paintings. A selection of these paintings, of which multiple versions are known, is studied further to determine the context of their production and acquisition. Did the collectors prefer quantity over quality, and, if so, why?

Introduction

In a recent article, Michael North urges that ‘many castles of the nobility in Denmark ... contain or may contain a wealth of Netherlandish paintings, including both high and low art, that need to be researched in the years to come.’¹ North’s comment on Danish castles and ‘both high and low art’ arouses questions as to the status of lower quality paintings in these collections and the reason why the nobility would have collected these types of paintings in the first place. North’s article, however, continues with a discussion of the purchases of Gerhard Morell (c.1710–1771) for the Royal Danish Kunstkammer thereby focusing on the top price bracket.

These private castle collections, which originated mainly in the 18th century, are often inaccessible and unstudied. What scant information is available suggests a predominance of Flemish and Dutch works by little known painters and copies.² Analysis of the written sources on noble collections in early modern Denmark carried out by Jesper Svenningsen in his excellent dissertation suggested an overall taste for Netherlandish baroque.³ The high density of Netherlandish paintings in Danish castle collections might be explained by Morell’s purchases for the Kunstkammer, which popularised certain Dutch and Flemish painters in court circles, as both North and Svenningsen argue.⁴ But how can we explain the many low quality paintings in these collections?

This paper stems from research conducted in one of these castles. The research project explores the dominance of Netherlandish lesser quality paintings in Denmark by examining one particular castle collection, the largest part of which

originated in the 18th century.⁵ The manor house, which was bought in 1739 by an ancestor of the current owners, was rigorously renovated and enlarged. On 29 August 1750, four men were paid for the transfer of an unknown number of paintings from the family’s Copenhagen residence to the castle. The walls were further decorated with old master paintings bought at auctions. Following the owner’s death, his eldest son acquired the building and its contents (hereafter referred to as the father and the son). The son expanded his father’s collection with purchases at auctions: an inventory of the collection drawn up in 1790 includes 429 paintings and specifies whether he had bought the works himself or if they were inherited.⁶ This inventory demonstrates that the son purchased 230 paintings over a period of 37 years for a total of 4,800 *rigsdaler*, most of which cost 10 *rigsdaler* or less. To put this into perspective, an unskilled labourer working in Copenhagen in 1789 earned about 1 *rigsdaler* a week in winter and 1.25 *rigsdaler* a week in summer.⁷

This 18th-century collection of hundreds of paintings contains different genres, painting sizes, supports and styles. While some German, French, Danish and Italian painters are represented, the vast majority of the works are painted by Flemish and Dutch masters. The research comprises the c.450 old master paintings in the main building,⁸ many of which have not previously been documented or studied. The frames are mainly of a uniform type, suggesting that the collectors had considered how their painting collection would be presented. Most frames carry nameplates with highly doubtful attributions to well-known painters. The most recent inventory of the entire collection was drawn up in the 1960s but



Fig. 1 Victor Wolfvoet (II) or circle, *The Horrors of War*, after 1636, oil on copper (attached to panel at a later date), 55.9 × 49.5 cm, private collection, Denmark. (Photo: Frida Gregersen.)



Fig. 2 Victor Wolfvoet (II) or circle, *The Benefits of Peace*, after 1636, oil on copper (attached to panel at a later date), 57 × 50.7 cm, private collection, Denmark. (Photo: Frida Gregersen.)

clearly without any research into attribution: often the painter's name on the uniform frame was simply adopted. This project will publish the entire collection as individual records in the open-access image database of the RKD – Netherlands Institute for Art History, including object data, new attributions and provenance information.⁹

This paper focuses on a selection of paintings of which multiple versions are known. It will determine when, where and how were they produced, when they entered the collection and the conditions of their purchases. The results will be used to assess if the collectors preferred quantity over quality, and, if so, why.

The paintings

Flemish paintings: the dominance of Rubens' designs

The first case to be considered are two paintings entitled *The Horrors of War* and *The Benefits of Peace*. Both are painted on copper supports of similar size and have complementing iconography (Figs 1 and 2). On *The Horrors of War*, Minerva, goddess of wisdom, expels Mars, the god of war. Mars symbolises the destructive power of war: he has several dead bodies beneath him and is dragging off a mother and child. As the goddess of wisdom and patron of the arts, Minerva defends the virtues and arts that can only flourish during peace. This is depicted in *The Benefits of Peace*: Peace is being crowned by Victory, while she points her caduceus at a winged and

tailed figure at the right who, with her encouragement, sets light to a pile of weapons and armour. Peace is surrounded by the virtues of Abundance (cornucopia), Harmony (bundle of arrows) and Justice (pair of scales). The fruits of peace are spilling from the cornucopia and are gathered by four putti.

The Horrors of War relates to three sketches by Rubens showing the motif of Minerva driving away Mars, while he is dragging off a mother and child.¹⁰ The sketches are generally considered to be studies for the *The Consequences of War* (1637–1638) in the Palazzo Pitti in Florence.¹¹ The gouache in the Musée du Louvre is the last of these three studies (Fig. 3).¹² The copper painting in the Danish collection comprises most details of the Louvre gouache, but in a reduced vertical format composition, excluding Hercules and his club joining the fight at the left and the burning city at the right. Presumably the visual source was either the Louvre gouache or another unpre-served sketch.

The preparatory sketches are not followed exactly in any surviving painting by Rubens, but two paintings attributed to Victor Wolfvoet (II) (1612–1652) adopt the full design (Fig. 4).¹³ Nils Büttner convincingly suggests by the strangely empty landscape and the awkward articulation of space that Wolfvoet must have had a design by Rubens from which to work, but no final painted version.¹⁴ Rubens kept most of his sketches in his studio, but following his death and the auction of his estate in 1642, many came into the possession of Antwerp artists and dealers who reproduced these designs for the art market.¹⁵ Wolfvoet was one of those painters: he owned 20 oil sketches by Rubens and produced painted up copies after them.¹⁶

The Horrors of War in the Danish collection differs from the two paintings attributed to Wolfvoet because it shows a



Fig. 3 Peter Paul Rubens, *Hercules and Minerva Expelling Mars*, c.1634–1636, body colour, oil and brown ink over black chalk on light brown paper, 370 × 535 mm, Musée du Louvre, Paris, inv. no. 20.183. (Photo © RMN-Grand Palais, Musée du Louvre/Thierry Ollivier.)



Fig. 4 Victor Wolfvoet (attributed to), *Hercules and Minerva Expelling Mars*, after 1636, oil on canvas, 67 × 89 cm, The State Hermitage Museum, St Petersburg, inv. no. GE 8531. (Photo: Leonard Kheifets © The State Hermitage Museum.)

reduced composition as opposed to its model, and has a pendant painting. This pendant, *The Benefits of Peace*, does not relate to known paintings or oil sketches by Rubens but its motif of Peace surrounded by three virtues and being crowned by Victory features on a painting signed by Wolfvoet.¹⁷ This painting has a horizontal format composition with more

showing on each side: Mercury is sitting crossed-legged at the left, playing the lute, and two bound prisoners, stripped from their armour, are on the right. There are three detailed preparatory drawings and five paintings of this composition, recently attributed to Wolfvoet by Gregory Martin and Bert Schepers.¹⁸

No other versions of the two Danish vertical format compositions are known. However, the decorations of an Antwerp cabinet attributed to Wolfvoet and/or his studio include the depiction of a further reduced motif in which Peace, accompanied by Abundance, Harmony and Justice, is crowned by Victory, but three putti instead of four are gathering the fruits of peace, and one putto, instead of two, is climbing the tree (Fig. 5).¹⁹ Many of the other compositions that decorate this cabinet derive from models by Rubens.²⁰

For the provenance of the Danish coppers, I would like to propose that they originally decorated the sides or doors of the same cabinet. Besides their thematic relation, both are painted on vertical format copper supports of similar size and display a reduced composition compared to other known examples. There are several versions of *The Horrors of War* and *The Benefits of Peace*, but the Danish collection is the only example known to date where these two compositions function as pendants. Wolfvoet is regularly recorded as a painter in the accounts of the art dealer Matthijs Musson (1598–1678).²¹ Musson commissioned the artist to paint larger copper plates with motifs after Rubens and other Flemish painters in order to decorate cabinet doors.²² These cabinets were exported overseas, to the Iberian Peninsula in particular.²³

As previously mentioned, Wolfvoet is known to have owned and reproduced designs by Rubens. However, the inventory of his estate does not include examples featuring Peace and War: the closest in iconography are ‘a sketch after Rubens of Mars and Venus on panel’ and ‘Abundance, copy after Rubens on canvas’.²⁴ A document from Musson in 1651 mentions the sale of ‘a copper plate of the Peace after Victor [Wolfvoet]’, thereby indicating Wolfvoet as the originator of *The Benefits of Peace*.²⁵ Wolfvoet’s depiction quotes heavily from Rubens, among others from the oil sketch *Abundance* that Wolfvoet owned.²⁶ Wolfvoet received several commissions from Musson for paintings featuring Peace and Peace crowned by Virtue, but none with war iconography; however, once, having given Wolfvoet a commission for *Peace*, Musson also commissioned ‘Just den Schilder’ to paint *Mars Troubles Peace*.²⁷

It is likely that Musson provided painters on his payroll with the examples.²⁸ The fact that Wolfvoet painted the same design a number of times does not therefore necessarily prove his authorship of the Danish painting or other paintings attributed to him: they may have been painted by another painter working for the art dealer.²⁹ Even after Musson’s death, the same designs spread to other workshops and continued to be produced. The name ‘Beschey’ on the reverse of the frames is of relevance here: Balthasar Beschey (1708–1776) reproduced Rubens’ designs until his death in 1776.³⁰ These two subjects are also recorded as having been painted by him: a London auction in 1824 includes paintings of ‘*The Horrors of War* by Bischey after Rubens; *The Blessings of Peace*, ditto’,³¹ presumably copies after Rubens’ Florence and London paintings.³² The origin of this attribution to Beschey is unclear and of a more recent date: the paintings appeared at Otto Thott’s auction in 1787 as anonymous.³³ The son bought them for 54 *rigsdaler*, listing them in the 1790 inventory as ‘Rubens School’.

A third work in the collection relates to a sketch by Rubens: the panel painting *The Raising of Lazarus* (Fig. 6).



Fig. 5 Detail of an Antwerp cabinet, c.1650, Rijkmuseum, Amsterdam, inv. no. BK-NM-11906-1, attributed to the workshop or circle of Victor Wolfvoet (II): *Peace, Accompanied by Abundance, Harmony and Justice, is Crowned by Victory*.

The deceased Lazarus is rising from his rocky grave at the left, supported by Peter, while Martha kneels in front of Lazarus and loosens the bandages around his hands; Mary sits behind her, looking up at Christ at the right with tears in her eyes. The painting is a copy of Rubens’ preparatory oil sketch of *The Raising of Lazarus* in the Louvre, rather than of the much larger final painting from 1617–1620 (compare Figs 7 and 8).³⁴ This can be deduced from the inclusion of an extra figure behind Jesus and from several other details such as the colour of Mary’s undergarment and the raised knee of Martha.

It is possible that the work was produced during Rubens’ lifetime: the panel support was made in Antwerp between 1626 and 1658, as indicated by the marks of the Antwerp panel makers guild and the panel maker Guiliam Aertssen on the reverse.³⁵ As previously stated, most of Rubens’ oil sketches remained studio property until his death. However, it seems unlikely that this painting was produced in his workshop because of the quality of the painting and the master’s habit of finishing and/or retouching his pupil’s work.³⁶ The lack of painterly quality also excludes the name on its frame, Theodoor van Thulden (1606–1669), and its attribution to Jacob Jordaens (1593–1678) at the time of its purchase for 50 *rigsdaler* by the son. As with many copies, the author of this particular painting will remain unidentified.

This painting is presumably one of multiple copies. A gallery interior by Hans Jordaens (III) (c.1595–1643) and Cornelis de Baulleur (1607–1671) shows a larger painted version of the oil sketch being studied by two men.³⁷ De Baulleur had ties to the previously mentioned Musson and Wolfvoet – Musson was married to his sister and Wolfvoet was godfather to one of his children³⁸ – and might have seen Rubens’ oil sketch of *The Raising of Lazarus* or one of the copies. This copy may have been commissioned by Musson, just as the *The Horrors of War* and *The Benefits of Peace*. The discussion of this selection of Flemish paintings in the Danish collection suggests the importance of Rubens’ designs in Flemish art production until well into the 18th



Fig. 6 Unknown Flemish artist after Peter Paul Rubens, *The Raising of Lazarus*, after 1626, oil on panel, 63 × 48.5 cm, private collection, Denmark. (Photo: Frida Gregersen.)



Fig. 8 Peter Paul Rubens, *The Raising of Lazarus*, oil on panel, 36.6 × 28.3 cm, Musée du Louvre, Paris, inv. no. R.F. 188. (Photo © RMN-Grand Palais, Musée du Louvre/Jean-Gilles Berizzi.)



Fig. 7 Peter Paul Rubens, *The Raising of Lazarus*, 1617–1620, oil on canvas (originally arched at the top), 261 × 194 cm, Kaiser-Friedrich-Museum, Berlin, inv. no. 783 (destroyed in May 1945).

century. Rubens' preparatory oil sketches were owned by artists and dealers, and reproduced in many forms for the art market – from smaller easel paintings to copper plates adorning the cabinets. The oil sketches were manageable in size and less elaborately finished than Rubens' paintings, making them easier to copy. The paintings were not made or sold as copies of Rubens' work but in the 18th century they were recognised as such (or 'Rubens School'), giving collectors a chance to own an accessible and affordable example of the master's work.

Dutch paintings: original designs for mass production

At first sight, the 1960s inventory indicates a similar situation for several Dutch paintings in this collection: it includes six paintings simply attributed to the 'Rembrandt School'.³⁹ Five of these are very similar in execution and can be linked to the workshop of history painter Jacob de Wet (I) (1610–1675), who trained many pupils in his large workshop in Haarlem.⁴⁰ De Wet's works reflect familiarity with Rembrandt, but are not copies or imitations of his works,⁴¹ however, these five Danish paintings are too weak in execution to be by De Wet himself. The following discussion of three of these argues that they were painted by one his many pupils and assistants who produced speedy, inexpensive paintings after De Wet's designs for the art market.⁴²



Fig. 9 Workshop of Jacob de Wet, *Christ and the Woman Taken in Adultery*, oil on panel, c.50 × 93 cm (top panel missing due to woodworm activity), private collection, Denmark. (Photo: Frida Gregersen.)



Fig. 10 Jacob de Wet, *Christ and the Woman Taken in Adultery*, signed 'J.d.Wet', oil on canvas, 44.5 × 54.4 cm, sale Vienna, Dorotheum, 16 March 1976, lot 157.

Christ and the Woman Taken in Adultery, for example, is a simplified composition of two prototypes by De Wet (Fig. 9). In the biblical account of Christ and the woman taken in adultery (John 8:2–11), a group of scribes and Pharisees bring a woman to Jesus, accuse her of committing adultery, and ask whether she should be stoned. Jesus replies 'He who that is without sin among you, let him cast the first stone at her'. Eventually he tells the woman to leave. The three main characters (the kneeling adulteress, Christ standing and the seated Pharisee) are adopted almost directly from De Wet's prototype (Fig. 10), which shows the woman's hands clasped together begging for forgiveness, a pose well known



Fig. 11 Jacob de Wet, *Christ and the Woman Taken in Adultery*, signed 'JW', after 1644, oil on canvas, 105.7 × 85 cm, sale Amsterdam, Sotheby's, 30 November 2010, lot. 45.

from Rembrandt's *Judas Returning the Thirty Silver Pieces* (1629).⁴³ In the Danish painting, the woman's hands are in her lap instead, as portrayed in another painting of this subject by De Wet (Fig. 11). This second prototype reminds us of Rembrandt's depiction from 1644 in the National Gallery in



Fig. 12 Workshop of Jacob de Wet, *Solomon Blessing David as his Successor on the Instigation of Bathsheba*, oil on panel, 50.6 × 73.6 cm, private collection, Denmark. (Photo: Frida Gregersen.)



Fig. 13 Workshop of Jacob de Wet, *The Queen of Sheba Visiting Solomon*, oil on panel, 55 × 72 cm, collection E. Stibbe (in 1983), Wageningen.

London, with the vast and dark temple filled with people, the central scene taking place at ground level on the stairs, and a second scene with a priest cast in shadow on a higher level in the background.⁴⁴

The Danish painting is one of nine known ‘repetitions’ executed in different sizes.⁴⁵ In all of these, the proportions of the characters remain intact, demonstrating that the scene was repeated to scale and possibly indicating the use

of a reproduction method such as a grid. The paintings were painted by different hands. The dates of 1650 and 1657 on the cap of the Pharisee on two of these repetitions suggest that the design was produced by De Wet’s workshop over the course of several years.⁴⁶ The composition was presumably specifically designed by De Wet for the reproduction by pupils.

David Blesses Solomon as his Successor on the Instigation of Bathsheba (Fig. 12) is also one of three repetitions, identical



Fig. 14 Workshop of Jacob de Wet, *The Feeding of the Five Thousand*, oil on panel, 72.9 × 138.3 cm (top plank missing due to woodworm activity), private collection, Denmark. (Photo: Frida Gregersen.)

in composition but executed in different sizes done to scale. The arrangement of this scene closely parallels repetitions of the completely different subject, *The Queen of Sheba Visits Solomon*, in the figures as well as the background (Fig. 13). The first scene shows Bathsheba kneeling before David, asking him to proclaim their son Solomon king. In the second scene, the Queen of Sheba arrives at King Solomon's throne to test his wisdom, bearing spices and precious stones. As different as these subjects are, both are depicted by a central group with a female protagonist in the same pose, a servant carrying her train in the exact same position and the three figures following behind. The outlines of the group to the right are comparable, even though the figures by the throne of Solomon are elevated in relation to the man seated at the table and the chambermaid by the bed of King David.

The comparison suggests that De Wet's pictorial arrangements and 'dense' figural groups were intended to be adaptable to a number of different subjects. The design allowed for the contours of the figural group to be drawn and the background painted before the subject had been defined. The composition in any number of paintings could be reproduced simply and quickly in advance, speeding up the painting process while retaining maximum iconographic flexibility, allowing De Wet to meet the demand with a limited number of standardised compositions. The painting of *Solomon Blessing David as his Successor on the Instigation of Bathsheba* was studied with infrared reflectography (IRR) in an attempt to confirm the hypothesis. Although no underdrawing was detectable in the figures, IRR did reveal a predetermined design: the figures were reserved in the background and painted directly on the ground.⁴⁷

The suggestion of adaptable designs can be further clarified with *The Feeding of the Five Thousand* (Fig. 14) in



Fig. 15 Jacob de Wet, *The Feeding of the Five Thousand*, signed 'J. de Wet', oil on panel, 66.5 × 50.5 cm, The State Hermitage Museum, St Petersburg, inv. no. GE-3364. (Photo: Alexander Koksharov © The State Hermitage Museum.)

relation to two paintings by a pupil registered with De Wet. This story (John 6:1–14) describes how Jesus fed a multitude with only five barley loaves and two small fish. The



Fig. 16 Adriaen Gael, *Pharaoh's Army Engulfed in the Red Sea*, signed, oil on panel, 54 × 73 cm, collection Friedrich Glück (in 1929), Budapest.

design – in particular Christ's pose and the steep mountain – is based on De Wet's work in the collection of the Hermitage in St Petersburg (Fig. 15). The Danish version is one of four known unsigned paintings that feature a (nearly) identical arrangement, executed in different sizes and repeated to scale. On this painting, the background colours are thinly applied so that the ground beneath is visible between the brushwork. The figures and the contours are applied directly on the ground, suggesting that the painter had a pre-existing model from which to work. IRR confirmed that there was no underdrawing in black chalk, paint or lead pencil. As no alterations were detected either, it may be assumed that the painter executed his underdrawing and/or grid using a material not detectable by IRR such as red chalk.⁴⁸

Christ is central to this biblical narrative: the characters around him have a supporting role with the exception of the boy who kneels in front of him holding a loaf of bread in his hand. This made the composition of *The Feeding of the Five Thousand* easy to adapt to different stories because its meaning could simply be shifted by changing the attributes. This is evident in two paintings by Adriaen Gael (II) (1618–1665) who, in 1640, was registered as a pupil of De Wet (Figs 16

and 17). Gael continued working in De Wet's workshop until 1660 and was allowed to sign his works in De Wet's manner with his own name.⁴⁹ These paintings depict *Pharaoh's Army Engulfed in the Red Sea* (Exodus 14:26) but are very similar to *The Feeding of the Five Thousand*: Moses is in the same position and pose as Christ, but holds a staff instead of the loaf of bread. The same overall design could therefore be reused with minimal adjustments. Narrative-specific elements, such as the Red Sea and drowning Pharaoh, are easily accommodated to the side of the mountain. The motif of the woman with a baby, on the other hand, is painted on both *The Feeding of the Five Thousand* and *Pharaoh's Army Engulfed in the Red Sea*.

These unsigned paintings with biblical subjects in simplified compositions on supports of different sizes were produced for the art market. Connections with De Wet's work are evident in the compositions, figure types and pictorial elements, but it cannot be ascertained whether all originated from his workshop. Amsterdam art dealers specialised in the sale of inexpensive history painting also had production capacity.⁵⁰ De Wet's style appears to have been rather popular in Amsterdam and was used as the main example for many (mediocre) history painters throughout



Fig. 17 Adriaen Gael, *Pharaoh's Army Engulfed in the Red Sea*, oil on panel, 57 × 72 cm, sale London, Phillips, 10 December 1991, lot 22.

the 17th century.⁵¹ One art dealer, Hendrick Meijeringh (1639–1687), is recorded as having kept paintings by De Wet in his attic as examples for his own employees.⁵²

Fascinatingly, the five paintings in the Danish collection linked to De Wet's production appear in the 1790 inventory as by one 'De Bie'. This name occurs in at least seven catalogues of art sales in 18th-century Denmark; the lots describe subjects typical of De Wet.⁵³ The paintings were part of the father's collection, but the prices in these auction catalogues demonstrate that paintings attributed to De Bie were relatively inexpensive (4 *rigsdaler* on average). There are several painters known by this name, but to my knowledge the only one who qualifies with his oeuvre is the Amsterdam painter and dealer Cornelis de Bie (1622–1664), whose probate inventory contains 165 paintings of which 41 were by his own hand, mainly biblical paintings and landscapes.⁵⁴ The few paintings known today to be by him do not follow De Wet's compositions. Future research should determine the identity of this 'De Bie' and if he played any role in the production of these De Wet style paintings found in 18th-century Danish auctions.

Conclusions

This 18th-century castle collection consists almost exclusively of 17th-century paintings, the vast majority of which were painted by minor Flemish and Dutch masters. A selection of these paintings with multiple versions was studied in order to understand the conditions of their production and purchase. This analysis suggested two different approaches, one being the reproduction of designs by well-known painters. *The Horrors of War* and *The Raising of Lazarus* were both painted versions based on sketches by Rubens. *The Benefits of Peace* was probably an invention by Victor Wolfvoet, but quotes heavily from Rubens' work. The same designs were used for easel paintings on panel or copper supports, or as decorations on cabinet doors, often commissioned by dealers such as Matthijs Musson, who traded the products on the national and international market. An alternative approach was revealed by the study of the three Dutch paintings in the Danish collection. Pupils and assistants in the large workshop of Jacob de Wet repeated the same compositions time and again, on supports of different sizes. These compositions do not adopt designs by recognised artists – instead they were presumably specifically designed by De Wet to be produced

by his assistants. They were simplified versions of his own designs and were adaptable to a number of different subjects to speed up the production process. Both approaches can be labelled as mass production.

The Flemish paintings after Rubens' designs were accepted in the 18th century as by Rubens' immediate environment or at least considered close enough to list them in 1790 as 'Jordaens' and 'Rubens School'. They were purchased at auctions in Denmark for reasonable prices. Presumably, their popularity lies in the fact that collectors could own an accessible and affordable example of Rubens' work. The Dutch paintings discussed in this paper were only (falsely) considered to be by the 'Rembrandt School' in recent times – in the 18th century they were attributed to one 'De Bie'. The Danish paintings could all be linked in composition to the production of Jacob de Wet and his workshop. This 'De Bie' might be identified with the Amsterdam painter and dealer Cornelis de Bie, but his role in the production of these paintings is unclear.

As to whether collectors preferred quantity over quality, the collection of 450 paintings consists largely of copies and mass-produced paintings of 17th-century Netherlandish origin. This paper investigated six of these paintings in order to fully understand why this particular family bought so many of these works in a relatively short period of time. Future research should explore the relevance of the supply of paintings, this family's economic situation, decoration fashions and knowledge on the art history in Denmark. For now, these purchases seem connected to the ready availability of these works on the Danish art market. Flemish and especially Dutch old master paintings were easy to find and relatively inexpensive. The purchase of large numbers of paintings at auctions was a quick and easy solution to cover the empty walls of the new castle.

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Notes

1. M. North, 'Collecting Dutch and Flemish paintings in 18th-century Denmark', in R. van Leeuwen and J. Roding (eds), *Gerson Digital: Denmark (Dutch and Flemish Art in European Perspective 1500–1900, Part II)*, The Hague (RKD) 2015, § 7. See <http://gersondenmark.rkdmonographs.nl/7-collecting-dutch-and-flemish-paintings-in-18th-century-denmark-2013-michael-north> (accessed 6 April 2019).
2. H. Gerson, annotated by R. van Leeuwen, 'Dispersal and after-effect of Dutch painting of the 17th century: Denmark.

- A translated, illustrated and annotated chapter from Horst Gerson's *Ausbreitung und Nachwirkung der holländischen Malerei des 17. Jahrhunderts* (1942/1983)', in Van Leeuwen and Roding 2015 (cited in note 1), § 3.14.
3. J. Svenningsen, *Samlingssteder. Udenlandsk kunst i danske samlermiljøer 1690–1840*, PhD dissertation, Aarhus, Aarhus University, 2015.
 4. North 2015 (cited in note 1); Svenningsen 2015 (cited in note 3), pp. 77–78.
 5. The owners of the collection wish to remain anonymous therefore information on its location and history is not disclosed.
 6. 'Anno 1790. Fortegnelse.' The current owners of the collection provided a 20th-century transcription of this 1790 inventory. The transcription is incomplete and contains errors. The inventory is numbered and lists 429 paintings; the numbers 168–194 and 343 are not included in the transcription. With many thanks to Jesper Svenningsen, who kindly assisted me in attempting to locate the original inventory in the castle archives but unfortunately without success.
 7. L. Seltow, 'Wealth distribution in Denmark in 1789', *Scandinavian Economic History Review* 27(2), 1979, pp. 121–138; p. 137, n. 23.
 8. This research excludes the portrait gallery with approximately 150 portraits of relatives and relations. The portraits were commissioned by this family and do not shed light on the purchase of old masters in 18th-century Denmark. Moreover, they were not included in the 1790 inventory, indicating that they were not considered part of the painting collection.
 9. RKDexplore, The Hague (RKD): <https://rkd.nl/en/explore/images>.
 10. Peter Paul Rubens, *Minerva Fighting Mars*, c.1634–1636, oil on panel, 40.5 × 27.5 cm, Museum Boymans-Van Beuningen, Rotterdam, inv. no. 2299; *Hercules and Minerva Fighting Mars*, c.1634–1636, oil on panel, 35.5 × 53 cm, Koninklijk Museum voor Schone Kunsten Antwerpen, Antwerp, inv. no. 5097; *Hercules and Minerva Expelling Mars*, c.1634–1636, paper, 370 × 539 mm, Musée du Louvre, Paris, inv. no. 20.183.
 11. Peter Paul Rubens, *The Consequences of War: Venus Tries to Prevent Mars from Going to War*, 1637–1638, oil on canvas, 206 × 342 cm, Florence, Palazzo Pitti, inv. no. 1912.86. Links in form and content also exist with Rubens' *The Blessings of Peace*, 1629–1630, oil on canvas, 203.5 × 298 cm, London, National Gallery, inv. no. NG46. This painting, however, precedes the sketches: see N. Büttner, *Rubens: Allegories and Subjects from Literature. Corpus Rubenianum Ludwig Burchard XII*, vol. 1, London, Harvey Miller, 2018, pp. 263–282, no. 32.
 12. Büttner 2018 (cited in note 11), pp. 260–263, no. 31; p. 263. Like the Danish painting, the drawing in Rotterdam contains only the central group of Minerva and Mars. Held suggests that the Rotterdam drawing is a fragment of a larger study: J.S. Held, *The Oil Sketches of Peter Paul Rubens: A Critical Catalogue*, Princeton, Princeton University Press, 1980, cat. no. 253. This is disputed by Büttner 2018 (*op. cit.* p. 256).
 13. Victor Wolfvoet (attributed to), *Hercules and Minerva Expelling Mars*, oil on canvas, 67 × 89 cm, The State Hermitage Museum, St Petersburg, inv. no. GE 8531; *Hercules and Minerva Expelling Mars*, support and dimensions unknown, private collection, Seville. For the attribution and illustrations, see M. Diaz Padron, 'Tres nuevos cobres de Victor Wolfvoet con la Paz y la Guerra bajo las Consigna de Rubens', *Archivo Español de Arte* 85(337), 2012, pp. 88–94, fig. 3-4.
 14. Büttner 2018 (cited in note 11), p. 263.
 15. M.E. Wieseman, 'Pursuing and possessing passion: two hundred years of collecting Rubens' oil sketches', in P.C. Sutton and M.E. Wieseman, *Drawn by the Brush: Oil Sketches by Peter Paul Rubens*, Greenwich, Bruce Museum of Arts and Science/

- Berkeley, University of California/Cincinnati, Cincinnati Art Museum, 2004/2005, pp. 46–47.
16. For example, Wolfvoet owned Rubens' *bozzetti* for the Eucharist series: *Abraham and Melchizedek*, 1625–1627, oil on panel, 15.5 × 15.5 cm, Fitzwilliam Museum, University of Cambridge, inv. no. 231; *Israelites Collecting Manna in the Desert*, 1625–1627, oil on panel, 15.5 × 13 cm, Musée Bonnat, Bayonne, inv. no. 456 (P). Painted up copies of the *bozzetti* signed with Wolfvoet's monogram are held in the collection of Rijksdienst voor het Cultureel Erfgoed (formerly Mauritshuis): *Abraham and Melchizedek*, signed lower right 'V.W.', oil on copper, 37.5 × 27.5 cm and *Israelites Collecting Manna in the Desert*, oil on copper, 37.5 × 27.5 cm. See Q. Buvelot, *Royal Picture Gallery Mauritshuis: A Summary Catalogue*, The Hague, Mauritshuis, 2014, pp. 338, 340, nos. 267, 268. The Danish castle collection which is the subject of this article owns two unsigned and slightly smaller copies of these, here attributed to Victor Wolfvoet: *Abraham and Melchizedek*, oil on copper, 30.5 × 23.5 cm and *Israelites Collecting Manna in the Desert*, oil on copper, 30 × 23.2 cm.
 17. M. Diaz Padron, 'Dos cobres de Victor Wolfvoet en el Museo de San Carlos de Méjico', *Boletín del Seminario de Estudios de Arte y Arqueología* 65, 1999, pp. 323–327.
 18. G. Martin and B. Schepers, 'Two Antwerp cabinets decorated by Victor Wolfvoet II', *The Burlington Magazine* 158, 2016, pp. 793–802. The etched copy by Remoldus Eynhoudts (1613–1680) follows the entire composition (in reverse) and contains a rejected attribution to Rubens: etching, 296 × 416 mm, Teylers Museum, Haarlem, inv. no. KG 17671. A large canvas in Barcelona, previously falsely attributed to Jacob Jordaens, clearly derives from the central motif of the paintings by Wolfvoet: *Allegory of Peace*, 1600–1699, oil on canvas, 220 × 300 cm, Biblioteca Museu Víctor Balaguer, Barcelona, inv. no. 1074. See D. Castillo, 'Rubens o Jordaens al Museu Víctor Balaguer de Vilanova i la Geltrú?', *El Punt Avui*, 16 June 2011, p. 10. Available at: <http://www.elpuntavui.cat/cultura/article/19-cultura/423970-rubens-o-jordaens.html> (accessed 6 April 2019).
 19. Martin and Schepers 2016 (cited in note 18), pp. 795–796.
 20. Ibid., pp. 796–798. Rubens' compositions were often used to decorate cabinets: see R. Fabri, *De 17e-eeuwse Antwerpse kunstkast. Kunsthistorische aspecten*, Brussels, Koninklijke Academie voor Wetenschappen, Letteren en Schone Kunsten van België, 1993, pp. 55–74.
 21. E. Duverger, *Nieuwe gegevens betreffende de kunsthandel van Matthijs Musson en Maria Fourmenois te Antwerpen tussen 1633–1681*, Ghent, 1969, p. 78; J. Denucé, *Na Peter Pauwel Rubens. Documenten uit den kunsthandel te Antwerpen in de XVIIe eeuw van Matthijs Musson*, Antwerp, 1949, pp. 70, 92, 101, 112–114.
 22. Duverger 1969 (cited in note 21), pp. 75–76; Denucé 1949 (cited in note 21), pp. LXVIII–LXIX, 101, 112; Fabri 1993 (cited in note 20), pp. 104–105.
 23. Fabri 1993 (cited in note 20), pp. 161–170. For the overseas paintings trade see also S. van Ginhoven, *Connecting Art Markets: Guiliam Forchondt's Dealership in Antwerp (c. 1632–78) and the Overseas Paintings Trade*, Leiden and Boston, Brill, 2017. See also S. van Ginhoven, 'Flemish dealers and a thriving transatlantic art trade during the 17th century', in this volume, pp. 15–25.
 24. The inventory of Wolfvoet's possessions is published in E. Duverger, *Antwerpse kunstinventarissen uit de zeventiende eeuw*, vol. 6, Brussels, Koninklijke Academie voor Wetenschappen, Letteren en Schone Kunsten van België, 1984–2004, pp. 343–361, and includes 'eenen schetse na rubens van mars ende venus op pannel in lyste' and 'een abundantie cotype na Rubens op doeck in lyste'.
 25. Denucé 1949 (cited in note 21), p. 92: 'een ditto [acht stuyvers plaat] den Peys naar Victor'.
 26. Peter Paul Rubens, *Abundance*, c.1630, oil on panel, 63.7 × 45.8 cm, National Museum of Western Art, Tokyo, P.1978-0004; Duverger 1984–2004 (cited in note 24), pp. 343–361.
 27. The Peace scenes were described as *Peys (Peace)* and *Peijs wort gecront van de deucht (Peace Crowned by Virtue)*: Duverger 1969 (cited in note 21), pp. 75–76; Denucé 1949 (cited in note 21), pp. 101, 112. The Mars scene was described as *Maers daer hij komt de vrede trubereren (Mars Troubles Peace)*: Duverger 1969, *op cit.* pp. 50, 78. Just den Schilder might be Joos (Justus) Daneels (c.1618–1663?), who was registered as a pupil in 1618–1619 and as master in 1627–1628. Musson mentions him several times in his books, once as 'coesyn' (cousin): *op cit.* pp. 54, n. 273, 95–96, 160–161, 168, 188. Five canvases signed and dated 1648–1649 in the Kapel van Onze-Lieve-Vrouw van Zeven Weeën in Zele follow designs by Rubens and Van Dyck.
 28. See also Fabri 1993 (cited in note 20), pp. 17–18, 56.
 29. After Wolfvoet's death, Musson commissioned other painters with the same subjects. Besides the already mentioned copy by name (note 25), see for example a delivery in 1671 of several large coppers, including *Den peys met abonansie (Peace with Abundance)*: Duverger 1969 (cited in note 21), p. 134. Musson purchased some of Wolfvoet's sketches and paintings after his death: *op cit.* p. 81.
 30. The sale catalogue of Beschey's estate (1776) contains many paintings by Beschey after examples by Rubens and others: *Catalogue van extra schoone schilderyen, zoo door Italiaensche, Fransche als Nederduytsche beroemste meesters, als ook eenige teekeningen ende printen, naergelaeten by wylen d'Heer Balthazar Beschey*, Antwerp, Caudron, 1 July 1776.
 31. Sale, London George Stanley (London), 2 March 1824 (Lugt no. 10605a), lot 69 (*The Horrors of War*, by Beschey, after Rubens) and lot 70 (*The Blessings of Peace* ditto).
 32. Büttner concludes that the 1824 *Horrors of War* by Beschey is a copy after Rubens' final painting after tracing it back to a painting in Paris in 2016: Büttner 2018 (cited in note 11), pp. 265–266, no. 32 (copy 14). The sale of Beschey's estate includes a *Venus Stops Mars*: see note 30, no. 42.
 33. Sale Otto Thott, Copenhagen, 24 April 1787, lot 63: '2de allegoriske Malerier, hvoraf det ene forestiller Krigens Ulyksalighed, det andet Fredens Lyksalighed. Minerva holder Krigsguden Mars, som staaer blant myrdede Mennesker, og slæber et Fruentimmer ved Haarene tilbage. Det andet et roligt siddende Fruentimmer holder, ved Hielp af et andet, Overflødheds-Horn under Armen, og bliver af Victoria kronet.'
 34. For a recent analysis of the several depictions of *The Raising of Lazarus* by Rubens see K. Bulckens, *Rubens: The Ministry of Christ. Corpus Rubenianum Ludwig Burchard V (2)*, London, Harvey Miller, 2017, pp. 146–160, nos. 32–35.
 35. Many thanks to Jørgen Wadum for identifying the panel makers' mark as Aertsen's second punch, in use in the period 1626–1658. For the Antwerp marks, see J. Wadum, 'The Antwerp brand on paintings on panels', in E. Hermens (ed.), *Looking through Paintings: The Study of Painting Techniques and Materials in Support of Art Historical Research*, London, Archetype Publications, 1998, pp. 179–198.
 36. N. Büttner, 'Die Firma Rubens', Bettina Baumgärtel (ed.), *Himmlisch, Herrlich, Höfisch: Peter Paul Rubens, Johan Wilhelm von der Pfalz and Anne Maria Luisa de' Medici*, exh. cat., Museum Kunstpalast, Düsseldorf, 2008, pp. 62–73.
 37. Bulckens 2017 (cited in note 34), p. 152, no. 34a (copy 2), ill. 163.
 38. J. Denucé, 'VI. Familie Musson - de Wael', *Antwerpsch Archievenblad* 2(4), 1927, pp. 282–294; Duverger 1984–2004 (cited in note 24), vol. 10, 1999, p. 401, no. 3353.

39. *The Beheading of John the Baptist; Abraham and the Visit of the Three Angels; Christ and the Woman taken in Adultery; Solomon Blesses David as his Successor on the Instigation of Bathsheba* (wrongly identified as Abraham and Isaac); *Pharaoh's Army Engulfed in the Red Sea; The Feeding of the Five Thousand; The Meeting of David and Abigail; Self-portrait*.
40. A. Jager, 'The workshop of Jacob de Wet (1610–1675) and his mass production of history painting', *Oud Holland* 131(2), 2018, pp. 67–108, 94–98.
41. E.J. Sluijter, *Rembrandt's Rivals: History Painting in Amsterdam 1630–1650*, Amsterdam, John Benjamins Publishing Company, 2015, pp. 245–246.
42. Jager 2018 (cited in note 40).
43. Jacob de Wet was very familiar with Rembrandt's Judas, which is further demonstrated by his own depictions of *Judas Returning the Thirty Silver Pieces* in 1636 and 1642; see Jager 2018 (cited in note 40), p. 87.
44. Rembrandt van Rijn, *Christ and the Woman Taken in Adultery*, signed 'Rembrandt f 1644', oil on panel, 83.8 × 64.5 cm, National Gallery, London, inv. no. NG45.
45. Jager 2018 (cited in note 40), pp. 86–94.
46. Workshop of Jacob de Wet, *Christ and the Woman Taken in Adultery*, dated '1650', oil on panel, 59.5 × 80 cm, Museum Narodowe w Warszawie, Warsaw, inv. no. M.Ob.1657 MNW; Workshop of Jacob de Wet, *Christ and the Woman Taken in Adultery*, dated '1657', oil on panel, 50 × 95 cm, sale Munich, 3 June 1908, lot 60.
47. The IRR was carried out on location by Jørgen Wadum and the author with an Artist PRO camera mounted with a CCD progressive scan image sensor (1360 × 1036 pixels) and a Schneider Kreuznach Xenoplan 23 mm F/1.4 CCTV lens in near Infrared 2 with a long wave pass filter 1000 nm. The images were captured with Artist software (release 1.2) and assembled with Adobe Photoshop CS6 with photo merge function (reposition parameter).
48. Ibid.
49. Jager 2018 (cited in note 40), pp. 96–97.
50. A. Jager, "Everywhere illustrious history paintings that are a dime a dozen": the mass market for history painting in seventeenth-century Amsterdam', *Journal of Historians of Netherlandish Art* 7(1), 2015, DOI: 10.5092/jhna.2015.7.1.2.
51. Sluijter 2015 (cited in note 41), p. 331.
52. A. Jager, 'Barend Jansz. Slordt (ca. 1625–na 1690), "galey-schilder" uit Schermerhorn', *Oud Holland* 127, 2014, pp. 223–233.
53. Sale, S.T. Herr Conferentz-Raad og Justitiarius Horn, Copenhagen, 27 April 1778, lot 39 (Et Stykke som forestiller Israels Börns Overgang over det fode Hav, paa samme sees Pharaos med sin Hær, som drukner i samme), lot 78 (Et historisk Stykke), lot 93 (Et historisk Stykke); Sale, Otto Thott, Copenhagen, 24 April 1787, lot 750 (2de historiske Stykker, det ene med Rebekka ved Brönden, &c.), lot 751 (3de dito [historiske] bibelske Stykker, af dito [de Bie]), lot 752 (De 3 Mænd i den gloende Ovn, af dito [de Bie]); Sale, Johan Mathias Möller, Copenhagen, 9 February 1789, lot 177 (Et historisk Stykke); Sale, Jean Francois Fistaine, Copenhagen, 3 February 1790: lot 29 (2de Stykker, Salomons første Dom og Dronning Ester); Sale, Johannes and Wilhelm Colsmann, Copenhagen, 8 June 1792, lot 41 (G. de Bie - Et Landskab ved Strandbredden, endeel Fiskere med Fisk); Sale, Anna Hensel, collection formed by Johannes Colsmann, Copenhagen, 12 October 1795, lot 108 (J.D. Bie - Moses slaar paa Klippen for at faae Vand til Israels Börn); Sale, Nicolai Steemann, Copenhagen, 20 April 1796, lot 79 (Et Landskab med endeel Kreaturer der vogtes af en Hyrde og toe Hyrdinder).
54. A. Jager, *'Galey-schilders' en 'dosijnwerck'. De productie, distributie en consumptie van goedkope historiestukken in zeventiende-eeuws Amsterdam*, PhD dissertation, Amsterdam, University of Amsterdam, 2016.

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THE TRADE IN PAINTERS' SUPPLIES IN 17TH-CENTURY DENMARK¹

Anne Haack Christensen

ABSTRACT This paper investigates the domestic and international trade and origin of painters' supplies available in Denmark in the 17th century. Painters in Denmark relied heavily on the import of materials, however, as part of an industrial policy, King Christian IV (1577–1648) introduced a number of mercantile initiatives in order to enhance local production as well as the export of locally produced goods, including materials relevant for painters. Accounts from Christian IV's Colour Chamber in particular, letters from the Danish court, administration documents, pricelists and inventories from apothecaries and grocers reveal that a wide range of painting materials was available to painters and craftsmen in Denmark during this period. The majority of materials were shipped from the large trading centres of Europe, while only a limited number of materials appear to have been produced or mined locally. The main dealers of painters' supplies in Denmark were the apothecaries and the spice traders but materials were also purchased by the court from the ships docking at the harbour in Elsinore or directly from local craftsmen.

Introduction

During the reign of King Christian IV (1577–1648) a stockroom of materials for painters and craftsmen called *Det Kongelige Farvekammer* (the Royal Colour Chamber) provided painters and other craftsmen of the Danish court with a wide variety of materials. These were used mainly for coarser projects such as basic and decorative painting on warships, interior painting and artistic firework sculptures, but also for finer projects such as tapestry cartoons, easel paintings, frames and sculptures.² In the Colour Chamber accounts preserved from the period 1610–1626, the outgoing materials were listed with short descriptive passages of the assignments to be carried out and the names of the craftsmen receiving the supplies. Incoming supplies were likewise registered in detail in the accounts (Fig. 1), including the names of various tradesmen. A high proportion of the projects described in the accounts were completed in order to manifest the king's courtly power and cultural superiority during a particularly lucrative and affluent period of increasing decorative and architectural endeavours.

The Colour Chamber accounts are preserved from a period that was essential for the development of an industrial policy in Denmark. During the period 1613–1625, between the Kalmar War (1611–1613) and Denmark's involvement in the Thirty Years' War (1625–1629), a number of important manufacturing industries with production monopolies were established, based on the development in other European

countries, especially the Netherlands. Christian IV's goal was to advance the export of locally produced goods while limiting imports and to achieve this import bans on various goods, including silk, glue and soap, were introduced. There was, however, no adequate market abroad for Danish goods/production and trading companies such as the Danish East India Company lacked the capital needed to compete with foreign trading businesses. This eventually led to a failure of the mercantile regulations initiated by the king.³ The economic growth of this particular period between various wars and the ambitions of the Danish king are reflected in the accounts that show an increasing availability and assortment of painting materials concurrently with the ambitious decorative and architectural goals of the Danish court.

The discovery of America, and centuries earlier the sea route to India, combined with an increasing population in Europe, had already opened up the world of luxury goods to the nobility and upper-middle class in 17th-century Denmark. Grain and steers were the main export products from Denmark to the Netherlands in the first decades of the 17th century, while salt, wine and colonial products were distributed in return. Colonial products comprised all sorts of medicines, herbs, spices and luxury goods, including various materials used by painters and craftsmen such as pigments, dyestuffs and oils. The various painting materials employed by 17th-century painters originated from all over the world. Some materials were traded from the colonies and other continents, such as indigo, ultramarine, cochineal

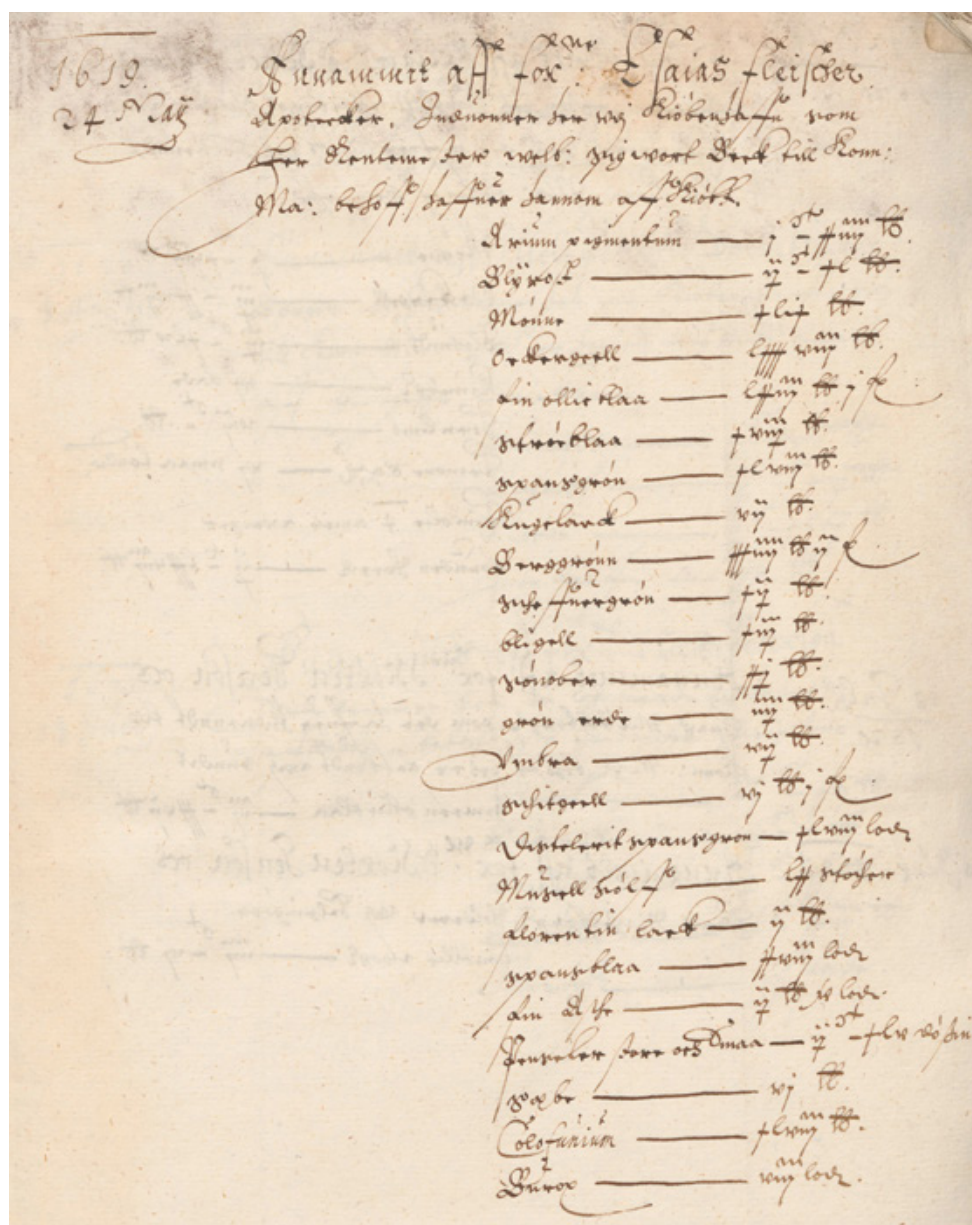


Fig. 1 Example from the Colour Chamber accounts listing materials supplied by apothecary Esaias Fleischer on 24 May 1619. The text states that the treasurer has purchased the goods on behalf of the king. Some of the materials supplied by the apothecary included: 124 pounds of orpiment, 48 pounds of distilled Spanish green, 2 pounds of Florentine lake, 12.5 pounds of lead-tin yellow, 98 pounds of yellow ochre, 70 pieces of shell silver and 195 dozen brushes (FKR, 1610–1626, III, f. 7).

and brazilwood, while others were mined or extracted within Europe, for instance earth colours, azurite, cinnabar and mountain green. A selection of materials was also artificially manufactured, including lead white, vermilion, lead-tin yellow, smalt and verdigris.⁴

The Netherlands as inspiration

The Netherlands was a source of great inspiration for Christian IV – not only in connection with his artistic and architectural ambitions, fulfilled mainly due to his invitation of foreign labour to Denmark, but also as an ideal for consolidating a mercantile policy of manufacture and export of

locally produced goods. Similar initiatives were also in effect in England during this period in response to the country's economic problems; these resulted in monopoly privileges in relation to soap, paper and oil making, as in Copenhagen, as well as the introduction of patents for manufacturing and selling smalt.⁵ Antwerp had been the main centre of trade in the 16th century until Spain conquered the city in 1585, which resulted in a decline in trade.⁶ Amsterdam eventually became the new flourishing centre of commerce in the 17th century, and with its lucrative position and easy access to southern Europe, England, Scandinavia and the Baltic, the city benefited from important overseas trade networks. Local merchants cooperated with traders from other towns, especially Hamburg, to which Amsterdam was closely related at the time.⁷ As a result of inspiration from the Netherlands,

several Danish trading companies and manufacturers were established, including a reformatory (Christian IV's Børnehus) which was founded to address increasing social problems in Denmark.⁸ The establishment of the orphanage followed the example of similar institutions abroad, in particular the male prison Het Rasphuis in Amsterdam⁹ – a prolific source for brazilwood fabrication. Here, female prisoners were placed in spinhouses (*spinhuisen*), where the main activities were spinning, weaving and sewing.¹⁰ Various types of canvas were produced in Christian IV's Børnehus: the painters' canvases were frequently purchased by court painters such as Søren Kiær (pre-1609–post-1630) and Pieter Isaacs (1569–1625).¹¹ The Danish East India Company and the Icelandic Company, founded in 1616 and 1619 respectively, were established in order to compete with Dutch merchants,¹² while a silk manufacturer was founded in 1620 to satisfy the growing demand for luxury goods.¹³ Metal production for military purposes in Elsinore and various mills, including copper mills, had already been established.¹⁴ A local production of copper plates for painting is evident from a letter dated 26 December 1633 in which Christian IV instructed stadtholder Frederik Urne (1601–1658) to order the coppersmith to beat a copperplate for a portrait.¹⁵ The king also looked to the Netherlands for inspiration in smaller matters. For example, on 21 February 1620 in a declaration concerning a local soap manufacture, Christian IV states that Hans Røper is allowed to make soap for the next 10 years which, in all ways, has to be as good and pure as the Dutch green soap.¹⁶

Import bans for certain products were introduced by the king including an embargo on the import of glue in 1622¹⁷ and indigo, a widely used colorant by the court painters, craftsmen and textile dyers of the period. At the beginning of the 17th century, indigo was exported from India to the Netherlands by the Dutch East India Company and re-exported to other parts of Europe. Indigo was prohibited for a period around 1600 in France, Germany and England in an effort to revive the declining woad industry,¹⁸ which had been virtually replaced by the more profitable import of Indian indigo. A ban was also attempted in Denmark.¹⁹ These restrictions were eventually lifted and, with the establishment of the Danish East Indian Trading Company in 1616, indigo was also exported directly from Tranquebar in South India (now Tharangambadi) to Copenhagen. This is documented by the Icelandic explorer and artilleryman Jon Olafsson (1593–1679) who, while on expedition to Tranquebar in 1622–1624,²⁰ reported in his diary that the cargo to be brought back to Denmark from Tranquebar included indigo, pepper, silk- and gold-woven textiles, jewellery and 'many other things, rarely seen at our place.' The entire cargo had a value of 10 barrels of gold, of which the indigo constituted the value of one barrel.²¹

A local production of painting materials

There were fewer requests for painters' supplies than for other types of luxury commodities, such as herbs, textiles and tapestries, furniture, glass and artefacts, making it less

economically viable to produce painting materials locally in Denmark. Despite extensive imports from abroad however, Christian IV appears to have identified a financial advantage to local production of some materials. This is evident from the letters of the Chancellery, in which a range of materials and products manufactured locally are listed, including soap, nails, saltpetre for gunpowder, astrag (floor tiles of burned glazed clay) linseed oil and glue. Local glue makers (*limsydere*) Johan von der Pot and Marie Petersdatter provided the Colour Chamber with more than 1000 pounds of glue.²² Various types of metal foil were purchased from local goldbeaters and goldsmiths such as Ambrosius Franker, who supplied the Colour Chamber with more than 13,000 metal leaves, mainly intended for decorating interior, outdoor building parts, warships and frames. Papier maché sculptures for firework spectacles and decorative dishes – the so-called *skueretter* – were adorned with gold leaves.

In a letter of 10 October 1607, Christian IV gave permission to Hans Bremmer, a citizen of Malmø, to establish an oil mill at his own cost. In return, Bremmer made a commitment to provide the king with oil, especially good linseed oil, for the price of 5 *skilling* per pound. In the same letter, the king prohibited others from establishing oil mills for the following eight years.²³ Although the price decided by the king for Bremmer's linseed oil was favourable compared with the price of linseed oil listed in a Danish apothecary legislation (*Taxt*) from 1619,²⁴ Bremmer appears not to have been capable of supplying the court with the full amount of linseed oil required. Between 1610 and 1611, the Colour Chamber received more than 1500 pounds of linseed oil from the local apothecary Werner van Cleve and from customs officers in Elsinore. As the 1620s approached, the king's decorative projects gradually expanded with privileges awarded to more oil mills in 1620: Theodoor Rodenburg (1578–1644) set up at least two oil mills near Copenhagen.²⁵ In a letter of July 1611, Christian IV gave instructions to the customs officers in Elsinore that upon the arrival of oil in the Sound, 1 *fad* linseed oil and 1 *fad* Lisbon oil should be purchased and sent directly to the Arsenal.²⁶ Although the type of oil is not known for certain, the term 'Lisbon oil' might relate to its commercial route: Lisbon was an important trade gateway into Europe. This particular oil is also mentioned several times in the Sound Toll Registers.²⁷ In 1621, the king gave permission for the establishment of one or more paper mills – to serve the Chancellery, Exchequer and elsewhere – for the manufacture of all varieties of fine and coarse paper, specifying that it should be of the same quality as that normally imported by foreign grocers and demanding that it should be sold five per cent below market value.²⁸

Clay used for brick production, which may also have formed part of the ground layers of paintings,²⁹ was obtained from earth deposits in Jutland. A supply of clay is mentioned in a letter dated 10 April 1619 to a Laurids Ebbesen in which the king asked for six barrels of the best and 'reddest clay', suitable for colouring, to be found in the area of the town of Skanderborg.³⁰ The letter, however, does not reveal what type of object or building was to be coloured with the clay. The clay near Skanderborg Sø (Lake Skanderborg) has been used

Table 1 Suppliers of materials to the Colour Chamber and the years in which they are mentioned in the accounts.

Profession	Name	Dates listed in the Colour Chamber accounts
Apothecaries	Werner van Cleve	1610, 1611
	Esaias Fleischer	1613, 1614, 1615, 1616, 1617, 1619, 1623
Spice traders	Wulf Steffens	1615
	Coert Dragun	1617
	Niels Pedersen	1620, 1621, 1622
	Jørgen von Velling	1621, 1622
	Johan Dolfin	1622, 1623
	Henrik Rodthe	1622
	Gert Sachariasen	1622, 1623
	Peder Borchortsen	1624
Grocer	Johan Borchersen	1615
Customs officers	Søren Ingemann	1611
	Morten Jensen	1615, 1616, 1620, 1623
	Hans Mikkeltborg	1616, 1620, 1623
Painters	Pieter Isaacs	1616, 1619, 1622
	Helge Torbensen	1623
	Søren Kiær	1624
Goldsmiths and Goldbeaters	Ambrosius Franker	1615, 1616, 1617
	Hans Walter	1617, 1619
	Matias Nickel	1620, 1622, 1624
Glue manufacture	Johan von der Pot	1620, 1622
Stadtholder	Breide Rantzau	1610
Clerk of treasurer account	Anders Olufsen	1622
Widows	Karine, widow of Johan Borchersen	1617 + ? (no date in Book III)
	Widow of Hans Walter	1620
	Anne, widow of Jørgen von Velling	1622
Citizen of Copenhagen	Mari Petersdatter	1623
Citizen of Hamburg	Jørgen Hombfeldt	1625
Citizen of Königsberg	Albert Jansson	1624
Metter Frank's waiter	Hans Werdt	1623
Other	Wolfgang (...) [af] Nørrenberg	1610
	Dutch Ship	1617
	Didrik Hesell	1624

since the 16th century, and in 1751 Frederik V established a colour factory in the area, where several mills were located. In 1727, before the establishment of the colour industry, the local priest Hans Lønborg from Fruering, close to Lake Skanderborg, published a small leaflet on the clay from Røde Mølle (Red Mill), also near the lake, in which he wrote: '[The clay] is made like a Dough, kneaded, like one kneads Bread, set to dry some in the Sun, then one put it in a Baking-Oven, that it becomes hard. Then it is pounded small, and ground on a Stone, like one grinds other Colour.'³¹

In the 18th century Frederik V's colour factory also produced yellow ochre from clay found at Vestermølle (West Mill), a different mill located close to Red Mill. Tripoli, a fine-grained porous silica material, supplied on several occasions from the Colour Chamber mainly to the court joiners, was also mined at Red Mill in the 18th century, and both ochre and tripoli may well have been extracted already from this location during the reign of Christian IV.³² Although not mentioned in the written sources consulted here, a range of other materials could potentially have been produced locally such as other types of oil at the local oil mills initiated by Christian IV, as well as wax, brushes, ink powder, soot black (*kørnøg*) and chalk.³³

While the administrator of painting at the Munich court in the late 16th century, Wolf Pronner, received various types of

brushes from a local specialist brush-maker (*Penselmacher*),³⁴ the brushes listed in the Colour Chamber accounts were purchased from local apothecaries, spice traders, grocers and, on one occasion, from court painter Pieter Isaacs, who in April 1619 had ordered a range of materials from Holland on behalf of the king.³⁵ The purchase by Isaacs was apparently not sufficient since during the same year, apothecary Esaias Fleischer provided the Colour Chamber with no less than 195 dozen (equivalent to 2340) brushes over a period of 12 months.³⁶ There is no mention of a brush-maker (*børstenbinder*) in the accounts, however this typical 17th-century craft profession is likely to have had a presence in Copenhagen, in which case dealers might have purchased the brushes directly from one of them.

Apothecaries in Copenhagen

While evidence exists from other European cities of specialist paint dealers such as the *verfkoopers* or *verfverkopers* in the Netherlands, the earlier *vendecolori* in Italy and the *farbprenner* in Germany,³⁷ no evidence has yet been found of a similar profession in Denmark in the 17th century, probably because the market was too limited. However, in Rotterdam for example,

the circumstances were quite different: there was a flourishing art market in the first half of the 17th century, where individuals such as Crijn Hendricksz. Volmarijn (c.1601–1645) ran a large enterprise selling paintings and painters' materials.³⁸ In 1643, his brother Leendert Hendricksz. Volmarijn, opened a shop in Leiden selling various types of painters' materials.³⁹ In the absence of such a specialised profession in Denmark, apothecaries, grocers and spice traders acted as direct suppliers of painting materials to the court. As most painting materials were also used mainly for medical purposes, apothecaries constituted a particularly important supplier of this category of goods. For instance, the poisonous and arsenic-containing pigment orpiment was supposed to have a healing effect on abscesses, as described in a Danish medical book from 1533.⁴⁰ Danish apothecaries purchased the majority of their goods from wholesale traders in the Netherlands and Germany, primarily Amsterdam, Hamburg and Lübeck,⁴¹ but at times customs officers, painters, goldsmiths, goldbeaters, glue manufactures, stadtholders and clerks functioned as suppliers. Table 1 lists 33 names of suppliers that appear in the Colour Chamber accounts, some of which are mentioned frequently while others appear only once or twice.

As far back as the early 15th century, Cennino Cennini mentions the apothecary as a dealer in various colours,⁴² and similarly the apothecary is cited as a supplier of paint in the northern European Strasbourg Manuscript (Fig. 2).⁴³ Evidence of the purchase of apothecary goods from abroad for the Danish court by Danish apothecary Willem Unno exists from as early as the middle of the 16th century.⁴⁴ The first hints of medicine and the apothecary's trade in Denmark occurred around the year 1000 and were closely related to the Catholic Church, monasteries and the monks, who grew various herbs for medicinal purposes in the monastery gardens. This continued throughout the Middle Ages and later, in the 17th century, the role of the apothecary seems to have gained in importance: the profession played a prominent role in the trade of medicine, herbs and confectionery. In the Colour Chamber accounts, the variety of specific painting materials delivered to the court by apothecaries and other professions is clearly distinguished, allowing us to form a picture of the division of goods provided by different types of local retailers.

Painting materials comprised just a fragment of the overall product assortment in an apothecary's shop therefore it can be difficult to track specific painting materials in accounts and probates, since this rather limited area of trade would often be referred to in general terms such as *kramvarer* (smallware), *farver* (colours) or *specerier* (spices). The first Danish Apothecary *Taxt* applicable to the Copenhagen apothecaries was published in 1619 by Christian IV.⁴⁵ This publication and later similar pricelists contain comprehensive lists of goods commonly available from a well-stocked apothecary's shop in the 17th century, and include prices required by the Danish state upon sale (Table 2). The publication of Danish Apothecary *Taxter* with strictly regulated prices were based on a similar system already implemented in Germany.⁴⁶ The state-regulated price system on high quality apothecary goods was highly advantageous for the king, his court and the nobility who could afford the luxury goods, but for the average



Fig. 2 Jan Luyken, Jan Claesz ten Hoorn and Jan Bouman, 1683, Interior of an Apothecary, print (143 × 86 mm), Amsterdam, Rijksmuseum, inv. no. RP-P-OB-44.194.

citizen the prices were far less favourable.⁴⁷ In a letter from 1622, Christian IV requested an annual Apothecary *Taxt* from the doctors in Copenhagen, since in 1619 the published prices of certain commodities were not compatible with those in Hamburg and elsewhere.⁴⁸

A comparison of a selection of painting materials listed in the 1619 *Taxt* with materials mentioned in a later price list of 1672⁴⁹ demonstrates that the apothecaries' assortment of pigments, colorants and oils relevant for painting increased considerably during this period (Table 2). It is noticeable that the 1619 list includes only one blue pigment term, *Lapis Lazuli Præparatus*, which, based on the listed price, most likely referred to azurite. In 1672, however, the terms water blue, mountain blue and oil blue and the unspecified *blaafarf-fue* (blue colour) are also listed, as well as the Latin term *Ultramarin*, which is followed by the Danish term *søegrøn* and the German term *Seegrün* (lake/sea green). The price of this material is listed as 3 *Daler* for 2 *lod* (31 grams). In comparison 1 *lod* (15.5 grams) of mountain green was priced as 3 *skilling*, thus 48 times cheaper than the *søegrøn* colour, and mountain blue cost 3 *mark* for 2 *lod*, six times less than *søegrøn*. The high price of the *Ultramarin* suggests that the

Table 2 Pigments, colorants and oils relevant for painting listed in two 17th-century apothecary *Taxter*. The documents are structured differently: in the 1619 *Taxt* the materials are listed in Latin, occasionally followed by a Danish equivalent whereas in the 1672 *Taxt* the materials are listed first in Latin, occasionally followed by the Danish and/or German equivalents. In this table the Latin and German terms from the 1672 *Taxt* have only been included where relevant to the identification of the material.

Danish apothecary Taxt 1619		Danish apothecary Taxt 1672	
Latin (Danish) – as written in the source	English translation	Danish (Latin/German) – as written in the source	English translation
<i>Aramentum Scriptorium</i> (Bleck)	Ink		
<i>Pulvis Encaust</i> (Bleckpulver)	Ink powder		
<i>Mumia vera</i>	Mummy black		
<i>Cerussa alba</i> (Blegluit)	Lead white	Blyvit Toen Blyvit (Gewaschen Bleiweis)	Lead white Washed[?] Lead white
<i>Cinnabaris</i> (Cinnober)	Cinnabar	<i>Cinnabar. Nativ</i>	Cinnabar
<i>Minium</i> (Menie)	Minium	Menie	Minium
<i>Arsenicum citrinum</i>	Yellow arsenic	Guel arsenick	Yellow arsenic
<i>Auripigmentum</i>	Orpiment	Orpemene Russgeel Blygelb	Orpiment <i>Russgeel</i> Lead yellow
<i>Viridi æris</i> (Spanssgrøn)	Spanish green	Spanssgrøn	Spanish green
<i>Viridi æris Destillatum</i> (Destilleret Spanssgrøn)	Distilled Spanish green		
		Biergrøn Søegrøn (<i>Ultramarin</i>) Vandblaa Watterblau/Lazurblau)	Mountain green Sea green (ultramarine) Water blue
		Bierreblaa Blaafarffue Olleblaa (<i>smalt</i>) Lazursteen (<i>Lapis Lazuli</i>)	Mountain blue Blue colour Oil blue (smalt) Lazurite stone
<i>Lapis Lazuli præparatus</i>	Lapis Lazuli prepared [azurite?]		
		Bered Lazurstein (<i>Lapis Lazuli præpar.</i>) Umbre Guljord (Ochergelb/Gelb Erde) Rød Jord (Rothe Erde/Rothe Kreide) Rød Engelskiord Cólnisk Jord Grøn Jord Lack (<i>Lacc. Crud. in bacillis</i>) Florentiner Lack (<i>Lac. Florentin</i>)	Prepared Lazurite stone Umber Yellow ochre Red ochre Red English earth Cologne earth Green earth Lake Florentine lake
<i>Bolus Armenus</i>	Armenian bole		
<i>Bolus Communis</i>	Regular bole		
<i>Bolus Albus</i>	White bole		
		Kugellack (- <i>in Rotulis</i>) Paris Rød (- <i>Tabul</i>) Sort Spansk Lack Røs Spansk Lack Lackmus (<i>svec</i>)	Kuglelak Paris red Black Spanish lake Red Spanish lake Litmus
<i>Grana Tinctorum</i>	<i>Grana Tinctorum</i>		
<i>Lacca florentina pictorial</i> (Maler lack)	Florentine lake for painting		
		Blaa Brasilie Træ Hvid Sandel Gul Sandel Rød Sandel Østerigs Safran	Blue brazilwood White sandal Yellow sandal Red sandal Eastern saffron
<i>Lignum Brasiliense rubrum</i>	Red brazilwood		
<i>Lignum Brasiliense Cæruleum</i>	Blue brazilwood		
<i>Crocus orientalis</i> (Orientalisk Saffran)	Oriental saffron		
<i>Crocus Anglicus</i> (Englisk Saffran)	English saffron	Engels Safran Spansk Safran Ostindisk Safran Vild Safran Linolie Valnødolie	English saffron Spanish saffron East India saffron Wild saffron Linseed oil Walnut oil
<i>Ol.lini.</i>	Linseed oil		
<i>Ol. Nucis Juglandis</i> (Valnød olie)	Walnut oil		
<i>Ol. Olivarium</i> (Bomolie)	Olive oil	Bomolie	Olive oil
<i>Ol. Papaverinum</i> (Valmue olie)	Poppy seed oil		
<i>Petroleum</i> (Peterolie)	Petroleum oil	Peterolie	Petroleum oil
<i>Ol. Saturni</i> (Bly olie)	Lead oil	Blyolie	Lead oil
<i>Ol. Spicæ</i> (Spick olie)	Lavender oil	Lavendelolie	Lavender oil
<i>Ol. Terebinthinæ</i> (Terpentin olie)	Turpentine oil	Terpentinolie	Turpentine oil
		Vitriolie Tilbered Kriid Tyrckiste Gallas	Vitriol oil Prepared chalk Turkish oak galls

Table 3 The assortment of painting materials available from different suppliers mentioned in the Colour Chamber accounts.

Materials	Apothecaries (two individuals)	Spice traders (nine individuals)	Grocers (two individuals, including their widows)
Black pigments	Ink powder, <i>kønrog</i> , <i>isenfarve</i>	<i>Kønrog</i>	<i>Kønrog</i>
White pigments	Lead white	Lead white	Lead white
Red pigments	Cinnabar, plain minium, red lead	Minium, cinnabar,	Minium, cinnabar, red lead
Green pigments	Spanish green, distilled Spanish green, , mountain green, green earth, [<i>seigegrøn?</i>], <i>schieffergrøn</i>	Mountain green, Spanish green	Spanish green, fine mountain green, plain mountain green
Yellow pigments	Lead-tin yellow, orpiment, <i>ryssgul</i>	Orpiment, lead-tin yellow, <i>ryssgul</i>	Lead-tin yellow, orpiment, <i>ryssgul</i>
Blue pigments	Smalt blue, water blue, oil blue, fine oil smalt, strew blue, fine ash blue, fine mountain blue, fine smalt, fine oil blue, Spanish blue	Oil blue	Oil blue, fine oil blue, mountain blue
Earth pigments	Brown red, ochre yellow, umber, Cologne earth, bole	Brown red, umber, brazilwood	Brown red, ochre yellow, umber
Organic colouring materials	Purpur litmus, ball lake, rose lake, fine Florentine lake, Venetian lake, brazilwood, Pernambuco, <i>skiettgul</i> , sap green, litmus blue, indigo, saffron	<i>Kuglelak</i> , <i>skiettgul</i>	Indigo, Florentine lake, <i>skiettgul</i> , sap green
Chalk	English chalk, chalk, red chalk		
Metals	Fine gold, part gold, silver, beaten cobber, shell gold, shell silver, <i>flitterguld</i> , <i>kragesølv</i>	Fine whole-beaten gold	
Oils	Linseed oil, olive oil, lavender oil, nut oil, petroleum oil, <i>kinolie</i>	Linseed oil	Linseed oil
Adhesives	<i>Horn</i> glue, gum arabic, isinglass	<i>Horn</i> glue	<i>Horn</i> glue
Varnish & resin	Varnish, mastic, <i>Dansker</i> varnish, resin, glossy varnish, colophony	Glossy varnish, <i>Dansker</i> varnish	Glossy varnish
Wax, soap & starch	White wax, yellow wax, green soap, Venetian soap, soap, starch, <i>amdam</i>		
Brushes, tools & containers	Sponges, brushes, stone pot, glass pot, swan brushes, fish brushes		Brushes, small and large
Paper	Grey paper, fine paper	Grey paper	
Miscellaneous	Alum, pumice stone, white spirit, vitriol, tripolit, wine lees, litharge of gold, prepared litharge of gold, tragacanth, borax, laurels	Alum	Litharge of silver

term refers to the semi-precious and expensive *Lapis Lazuli* ultramarine, originating in present-day Afghanistan. But why was it referred to as *søegrøn* in Danish?

Despite the impression that the 17th-century apothecary and spice trader professions were similar, the Colour Chamber accounts do not confuse these titles. A sharp distinction is maintained between the professions as evidenced in 1609 by the granting of a license, by the king, to Berent Junger to operate an apothecary's shop in Aarhus. Christian IV ruled that no other apothecary was allowed to establish a business in Aarhus and he listed material categories that Junger had the exclusive right to sell. However, the king also stated that the town's spice traders would still be permitted to sell sugar, pepper, ginger and other similar goods.⁵⁰ A letter from Christian IV dated 19 August 1620 to a vassal (*lensmand*) in Aalborg further stresses the distinction: the king orders that a spice trader in Aalborg is not allowed to sell apothecary commodities.⁵¹ Two apothecaries, Werner van Cleve and Esaias Fleischer, provided the Colour Chamber with a broad assortment of materials consistent with the range of products available from a well-stocked apothecary shop in this period in accordance with the materials recorded in the Danish Apothecary *Taxt* of 1619. Van Cleve and Fleischer were responsible for delivering the majority of painting materials to the stockroom, not only in terms of quantity but also

variety. An overview of materials provided by the two apothecaries compared with materials sold by nine spice traders and two grocers makes clear that in this period, the apothecary was responsible for the majority of supplies to the Colour Chamber (Table 3).

Only Werner van Cleve, however, was awarded the prestigious title of Hofapoteker (court apothecary) during the period from which the Colour Chamber accounts are preserved. This was a privileged position that brought an annual wage and required the apothecary to prepare all sorts of medicine essential for the king, and to travel with him whenever needed.⁵² Esaias Fleischer followed in 1633, holding the title for five and a half years with an annual income of 300 *Rigsdaler*.⁵³ On 29 March 1634, Fleischer was paid 50 *Rigsdaler* to travel to Holland and purchase commodities for the king. In a letter a week later, Christian IV instructed that money should be put aside to pay for the goods purchased by Fleischer upon their arrival.⁵⁴ The goods may have been delayed, because 18 days later, in another letter, the king states that the Sound toll chest should be opened to pay for the *specerier* to be delivered in the Sound by Fleischer.⁵⁵

The mixed category of 'miscellaneous materials' listed in Table 3 demonstrates that the apothecary was considerably more specialised than the spice trader and the merchant as a supplier of less common goods such as pumice stone, white



Fig. 3 Freti Danici or Sundt accuratiss Delineatio (Kronborg Castle and the Sound) in G. Braun and F. Hogenberg, *Civitates orbis terrarum* / Georgius Bruin et Franciscus Hogenbergius. - Coloniae Aprippinae: Godofridum Kempensem, 1577–1588, Book 4, Plate 26 (32 × 47 cm) Det Kgl. Bibliotek/Royal Danish Library.

spirit, vitriol, tripoli, wine lees, litharge of gold, tragacanth, borax and laurels. If the Colour Chamber was in need of various types of metal foil, it was the apothecaries who stocked the broadest assortment – the goldbeaters and goldsmiths only supplied five different types of metal: fine whole-beaten gold, fine gold, half-beaten gold, beaten silver and part gold, while the apothecary also provided beaten copper, shell gold, shell silver, *Flitterguld* and *Kragesølv*,⁵⁶ as well as fine gold, part gold and silver. Shell gold and shell silver were supplied by the apothecaries and not the goldbeaters, probably due to the preparation required of the material that included grinding the metal leaf and mixing it with a binding medium; gum arabic, for example, which was also used as a binder in pills.

Additional suppliers

Although the apothecary, spice trader and grocer account for the majority of painting materials delivered to the Colour Chamber – both in terms of assortment and quantity – a number of additional individuals and professions also appear in the accounts as suppliers.⁵⁷ The acquisition of materials from customs officers, for instance, was somewhat random and must have depended on circumstances relating to the ships passing the Sound (Fig. 3), their cargo and the dues to

be paid. The Sound Dues were an important financial and highly lucrative source of income for Danish kings for decades, especially Frederik II and Christian IV for whom they constituted the financial basis for large architectural and decorative projects. More than half of the ships passing through the Sound were from the Netherlands,⁵⁸ and with Amsterdam as the leading trading centre of Europe in this period, opportunities to collect painting materials from the ships for the king's Colour Chamber were welcomed. On 24 May 1615, the Colour Chamber received 2 *fad* of linseed oil weighing 317 pounds each (excluding the cask, as specifically noted in the margin of the accounts) from a customs officer in Elsinore.⁵⁹ On another occasion customs officers in Elsinore obtained no less than 337 pounds of plain oil blue for the Colour Chamber as a result of what appears to be destroyed cargo.⁶⁰

The requisition of various materials from the ships was rather coincidental and the materials obtained were also quite common and neither expensive nor rare – in fact it is noticeable how these alternative channels of supply mainly delivered common pigments, glues and oils: rare pigments, metals, paper or tools etc. do not appear to have arrived in the Colour Chamber through these networks. A few materials were also delivered directly from Hamburg and Königsberg (present-day Kaliningrad) via the Baltic Sea. Jørgen Hombfeldt, citizen of Hamburg, delivered 4 pounds of fine lake to the Colour Chamber on 22 June 1624 and a month later, on 24 July, 31

lod of fine ash blue and 6.5 pounds of ash blue were delivered by Albert Jansson, citizen of Königsberg.⁶¹ Jansson's supply suggests that ash blue was traded in two different qualities.⁶²

More intentional acquisitions by the custom officers in Elsinore also occurred. Customs officer Morten Jensen and his colleague, Hans Mikkelsen, purchased linseed oil for the Colour Chamber on several occasions, possibly from ships docking in the harbour. On 24 May 1615, Morten Jensen bought 2 *fad* of linseed oil for the king, which was sent to the Colour Chamber. Each barrel contained, without *tråd* (possibly meaning *træet*, thus the wood/barrel), 317 pounds of oil.⁶³ Morten Jensen owned one of the largest art collections in Elsinore and was the landlord of the court painter Pieter Isaacs, who was not only closely involved in the artistic activities of the court, but also acted as King Christian IV's cultural agent and political spy in the Netherlands and Sweden, purchasing materials and other artefacts for the Danish court.⁶⁵ The housing arrangement was probably advantageous for both: Isaacs could contribute to Jensen's art collection through his various connections, while Jensen was able to provide Isaacs with various painting materials from the ships arriving in Elsinore. With regard to painting materials obtained either from ships passing Elsinore or from the customs officers collecting the fees, the Sound Toll Register constitutes a comprehensive and rich archive on the maritime trade passing through the Sound at Elsinore – an essential trade connection between the Baltic region and the rest of Europe for centuries.⁶⁶ The Sound Dues, introduced in the 1420s, obliged every ship passing the Sound to report their cargo and pay a toll. From around the mid-1500s, the so-called *lastpenge* (a fee relating to the contents of cargo) had to be paid and the cargo of each ship noted down, but it was not until c.1667 that the ships' destinations were recorded.⁶⁷ Therefore the commodities on board ships passing the Sound from Amsterdam and Hamburg in the first half of the 17th century are known but not their destination – if we look for Danish shipmasters departing from Amsterdam or Hamburg in this period, we can assume that their cargo was to arrive in Copenhagen. One example is shipmaster Christen Kieldtssen from Copenhagen who, on 26 April 1634, departed from Amsterdam with a range of commodities, including various spices, textiles and wine as well as 5 *fad crameri*, which may well have included painting materials.⁶⁸

Conclusions

The Colour Chamber accounts represent a period of Christian IV's reign during which the Danish economy was particularly strong: the lucrative income from the Sound Dues and other customs payments enabled increasingly ambitious architectural and decorative activity within the court. The prerequisites for domestic industrial development were in place, and this is reflected in the accounts, especially during the most dynamic period between the Kalmar War and Denmark's involvement in the Thirty Years' War. The mercantile initiatives launched by Christian IV resulted in

the local production of a range of materials, especially in the 1620s. The most prosperous grocers and apothecaries – from Copenhagen as well as other Danish towns – were part of a well-established trading network with direct connections to the main European centres of trade.

While the Colour Chamber accounts mention various dealers who supplied materials to painters and craftsmen of the court, including apothecaries, grocers, spice traders, goldsmiths, goldbeaters and glue manufacturers, a specialist colour dealer profession does not seem to have existed in Denmark in this period. Based on the information in the accounts, the apothecaries constituted the main traders in painting materials in relation to the court.

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Notes

1. This paper is based on a PhD project completed in 2017 on the Colour Chamber of Christian IV: see A. Haack Christensen, *Crafts & Colours during the Reign of Christian IV: Trade, Availability and Usage of Painters' Materials 1610–1626*, PhD dissertation, Copenhagen, The Royal Danish Academy of Fine Arts, Schools of Architecture, Design and Conservation, 2017.
2. *Farvekammerregnskaber, 1610–1626*, Archival number 570, Danish National Archive (Rigsarkivet), Copenhagen. The Colour Chamber accounts are referred to as 'FKR' in references throughout the text, followed by I, II or III referring to the relevant account book. Following the book number the relevant folio is listed as 'fol.'. The folios are numbered consecutively and the use of recto and verso is not applied.
3. H. Pers, 'Christian 4.s merkantilistiske erhvervspolitik ca. 1619–25', *Historiske/Lyske Samlinger* 10(3), 1972–74, p. 391.
4. For research into the trade in artists' materials, see also J. Kirby, S. Nash and J. Cannon (eds), *Trade in Artists' Materials: Markets and Commerce in Europe in 1700*, London, Archetype Publications, 2010.
5. N. Costaras, 'Early modern blues: the smalt patent in context', in Kirby *et al.* 2010 (cited in note 4), pp. 401–414.
6. On the 1585 Fall of Antwerp and the effects on commerce, art and science see S. Dupré, B. De Munck, W. Thomas and G. Vanpaemel (eds), *Embattled Territory: The Circulation of Knowledge in the Spanish Netherlands*, Ghent, Academia Press, 2016.
7. J.T. Lauridsen, *Krig, købmænd og kongemagt - og andre 1600-tals studier*, Copenhagen, Museum Tusulanums Forlag, 1999, p. 8.
8. P.A. Jensen, 'Christian IV's Tugt- og Børnehus: Social institution eller merkantilistisk foretagende?', *Kulturstudier* 1(3), 2012, p. 3.
9. E. Hermens and A. Wallert, 'The Pekstok Papers: lake pigments, prisons and paint-mills', in E. Hermens (ed.), *Looking through Paintings: The Study of Painting Techniques and Materials*

- in Support of Art Historical Research*, London, Archetype Publications, 1998, p. 277.
10. Jensen 2012 (cited in note 8), p. 4. For further information on Christian IV's prison and orphanage see O. Olsen, *Christian IV's tugt- og børnehus*, Copenhagen, Wormianum, 1978, and the more recent dissertation by L. Nørholtz, *Christian IV's Tugt- og Børnehus*, master's dissertation, Aalborg, University of Aalborg, 2005.
 11. Olsen 1978 (cited in note 10), pp. 84–85.
 12. H. Gamrath, *Residens- og hovedstad. Københavns historie, 1600–1728*, vol. 2, Copenhagen, Gyldendal, 1980, p. 45.
 13. B. Scocozza, 'Christian 4.'s silkeeventyr', in C. Bjørn, B. Fonnesbech-Wulff and K. E. Frandsen (eds), *Mark og menneske, studier i Danmarks historie 1500–1800*, Ebeltoft, Skippershoved, 2000, pp. 141–154.
 14. Jensen 2012 (cited in note 8), p. 15.
 15. O. Nielsen, *Københavns Diplomatarium. Samling af dokumenter, breve og andre kilder til oplysning om Københavns ældre forhold før 1728*, (8 vols), vol. III, Copenhagen, G.E.C. Gad, 1878–1889, p. 208.
 16. Ibid., vol. II, pp. 616–617.
 17. Ibid., vol. II, p. 704.
 18. P.T. Balaram, 'Indian indigo', in A. Feeser, M.D. Goggin and B.F. Tobin (eds), *The Materiality of Color: The Production, Circulation, and Application of Dyes and Pigments, 1400–1800*, Farnham, Ashgate, 2012, p. 143.
 19. M.V. Pedersen, 'Peasant featherbeds in "Royal Attire": the consumption of indigo in early modern Denmark', in E. Fihl and A.R. Venkatachalapathy (eds), *Beyond Tranquebar: Grappling Across Cultural Borders in South India*, New Delhi, Orient Black Swan, 2014, p. 547.
 20. J. Clausen and P.F. Rist, 'Islænderen Jon Olafssons Optegnelser som Ostindiefarer under Christian IV, nedskrevet af ham selv', in *Memoirer og Breve VII*, Copenhagen, Nordisk Forlag, 1907.
 21. Ibid., pp. 122–123.
 22. FKR, 1610–1626 (cited in note 2), III, fol. 16.
 23. L. Laursen, *Kancelliets Brevbøger vedrørende Danmarks indre forhold. I uddrag (1551–1660)*, Copenhagen, Rigsarkivet, 1885–2005 (1915), p. 617.
 24. *Apothecken Taxt 1619, Huorledis Medicamenta, simplicia oc composita, somhoss begge Privilegerede Apotheckere her i Kiøbenhaffn tilkiøbs findis, effter denne tids oc steds lejlighed selges, etc. Effter Kong. Majest. Naadigste Befalning, aff Medicis sammesteds forfattet*, facsimile edition from 1986, commented by P.R. Kruse, Copenhagen, Dansk Farmacihistorisk Selskab. See also the section on apothecaries in this article.
 25. Laursen 1885–2005 (1919) (cited in note 23), p. 778; Nielsen 1878–1889 (cited in note 15), vol. II, p. 711.
 26. Laursen 1885–2005 (1916) (cited in note 23), p. 400. The unit *fad* (cask, small barrel) could be a cubic unit or a weight unit: the size depended on the contents. *Fad* was usually applied in relation to fluid materials, however in the Colour Chamber accounts the pigment *kønrog* is repeatedly supplied in the unit of *fad*.
 27. *Øresundstoldregnskab* (1497–1857), Archival number 571, Danish National Archive (Rigsarkivet), Copenhagen. The scanned and transcribed Sound Toll Registers (STR) are available and searchable from STR online: www.soundtoll.nl.
 28. Laursen 1885–2005 (1922) (cited in note 23), p. 85.
 29. D. Buti, A. Vila, A. Haack Christensen, T. Filtenborg, K.N. Dalby and J. Wadum, "Clay grounds" in Denmark: from soil to canvas', poster presented at the Gordon Research Conference, Newry (ME), USA, 30 July 2014.
 30. Laursen 1885–2005 (1919) (cited in note 23), p. 582.
 31. 'lavet ligesom en Dej, slaget op, ligesom man slaar Brød op, settes hen at tørres noget i Solen, siden setter mand det i en Bag-Ovn, at det bliver hart. Derefter stødes det smaa, og rives paa en Steen, ligesom mand river anden Farve', in H. Lønborg, *Beretning om Scanderborrig Slott, naar det gamle Slott først er bygget, og hvad for en Konge i Dannemarck, som haver ladet bygge det nye Slott; samt adskillige Sagn og Old-Sager, som fortælles der i Egnen at være passeret*, part IV, 1727.
 32. S. Rasmussen, 'Kilderne og den røde jord i Skaarup', *Fruering-Vitveds Kirke & Sognekontakt* 35(2), 2006, pp. 20–21.
 33. German mineralogist and metallurgist Georgius Agricola (1494–1555) not only mentions English chalk deposits in his mid-1500s publication *De natura fossilium*, he also refers to the Danish island Møn, well known for the 6 km chalk cliffs on its eastern coast: see G. Agricola, *De natura fossilium* (Textbook of Mineralogy from 1955), translated from the first Latin edition of 1546 by M.C. Bandy and J.A. Bandy, New York, Dover Publications, p. 31. The question remains of whether local chalk from the cliffs of Møn was used by painters and craftsmen in Denmark in the 17th century or whether it was cheaper to import chalk from abroad.
 34. U. Haller, "Administrator of Painting": the purchase and distribution book of Wolf Pronner (1586–1590) as a source for the history of painting materials', in Kirby *et al.* 2010 (cited in note 4), pp. 325–335.
 35. FKR, 1610–1626 (cited in note 2), III, fol. 4.
 36. Ibid., fol. 7.
 37. See X. Henny, 'Hoe kwamen de Rotterdamse schildersaan hun verf?', in N. Schadee (ed.), *Rotterdamse Meesters uit de Gouden Eeuw*, Zwolle, Waanders, 1994, pp. 43–54; L.C. Matthew, "Vendecolori a Venezia": the reconstruction of a profession', *The Burlington Magazine* 144(1196), 2002, pp. 680–686; A. Burmester and C. Krekel, 'The relationship between Albrecht Dürer's palette and 15th/16th-century pharmacy price lists: the use of azurite and ultramarine', in A. Roy and P. Smith (eds), *Painting Techniques: History, Materials and Studio Practice*, London, International Institute for the Conservation of Historic and Artistic Works, 1998, p. 101.
 38. K. Levy-Van Halm, 'Where did Vermeer buy his painting materials? Theory and practice', *Studies in the History of Art* 55, 1998, p. 139.
 39. W. Martin, 'Een kunsthandel in een kleppersmanswachthuis', *Oud Holland* 19 (1901), pp. 86–88; D. Bomford, J. Kirby, A. Roy, A. Rüger and R. White, *Art in the Making: Rembrandt*, National Gallery Company, London, 2006, p. 26.
 40. C. Pedersen, *En nøttelig Legebog Faar Fattige och Rige Vnge och Gamle Om mange atskillige Siwgdomme [...]*, Malmø, 1533, p. 115.
 41. O. Degn, *Rig og fattig i Ribe: Økonomiske og sociale forhold i Ribesamfundet 1560–1660* (2 vols), vol. 1, Århus, Universitetsforlaget i Aarhus, p. 96.
 42. L. Broecke, *Cennino Cennini's Il libro dell'arte: A New English Translation and Commentary with Italian Transcription*, London, Archetype Publications, 2015, p. 64.
 43. S. Neven, *The Strasbourg Manuscript: A Medieval Tradition of Artists' Recipe Collections (1400–1570)*, London, Archetype Publications, 2016, pp. 88–89.
 44. P.R. Kruse, *Lægemedelpriserne i Danmark indtil 1645: En undersøgelse af lovgivningen for fastsættelse af forbrugerprisen på lægemidler*, Copenhagen, Dansk Farmacihistorisk Selskab, 1991, pp. 63–64.
 45. See note 24 and the Danish *Taxt* from 1672: *Apotecker Taxt 1672, Catalogus et valor medicamentorum simplicium et compositorum in officinis Hafniensibus prostantium, Apotecker Taxt paa alt hvis i Kiøbenhaffn hos de fire privilegerede Apotheckere til Kiøbs findis, Apothecker Taxa aller dehrer Medicamenten und Waaren, welche man bey den vier Privilegirten Apotheckern in Kopenhagen zu kauffe findet*,

- Copenhagen (Hafniæ): prostant apud Petr. Haubold, literis Georgii Gödiani.
46. Kruse 1991 (cited in note 44), p. 98. The role of the apothecary in the trade of painting materials has been widely published in relation to research on German pharmacy pricelists. See C. Krekel and A. Burmester, 'Pharmacy price-lists as a new type of documentary source for research into historical artist's materials: The Münchner Taxenprojekt', *Dyes in History and Archaeology* 19, 2003, pp. 32–36; A. Burmester, U. Haller and C. Krekel, 'Pigmenta et Colores: the artist's palette in pharmacy price lists from Ligeznitz (Silesia)', in Kirby *et al.* 2010 (cited in note 4), pp. 314–324. On the pigment trade in other countries see J. Kirby, 'The painter's trade in the seventeenth century: theory and practice', *National Gallery Technical Bulletin* 20, 1999, pp. 5–49 and L.C. Matthew and B.H. Berrie "'Memoria de colori che bisognino torre a vinetia": Venice as a centre for the purchase of painters' colours', in Kirby *et al.* 2010 (cited in note 4), pp. 245–253.
 47. Kruse 1991 (cited in note 44), p. 233.
 48. Laursen 1885–2005 (1916) (cited in note 23), p. 262.
 49. See note 45.
 50. Laursen 1885–2005 (1916) (cited in note 23), p. 113.
 51. Laursen 1885–2005 (1919) (cited in note 23), p. 897.
 52. A. Schæffer, *Studier til dansk apotekervæsens historie, hofapotekere og hofkemikere i Danmark ca. 1540–1660*, Copenhagen, Dansk Farmacihistorisk Selskab, 1963, p. 5.
 53. *Ibid.*, p. 96.
 54. C.F. Bricka and J.A. Fridericia, *Kong Christian den fjerdes egenhændige breve* (1589–1648) (7 vols), vol. III (1878–1889): *Selskabet for udgivelse af kilder til dansk historie*, Copenhagen, Forlaget af Rudolph Klein, pp. 256–257.
 55. *Ibid.*, p. 261.
 56. In Moth's vocabulary from around 1700, *flitterguld* is defined as thinly beaten brass added to draperies in order to glitter, see Moth, c.1700: <http://mothsordbog.dk/> (accessed 1 November 2018). *Kragesølv* (crow silver), also referred to as glimmer, and *marieglas* (Marie glass), seems to have referred to the easily cleaved muscovite – a sheet silicate mineral of the mica group: see N. Eastaugh, T. Chaplin, R. Siddall and V. Walsh, *Pigment Compendium: A Dictionary and Optical Microscopy of Historical Pigments*, vol. 1, London/New York, Routledge, 2004, p. 267.
 57. See also A. Haack Christensen, 'The Royal Danish Colour Chamber and the 17th-century trade in artists' materials', in S. Eyb-Green, J.H. Townsend, S. Kroustallis, K. Pilz and I. van Leeuwen (eds), *Sources on Art Technology: Back to Basics*, London, Archetype Publications, 2016, pp. 158–159.
 58. T. Hvidegaard, 'Øresundstolden på Christian 4.'s tid. Sundtoldens betydning 1613–1645 for forholdet mellem Danmark, Sverige og Nederlandene', in *Fortid og Nutid*, 2000, p. 201.
 59. FKR, 1610–1626 (cited in note 2), II, fol. 11.
 60. *Ibid.*, III, fol. 8.
 61. *Ibid.*, III, fol. 20. 1 *lod* = 15.5 grams.
 62. Historically the terms ash and ash blue have referred to both a low-grade azurite and a low-grade ultramarine, both being poorer quality due to their white mineral impurity content (Kirby *et al.* 2010 [cited in note 4], p. 447). The ashes and ash blues mentioned in the Colour Chamber documents probably referred to azurite. *Gemain* ash (regular ash) was distributed in the quantity of 32 and 55 pounds respectively for the purpose of painting several of the king's warships (FKR, 1610–1626 [cited in note 2], I, fols 33 and 64). It is unlikely that ultramarine would have been used in these quantities and for this purpose.
 63. FKR, 1610–1626 (cited in note 2), II, fol. 11.
 64. Upon Morten Jensen's death in 1625, two painters settled the value of his art collection, counting 180 paintings for 390 *rigsdaler*. Pieter Isaacs was Jensen's tenant until he died a few months before Jensen. Isaacs's son Isaac (1599–1649) continued to live in the house: P. Eller, *Borgerne og billedkunsten på Chr. 4.'s tid. Uddrag af Helsingørs skifteprotokoller 1621–1660*, Hillerød, Frederiksborg Amts Historiske Samfund, 1975, pp. 44–45.
 65. See B. Noldus, 'Pieter Isaacs's other life – legal and illegal', in B. Noldus and J. Roding, *Pieter Isaacs (1568–1625): Court Painter, Art Dealer and Spy*, Turnhout, Brepols Publishers, 2007, p. 158.
 66. O. Degn (ed.), *Tolden i Sundet, toldopkrævning, politik og skibsfart i Øresund 1429–1857*, Copenhagen, Told- og Skattehistorisk Selskab, 2010.
 67. E. Gøbel, 'Øresundstolden og dens regnskaber 1497–1857', in *Handels- og Søfartsmuseet på Kronborg*, Aarbog, 2010, p. 47.
 68. This example has been identified through the Sound Toll Register online: www.soundtoll.nl/public/dates.php?id=892838 (accessed 1 November 2018).

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JENS JUEL AND THE BUSINESS OF PORTRAIT PAINTING

Tine Louise Slotsgaard

ABSTRACT In the latter half of the 18th century cultural changes and economic growth in European society stimulated the demand for portraits and consequently the establishment of the prolific portrait painter. This paper examines the circumstances that may have contributed to the success enjoyed by Danish portrait painter Jens Juel during this period. It studies whether the increasing demand for portraits influenced their production with regard to technique and materials, and extends comparison to portrait painters from nearby countries, especially Sir Joshua Reynolds and Anton Graff. Together with great talent, Juel possessed good business acumen and adapted quickly to societal changes and trends, with a willingness to meet market demands and client requests. Through his connections in society, and perhaps self-promotion, he became a public figure and gained popularity and fame in his own lifetime. Juel was not just a gifted businessperson, self-promoter and talented painter who managed an increasingly productive portraiture business – a study of his work and the limited number of conservation records suggests that despite their fast execution, the quality and durability of his paintings did not suffer.

Introduction

The middle of the 18th century witnessed a new type of successful business in the field of portrait painting. European society was experiencing rapid commercial growth, and with an expanding bourgeoisie with money to spend on luxury goods, portraits provided sitters with a means of asserting social status. Portraiture gained new audiences and dominated other genres, subverting the traditional academic hierarchy, which placed history painting higher than portraiture, genre, landscape and still-life paintings.¹ There is evidence of the establishment of prolific and successful portrait painters in Europe, who gained both fame and the prestigious social status of a public figure. Portrait painters such as Sir Joshua Reynolds (1723–1792) in England, Anton Graff (1736–1813) in Germany and Jens Juel (1745–1802) in Denmark are prime examples of this type of portraitist. Juel, regarded as one of the most important portrait painters in the history of Danish art and culture, left behind over 1000 paintings, pastels, sketches and drawings. He could be considered one of the first commercial Danish painters and among the first Danish artists to achieve an international reputation in his own lifetime.² He was very popular with members of the Danish royal family, the nobility and the bourgeoisie, all of whom wished to have their portrait painted by him. How was Juel able to build up such a list of elite clientele, rise to fame and establish a means of prolific artistic production previously unseen in Danish

art? Did the increasing demand for portraits influence his production with regard to choice of technique and materials? These, like many other questions about Juel and his practice, remain unanswered. Little is known about the availability of materials for painters in Copenhagen at this time or of the commercial preparation of paintings for the emerging market for art and artistic practice in Denmark in the period leading up to the Danish Golden Age.³ In order to address the questions above, this paper studies written sources including an unpublished contemporary letter by Johan Conrad Spengler and Ellen Poulsen's *catalogue raisonné* from 1991.⁴

Jens Juel's training and career

Juel was born in 1745 on the island of Funen in Denmark,⁵ and his training and career as a painter largely reflect the traditions of the time. As the education at the art academy was based primarily on theory and drawing, the aspiring painter was expected to undertake an apprenticeship in a master's studio, to learn the practice of painting, as well as attend classes in the private studios of the professors of the art academy.⁶ Juel initiated his apprentice years at the age of 15 in the studio of painter Johann Michael Gehrman (1707–1770) in Hamburg, Germany. Around 1765 Juel returned to Denmark to study at the newly established Royal



Fig. 1 Jens Juel, *Portrait of Anna Elisabeth Battier, née Storp*, 1771, oil on canvas, 79 × 63.5 cm, The National Gallery of Denmark (SMK), inv. no. KMS3634: a member of the bourgeoisie who married the bookkeeper of the Danish Asiatic Company, Christophe Battier.

Danish Academy of Fine Arts in Copenhagen, founded in 1754, which was strongly influenced by the standards of the French Académie des Beaux-Arts. Portrait painting was Juel's main subject but he was required to practise classical history painting in order to participate in the competition at the art academy for the opportunity to win a gold medal and a stipend for a Grand Tour. Although Juel won a gold medal in 1771, the associated stipend went to his colleague, the history painter Nicolai Abildgaard (1743–1809). However, with sponsorship from private benefactors, Juel embarked on a four-year Grand Tour of the most important artistic centres in Europe: Hamburg, Dresden, Vienna, Venice, Bologna, Florence, Rome, Naples, Paris, Geneva and Kassel. Juel managed to extend his trip to eight years by painting portraits on commission, especially in Switzerland, where he remained for three years. Following his return to Copenhagen in 1780,

he became official court painter (1780), was elected member (1782), professor (1784) and later director (1795–1797 and 1799–1801) of the art academy, while simultaneously maintaining a busy private studio with assistants and academy students.⁷

The prolific portrait painter

Juel's success as a portrait painter was a combination of societal circumstances, timing, talent and taste. Not long after his arrival in Copenhagen around 1765, during his first years at the art academy, Juel started receiving commissions for portraits in the social circle related to a bourgeois family called Klingberg, with whom he resided. An introduction



Fig. 2 Jens Juel, *Self-Portrait*, 1766, oil on canvas, 34.5 × 43 cm, The Royal Danish Academy of Fine Arts.

by this family to other established families in Copenhagen is generally considered one of the reasons for his rapid breakthrough (Fig. 1).⁸ His popularity escalated quickly and he soon came to the attention of the royal family.

Juel arrived in Copenhagen at just the right time. King Frederik V (1723–66) founded the art academy in 1754 in order to supply the country with native artists, as well as to glorify the monarchy – until then, the demands of the Danish artistic scene had mainly been satisfied by foreign artists.⁹ There was a desire from high-profile figures to see talented academy students such as Juel and Abildgaard succeed their fields.¹⁰ Having returned to Denmark after his Grand Tour in 1780, Juel was considered a cosmopolitan artist with an international reputation: he came back to an art market with an increasing demand for portraits and quickly gained status as the primary portrait painter in Denmark.¹¹

He exceeded other portrait painters not only in talent, but also in fame, and it was considered prestigious to have one's portrait painted by Juel. As several eyewitnesses recount, even visiting his studio was a great attraction.¹² The country was experiencing a golden age of trade, and a growing bourgeoisie with increasing self-awareness was seeking to emulate the court, aristocratic concepts and fashions, and challenge the nobility. For centuries, aristocratic luxury had

been connected to wealth, status and power whereas the new bourgeois luxury was embedded in trade, utilitarianism, taste and comfort.¹³ Juel served both stratas of society but by the 1790s, the bourgeoisie constituted the majority of his clients. While Juel's studio was busy, other artists of the time were still highly dependent on a decreasing number of court commissions.¹⁴ Portrait painting thrived while other genres struggled. This is expressed in a letter from 1800 sent from Abildgaard to the Swedish sculptor Johan Tobias Sergel (1740–1814) in Stockholm: 'Jens Juel who is the Director, continually paints portraits; he is the only one who has anything to do', to which the sculptor replied: 'It doesn't surprise me that Juel is fully engaged; it is the same here, portrait painters are more like manufacturers than artists.'¹⁵ Erik Pauelsen (1749–1790), who could not decide whether he wanted to be a history painter or a portraitist, was outshone by both Abildgaard and Juel, and ultimately committed suicide.¹⁶

Famous portraitists with similar prolific commercial artistic production were also evident in other countries.¹⁷ In Germany, Anton Graff, based in Dresden, was the most popular portrait painter in the German-speaking region (Prussia); he left behind around 2000 paintings.¹⁸ In England, Sir Joshua Reynolds was the era's most celebrated portraitist: he was the first president of London's Royal Academy of Arts, founded in



Fig. 3 Jens Juel, *The Artist and his Wife Rosine, née Dørschel*, 1791, oil on wood, 52.5 × 41.5 cm, The National Gallery of Denmark (SMK), inv. no. KMSsp864.

1768, and left behind well over 3000 paintings.¹⁹ All three portrait painters ran busy studios with assistants and students, and had careers closely connected to the newly established art academies in their respective cities. In many ways, the careers and successes of these three portraitists parallel and represent the tradition and trends of portrait painting in Europe in the latter half of the 18th century, providing a good basis for comparison. All three painters received praise from their contemporaries for their ability to capture likeness and character.²⁰ During the Romantic period, portraits demonstrated increasing interest in revealing the character, thoughts and feelings of the sitter. The German philosopher Johann Georg Sulzer (1720–1779) defined a good portraitist as someone who allowed the viewer to recognise an individual human spirit in the person portrayed. Sulzer, who was also Graff's father-in-law, commented that Graff's talent lay in his ability

to look 'into the depths of the soul'.²¹ Juel also fell into this category, as described by the Swiss naturalist and philosopher Charles Bonnet (1720–1793). After having his portrait painted by Juel, in 1777 Bonnet wrote: 'He exerts his talent with an astonishing superiority, the soul as well as the body, and what may surprise you, is that he requires only three sittings, none of them exceeding three hours.'²²

Self-portraits as self-promotion

Upon Juel's first arrival in Copenhagen around 1765, advertising and self-promotion could have played a role in his receipt of initial commissions: a young painter needed to know how to make himself visible to the market. The

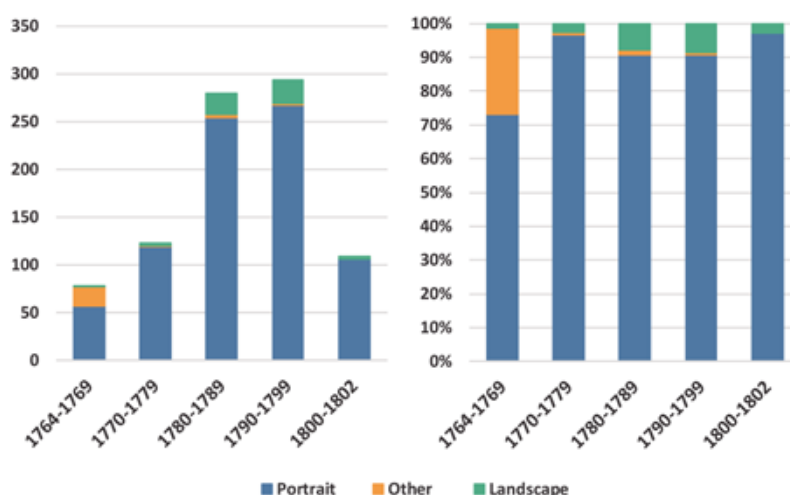


Fig. 4 The distribution of subjects for paintings and pastels by Juel per decade by number (*left*) and percentage (*right*). The subjects are divided between Portrait, Landscape and Other, which includes both genre, still-lives and copies (based on the 1991 *catalogue raisonné* by Ellen Poulsen).

motivation for artists to paint self-portraits varies, as does the audience for which they are intended. Some self-portraits were meant for private purposes, while others were intended for public display, either to mark an achievement, as a commission or as an advertisement.²³ Juel painted about 10 self-portraits throughout his career, and the self-portrait from 1766 in particular, in which Juel placed himself in the studio, may have had a promotional purpose (Fig. 2). This self-portrait shows a confident and skilled young artist capable of mastering several genres of painting. It may have functioned as both a type of preview of what the client could expect and of what Juel was capable. Some art historians have considered this a private practice piece, not meant for the public,²⁴ but examples from abroad support the idea that this painting may have functioned as an advertisement of Juel's skills. At this time, it was not yet common practice for him to display existing portraits in the studio for future clients to view, as in later years. Reynolds painted 27 self-portraits throughout his career and was very concerned with celebrity and self-promotion. His earliest self-portrait, from the late 1740s, is regarded as publicising his skills as an up-and-coming artist in London. Reynolds's self-portraits were, for the most part, related to his public life and his position in society – both as an artist and as a leading figure in the cultural establishment.²⁵ Graff painted more self-portraits than any other painter of his generation: more than 80 are known, produced as a means of self-promotion and documenting his skills over the course of his lifetime.²⁶

In his 1766 self-portrait, Juel has placed himself in his studio at the residence of the Klingberg family. He is looking directly at the viewer, sitting in front of the easel executing a history painting, with a portrait of Johan Klingberg in the background. Apart from a self-portrait from around 1765 by the artist Peter Cramer (1726–1782), Juel appears to be the first Danish painter to position himself in front of the easel in this manner. In later self-portraits, Juel portrays himself elegantly in the same format as his clients, and his self-portrait

from 1791, *The Artist and his Wife Rosine, née Dörschel* (Fig. 3), illustrates his dual role of practising artist and established gentleman.

Juel's subjects for paintings

When we relate the subjects, compositions and the style of Juel's paintings to his location at the time of their creation, we discover a painter who was very talented at adapting to societal trends. The following examples and the variety of subjects suggest that he was willing to change the style and composition of his work at his client's request and in response to market conditions. Figure 4 shows the distribution of subjects for paintings and pastels by Juel, as listed and dated in the *catalogue raisonné* from 1991.²⁷ About two-thirds of the paintings produced by Juel's studio, many of which were painted in his most productive years during the later part of his career, are not signed. In the catalogue the majority of his paintings are dated within decades (as in Fig. 4). Artworks attributed to Juel since 1991 are not included, but for the purposes of this study the bar charts provide a sufficient impression of the development in Juel's production and choice of subjects.²⁸

The first signed drawing by Juel is from 1760, while the first known painting dates from 1764 when Juel was still in Hamburg. At least 10 of the 17 known paintings from 1764 represent genres other than portraits, copying or imitating the styles of painters such as Balthasar Denner (1685–1749), Jan van Huysum (1682–1749) and Aert van der Neer (1603–1677).²⁹ These paintings are all of good quality and bear Juel's signature. By the second half of the 18th century, aristocratic and bourgeois collectors everywhere in Europe preferred Dutch paintings. Hamburg was the largest art market in Europe at this time, and results of auctions held there demonstrate that even copies or imitations of Dutch masters



Fig. 5 Jens Juel, *Baroness Matilda Guiguer de Prangins in her Park at Lake Geneva*, 1779, oil on canvas, 86.5 × 72 cm, The National Gallery of Denmark (SMK), inv. no. KMS4810.

were in high demand.³⁰ Little is known about the production and studio of Juel's master Gehrman. Several of Juel's early paintings executed in Hamburg have provenance in English and German collections before they entered their current museum or private collection but none has a provenance extending all the way back to the 1760s.³¹ A closer look at the provenance of the early paintings is necessary to establish the purpose of their production and to discover whether Gehrman and Juel supplied paintings to the commercial art market in Hamburg.

It may have been to Juel's advantage that he served his apprenticeship in Hamburg rather than enrolling directly at the new art academy in Copenhagen like his contemporaries Abildgaard and the engraver Johan Friedrich Clemens (1749–1831).³² Exposure to Hamburg's flourishing art market in the 1760s may have given Juel an insight into the commercial aspects of art and artistic practice, preparing

him for the demand in portraits in Copenhagen. Bourgeois collectors with an interest in Dutch paintings, common in Germany, are not found in Denmark until almost two decades later.³³ This class did, however, demand portraiture, as did the royal family and the nobility, and Juel was able to tap into that market as soon as he arrived in Denmark in 1765.

While in Rome during his Grand Tour, Juel had become acquainted with Pompeo Batoni (1708–1787) and his portraits of British travellers with landscapes in the background, a type also produced by Sir Thomas Gainsborough (1727–1788) in England.³⁴ In Switzerland, Juel produced several of these portraits in a landscape setting such as *Jean-Armand Tronchin, Ambassador to the French and English Courts* and *Baroness Matilda Guiguer de Prangins in her Park at Lake Geneva* (Fig. 5), both from 1779. The baroness's diary gives insight into Juel's practice while executing the painting.³⁵ Portraits in a landscape setting were not yet common



Fig. 6 Jens Juel, *Johan Christian Bodendick*, 1789, oil on canvas, 69 × 53.5 cm, Medical Museion, Denmark.

in Denmark at the time of Juel's return in 1780 – the earliest instance of such a portrait produced by Juel in Denmark was commissioned in 1788 by the English merchant Joseph Greenway, who was familiar with the type from his home country. According to art historian Kasper Monrad, Juel changed his painting technique and used a larger brush than normal for this painting, perhaps to imitate a different style in order to accommodate the client's wishes.³⁶

During his years in Switzerland, Juel developed an interest in landscape painting, with the earliest of these paintings dating from 1779. From 1782, he started painting landscapes in Denmark. The new type of bourgeois collector that emerged in Denmark during the 1780s adopted the taste for Dutch and Flemish paintings established by the preceding generation of aristocratic collectors.³⁷ Juel was able to provide landscape paintings to satisfy this new demand, along with portraits of the collectors. From early on, Juel was in vogue with collectors and became the first highly sought-after, collectable Danish artist. As demonstrated by auction and collection catalogues, his landscape paintings became increasingly popular and were well represented in the new private collections.³⁸ During the 1780s and 90s landscape paintings made up almost 10% of Juel's production (Fig. 4). The *catalogue raisonné* lists about 54 landscape paintings, but today these works are believed to number at least 75.³⁹ Juel's landscape paintings were downplayed by early art historians who considered them to have been completed in 'moments of leisure and for pleasure.'⁴⁰ In more recent years, however, Juel has gained recognition as the founder of Danish landscape painting.⁴¹

There are other examples of Juel having met specific requests from clients. For instance, the collector Johan Christian Bodendick (1735–1818) (Fig. 6) asked the artist to produce a counterpart for a small painting on copper by Ary de Vois (1635–1680) in 1788, and a still life by Frans van Mieris (1635–1681) in 1791, which Juel was able and willing to do.⁴² In general, Juel displayed an ability to adapt his style and genre based on context or to meet clients' needs.

Prices for paintings

A few documents exist with information on Juel's prices for paintings. The earliest known is an invoice dated 27 February 1769 from Juel to Queen Caroline Mathilde.⁴³ The invoice charges a total price of 160 *rigsdaler*: 80 for the original bust-length portrait including a gilded frame, and 40 each for two copies. Additional documents reveal that prices varied slightly, but the standard price for a bust-length portrait – generally measuring 68–75 cm in height, whether rectangular or oval – seems to have remained around 80 *rigsdaler* throughout Juel's career.⁴⁴ After 1770, he introduced the oval bust-length portrait format that makes up the majority of his production.

It appears that portraits were generally supplied within a frame, and that the frames themselves were quite valuable. While the frame was included in the price for the queen's painting, receipts from later years add 9 *rigsdaler* for the frame and packaging for a standard sized portrait. A few examples from the 1780s illustrate that Juel charged 130–135 *rigsdaler* for bust-length portraits of royals including the frame.⁴⁵ The cost of a three-quarter length portrait was 200 *rigsdaler*,⁴⁶ while a large full-figure portrait for the royal family was priced at 500–600 *rigsdaler*.⁴⁷ For larger sized portraits, the frames were more expensive, costing up to 30 *rigsdaler*. The majority of Juel's portraits have been preserved in their original frames, which tend to be variations on the neoclassical Louis Seize style.⁴⁸ All that is known of Juel's collaboration with a frame maker originates from a letter to his wife dated 24 July 1799, in which he urges her to pay a visit to a frame maker called Kriedt, who lives on the square of Christiansborg Palace across from Børsen.⁴⁹

It is clear that the luxury of commissioning a portrait was limited to members of royalty, the nobility and wealthy burghers. For comparison, a worker in Copenhagen, such as a carpenter, earned about 20–24 shillings per day (1 *rigsdaler* = 96 shillings),⁵⁰ thus a standard sized portrait would have cost more than a carpenter's annual salary. There were occasional complaints that Juel was too expensive: in 1793, the baron and privy councillor Gersdorff complained to the lesser known portrait painter Hans Hansen that the price of a good portrait used to be only 10 *rigsdaler* and 4 *rigsdaler* for a copy.⁵¹ Later in his career, Juel started producing pastels at a cost of 25 *rigsdaler*,⁵² while his landscape paintings in oil seemed to be charged at the lower price of around 15 *rigsdaler* or less.⁵³

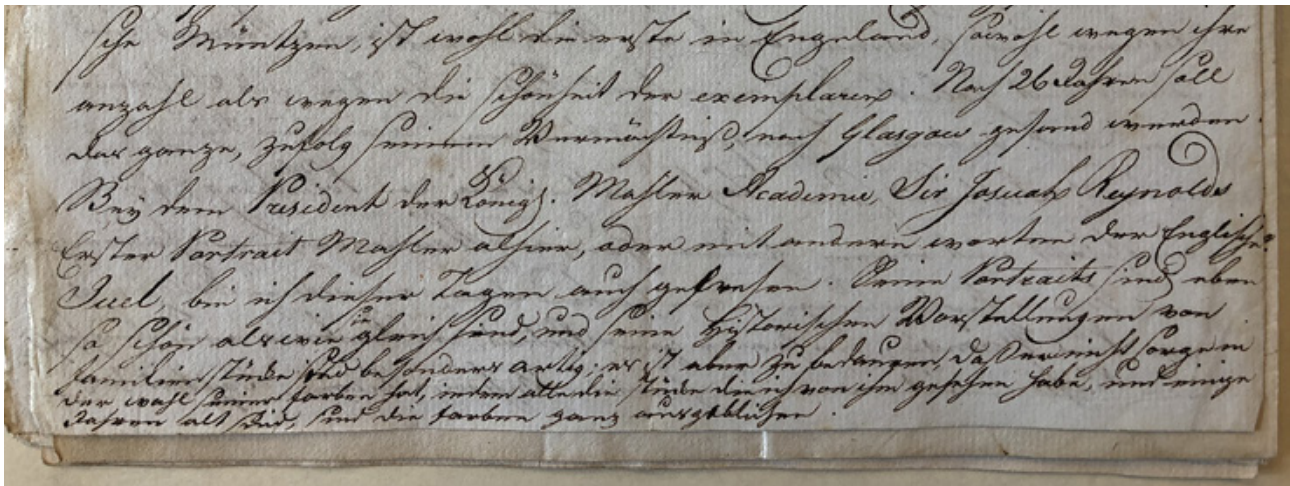


Fig. 7 Detail of the letter dated 2 October 1788 from Johan Conrad Spengler to his father Lorenz Spengler from London, referring to his visit to the studio of Sir Joshua Reynolds.

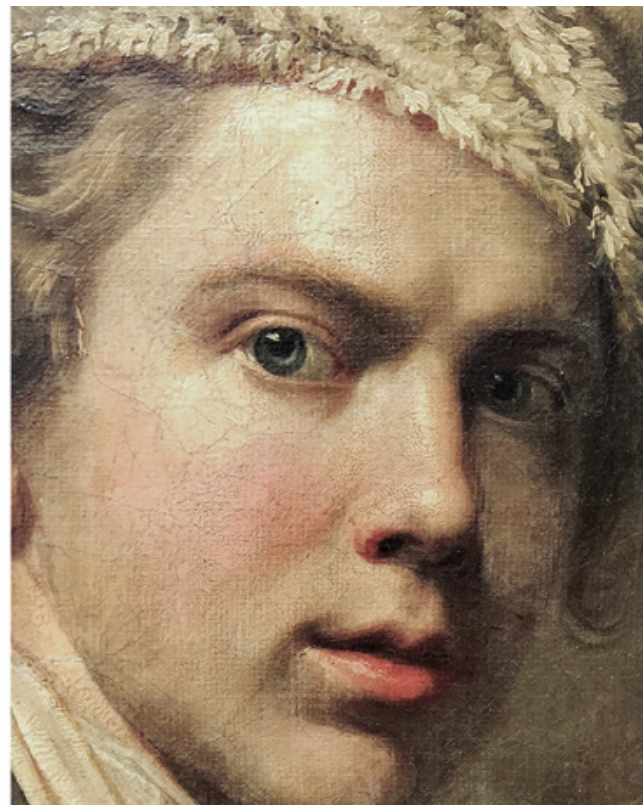


Fig. 8 Left: Jens Juel, *Self-Portrait with Portfolio*, 1773–74, oil on canvas, 56.5 × 44.5 cm, The National Gallery of Denmark (SMK), inv. no. KMS3275. Right: detail of the face displaying the type of wrinkling often associated with Anton Graff's technique.

Production and technique

It is reasonable to expect that increased efficiency of the so-called 'manufacture' of paintings, as Sergel expressed it, may have had an impact on the creation process for Juel's paintings and, subsequently, on the state of preservation of his works of art. Except for occasional comments by art historians that some of Juel's paintings from his most productive years have a rushed appearance, no collective information on issues related to painting technique in the preservation of Juel's oil paintings has been gathered.⁵⁴ Examination of Juel's artworks

and the relatively low number of existing conservation records suggest that his portraits are in relatively good condition.⁵⁵ On several occasions, a direct comparison has been made between Juel and Reynolds.⁵⁶ In a recently discovered letter from 1788, the son of the head of the Royal Danish Art Chamber, Johan Conrad Spengler, wrote to his father Lorenz Spengler from London (Fig. 7):

By the President of the Royal Art Academy, Sir Josuah Reynolds, the primary portrait painter here, or in other words the English Juel, I have also been these days. His

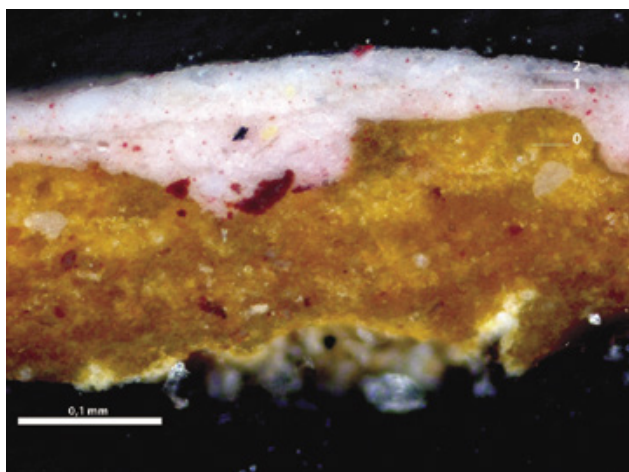


Fig. 9 Jens Juel, *Queen Caroline Mathilde*, 1769, oil on canvas, 75.5 × 62 cm, The National Gallery of Denmark (SMK), inv. no. KMS3764: cross-section showing a reddish-brown ground layer, seemingly widely used in Juel's early career, with two layers of paint for the flesh tones.

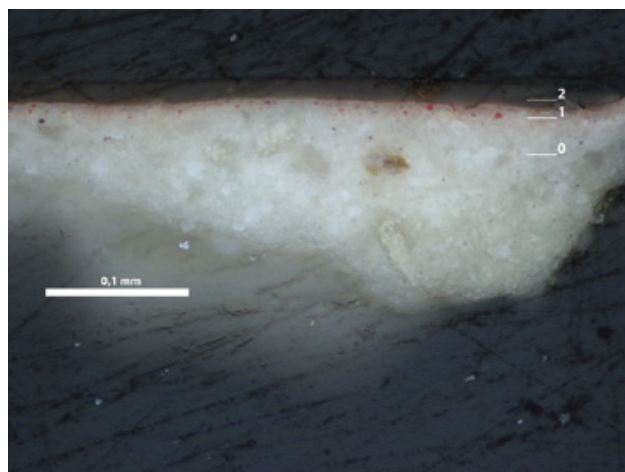


Fig. 10 Jens Juel, *Maria Ulrica Berner*, 1792, oil on canvas, 69 × 53.5 cm, The National Gallery of Denmark (SMK), inv. no. KMS1544: cross-section from a single white layer used in Juel's later career, and a single fine paint layer for the flesh tone (see also Fig. 12, left).

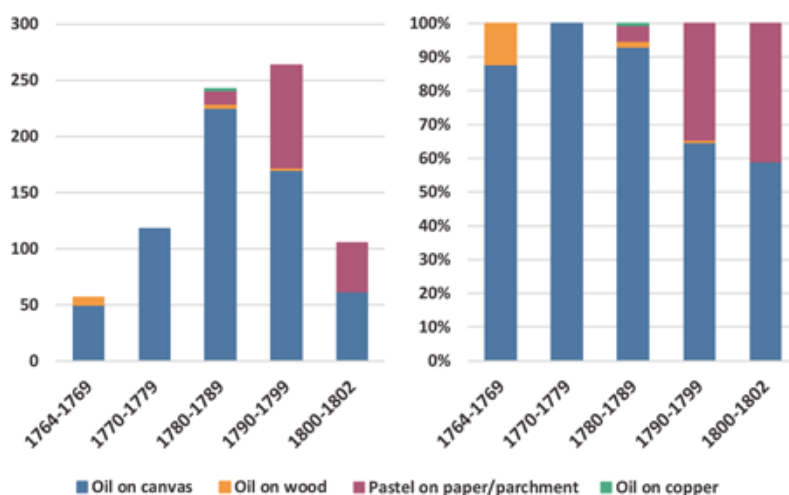


Fig. 11 The distribution of medium and supports used by Juel per decade by number (left) and percentage (right) (based on the 1991 *catalogue raisonné* by Ellen Poulsen).

portraits are as beautiful as they display likeness, and his historical representations and family pieces are particularly magnificent. But it is to be regretted that he does not worry about his choice of his colours [Farben], in all the pieces that I have seen by him, which are only a few years old, the colours are completely faded.⁵⁷

The reference to Reynolds provides a strong confirmation of Juel's status in his own time, but the letter also offers another piece of information: within Reynolds's lifetime it was already evident that his technique resulted in paintings that could be unstable. Reynolds was an artist who continually experimented with his technique and the issues of fading and cracking are well known by conservators today.⁵⁸ Similarly, Graff's paintings exhibit problems relating to painting technique: the paint surfaces of a number of his portraits bear wrinkling caused by the drying process, possibly as a result of applying paint layers too quickly in order to meet

commission deadlines.⁵⁹ Drying cracks or wrinkling have only been observed to a limited extent in Juel's portraits in oil. It is interesting that the *Self-portrait with Portfolio* from 1773–74, which Juel is said to have painted while in Dresden, actually displays the type of wrinkling associated with Graff's technique (Fig. 8). It is generally believed that Juel studied with Graff while visiting the city during the early 1770s.⁶⁰ Could this suggest that Juel altered his technique for this self-portrait under influence of Graff?

A preliminary investigation of Juel's painting technique reveals a change between the early and later periods of his career. Cross-sections from 11 portraits show that in his early career before the Grand Tour, Juel used a similar reddish-brown ground with one or two paint layers for the flesh tones, whereas later, after his return to Copenhagen, a diverse range of grounds was employed, but seemingly transitioning towards a lighter colour and simpler layer structure (Figs 9 and 10).⁶¹ A shift towards lighter coloured



Fig. 12 Left: Jens Juel, *Maria Ulrica Berner*, 1792, oil on canvas, 69 × 53.5 cm, The National Gallery of Denmark (SMK), inv. no. KMS1544: detail. Right: Jens Juel, *Bookkeeper H.E. Moe's Two Children*, 1790, pastel on paper, 26 × 36.2 cm, The National Gallery of Denmark (SMK), inv. no. KMS3993: detail. These images show the similar technique used for the execution of portraits in oil and portraits in pastel.

preparatory layers is seen generally in European painting throughout this period,⁶² but more recent observations suggest that Juel's use of ground colour in his later years was more varied than initially assumed. What caused the changes in Juel's technique and choice of ground colour? Could they be related to the commercial aspect of his production or perhaps a change in the availability of materials in Copenhagen? Examination by Troels Filtenborg of the ground layers of paintings by Juel's contemporary Abildgaard, revealed diversity with no evident systematic use of particular grounds.⁶³ Further investigation of Juel's use of ground colour may clarify whether his changes in practice occurred at a specific point in time or were perhaps related to a particular source of inspiration. While art historians have discussed Juel's artistic influences, his technical influences have not yet been subject to an in-depth study.

Changes in medium and support

The commercial aspect of Juel's production had a definite influence on his choice of medium and support. His production of portraits increased drastically following his return to Copenhagen in 1780, and in the mid-1780s he started creating portraits in pastel. Initially these made up less than 10% of his output, but later, from the 1790s until his death, pastels represented almost 40% of his production (Fig. 11). The use of pastel was probably a means of

satisfying the increasing demand for portraits from the bourgeoisie. Pastels were cheaper for the client, required less sitting time and were faster for the painter to execute. The expanding use of pastels by Juel over the years suggests that the artist was concerned with optimising his production of artworks. It appears, however, that he was not able to buy pastels in Copenhagen. In 1802 Philipp Otto Runge (1777–1810), a former student of Juel, wrote from Dresden to his brother in Hamburg stating that he was about to send a parcel with pastels and asking him to forward the pastels to Juel, as the artist cannot buy them in Copenhagen. Runge further commented that in the future Juel might also like to have some of the local Dresden canvas, which was considered very good, sent to him.⁶⁴ This information gives an important insight into the availability of materials in Copenhagen at this time, the extent of which still requires further investigation.

Juel's painting technique generally displays the use of a very controlled wet-in-wet *alla prima* painting technique, in which he integrated and blended the transitions between the elements and tonalities, creating a fluid and even paint surface, and adding the final highlights with a slight impasto. The simple layering, seen in the cross-section from the latest of the portraits investigated in the preliminary research (Fig. 12) does, to some extent, resemble the technique of working with pastels. It is possible that Juel developed a more rapid technique over the years, which would correlate with a description by one of the few contemporary witnesses who commented on Juel's painting technique. In 1801, while a student in Juel's

studio in Copenhagen, Runge wrote to Johann Wolfgang Goethe (1749–1832):

Once in a while he [Juel] has a manner, in which he executes his paintings, which after my opinion cannot be recommended, he retouches them almost from the beginning and executes them partly, you don't know how and you are astonished by how beautiful it turns out in the end.⁶⁵

Retouching here refers to the final layers of paint application, adding final effects and glazes to the composition, as discussed by the director of the French academy, Jean Baptiste Oudry (1689–1755), in his lecture from 1752.⁶⁶ On Juel's recommendation, after his stay in Copenhagen, Runge travelled directly to Dresden in 1801 to study with Anton Graff,⁶⁷ suggesting that over the years, there was some kind of connection between Juel and Graff.

Conclusions

The increased demand for portraits enabled Jens Juel to become established as a portrait painter. Not only was he highly talented, he also had a good understanding of business and adapted quickly to societal changes and trends. He seemed willing to meet market demands and client requests. As this paper has shown, through his connections in society and self-promotion, Juel became a public figure who achieved a popularity and fame unprecedented for a Danish artist.

The painting techniques of comparable prolific portrait painters, such as Sir Joshua Reynolds and Anton Graff, display experimentation or a rushed technique to meet demands. Juel, however, optimised his production by creating an increasing number of portraits in pastel, quicker to execute and requiring less sitting time. Some evolution seems to have taken place over the course of Juel's career in the colour and structure of the preparatory layers for portraits on canvas, but currently it is unclear if this was a result of a commercial consideration or due to changes in the availability of materials. Similarly, he may have developed a more rapid technique for paint application over the years but more research is required into how and why Juel changed his techniques over his career. However, it does seem that not only was Juel a gifted businessperson, self-promoter and talented painter, he also managed to achieve an increase in the production of portraits with no obvious decrease in quality and durability of the resultant artworks. Further studies might answer the questions as to what choices in materials and techniques made it possible for Juel to uphold a production that was rapid and of good quality, both in terms of visual representation and state of preservation. What circumstances or sources of inspiration could have influenced changes in Juel's painting technique and studio practice? As he probably influenced a whole generation of painters who followed during the Danish Golden Age, further technical analysis of his paintings may also provide an insight into these broader issues.

Acknowledgements

I would like to thank art historian Jesper Svenningsen for the information and transcription of the letter from Johann Conrad Spengler, and Ann Furholt Pedersen at Sorø Academy Library for helping to locate the original letter and other documents. I am grateful to Kristina Mösl, Head Conservator, Alte Nationalgalerie, Berlin, for referring me to Runge's letters and comments on Juel. Lastly, I would like to thank the Independent Research Fund Denmark (DFF) for making this study possible.

Notes

1. C.J. Murray, *Encyclopedia of the Romantic Era, 1760–1850*, New York, Fitzroy Dearborn, 2004; E. Salling and C.M. Smidt, 'Fundamentet. De første hundrede år', in A. Fuchs and E. Salling (eds), *Kunstakademiet 1754–2004*, vol. I, Copenhagen, Det Kongelige Akademi, Arkitektens Forlag, 2004, pp. 23–117; L. Lippencott, 'Expanding on portraiture: the market, the public, and the hierarchy of genres in eighteenth-century Britain', in A. Bermingham and J. Brewer (eds), *The Consumption of Culture, 1600–1800: Image, Object, Text*, London, Routledge, 1995, pp. 75–88.
2. With the exception perhaps of Vigilius Eriksen (1722–1782) who, between 1757 and 1772, travelled and worked in St Petersburg where he became the imperial court painter, or Peter Cramer (1726–1782) who painted both genre and portrait paintings on commission although on a much smaller scale than Juel: E.A. Neiiendam, *Peter Cramers billedverden, En vandring i 1700-tallets teater- og folkeliv*, Nivå, Nivaagaards Malerisamling, 1994.
3. On 18th-century painting technique in Denmark see: L. Bregnhøj, *Det Malede Rum. Materialer, teknikker og dekorationer 1790–1900*, Vesterborg, Historismus, 2010; T. Filtenborg, *Between Formula and Freestyle: Nicolai Abildgaard and 18th-Century Painting Technique*, London, Archetype Publications, 2014; T. Slotsgaard, 'An investigation of the painting technique in portraits by Jens Juel', in H. Evans and K. Muir (eds), *Studying 18th Century Paintings and Works of Art on Paper*, London, Archetype Publications, 2014, pp. 46–57; L. Ludvigsen, M. Bagge and V. Rask, 'The effect of Prussian blue on the technique of Danish court painters Hendric Krock and Benoit le Coffre', *op. cit.* pp. 7–15.
4. E. Poulsen, *Jens Juel I–II*, Copenhagen, Christian Ejlers' Forlag, 1991. This paper is an initial study forming part of an ongoing PhD project concerning Juel's painting technique, materials and studio practice.
5. The biographical section is based on, but not limited to, the following sources: Poulsen 1991 (cited in note 4); K. Monrad, *Jens Juel, Dansk Klassiskerkunst*, Copenhagen, Kunstbogklubben, Forlaget Søren Fogtdal A/S, 1996; C. Christensen (ed.), *Hvis engle kunne male... Jens Juels portrætkunst*, Copenhagen, The Museum of National History, Frederiksborg, Christian Ejlers' Forlag, 1996.
6. Salling and Smidt 2004 (cited in note 1). A proper painting school was not established at the academy until 1812.
7. For the structure and traditions of the academy see Salling and Smidt 2004 (cited in note 1).
8. C. Elling, 'Jens Juels Gennembrud', in *Kulturminde, Festskrift til Hugo Matthiessen*, Copenhagen, Selskabet for dansk kulturhistorie, Gyldendalske Boghandel, 1941, pp. 191–207.

9. Salling and Smidt 2004 (cited in note 1); T.H. Colding, 'Kongen og Kunsten', in V. Poulsen, E. Lassen and J. Danielsen (eds), *Dansk Kunsthistorie. Akademiet og Guldalderen 1750–1850*. Copenhagen, Politikens forlag, 1972, pp. 9–112.
10. Christensen 1996 (cited in note 5), p. 23; Salling and Smidt 2004 (cited in note 1), p. 42.
11. Poulsen 1991 (cited in note 4), p. 21.
12. See for instance Christian VIII, *Kong Christian VIIIs Dagbøger og Optegnelser. Volume 1: 1799–1814*, Copenhagen, Det kongelige danske Selskab for Fædrelandets Historie, 1943; S.F.L.C. Reventlow, *En dansk Statsmands Hjem omkring Aar 1800: Breve, 1774–1821*, Copenhagen, Gyldendal, 1902.
13. M. Venborg Pedersen, *Luksus: Forbrug og kolonier i Danmark i det 18. århundrede*, Copenhagen, Museum Tusculanum, 2013.
14. Christensen 1996 (cited in note 5), p. 18; Salling and Smidt 2004 (cited in note 1) p. 42; T.H. Colding, 'Kunsten og fædrelandet', in Poulsen *et al.* 1972 (cited in note 9), pp. 113–214; K. Kryger, 'Dansk identitet i nyklassicistisk kunst. Nationale tendenser og nationalt særpræg 1750–1800', in O. Feldbæk (ed), *Dansk identitetshistorie 1. Fædreland og modersmål, 1536–1789*, Copenhagen, C.A. Reitzel, 1991, pp. 231–424.
15. Abildgaard wrote to both Serjel and Bertel Thorvaldsen. For a letter from Abildgaard to Thorvaldsen see *Arkivet, Thorvaldsens Museum*, 21 July 1800: 'Juel, som er Directeur, maler uophørlig Portrætter, han er den eneste der har noget at gjøre', quoted in Poulsen 1991 (cited in note 4), p. 23. The location of the original letter from Abildgaard to Serjel is unknown. For a letter from Serjel to Abildgaard dated 12 August 1800 see 'Je ne suis pas étonné que Juel a toujours a faire, ici c'est de même, les peintres des portraits sont plus fabricants qu'artists', quoted in G. Göthe, *Sergelska Bref: Efterskrift Till Johan Tobias Serjel*, Stockholm, Kungl. Boktryckeri, 1900, p. 48.
16. Several artists of this period apart from Erik Pauelsen committed suicide, possibly due to financial difficulties: Johannes Gottfred Bradt (1741–1770), Hartman Beeken (1743–1781) and Johannes Wiedewelt (1731–1802). See Colding 1972 (cited in note 14).
17. Lippencott 1995 (cited in note 1)
18. E. Berckenhagen, *Anton Graff, Leben und Werk*, Berlin, Deutscher Verlag für Kunstwissenschaft, 1967; M. Fehlmann and B. Verwiebe, *Anton Graff, Gesichter einer Epoche*, Munich, Hirmer Verlag, 2013.
19. D. Mannings, *Sir Joshua Reynolds: A Complete Catalogue of his Paintings*, 2 vols, New Haven, Yale University Press, 2000.
20. For Juel, see N.L. Høyen, 'En samling af Juels arbejder', in *Fortegnelse over en Samling af Malerier, Tegninger og Kobbere, udstillet af Selskabet Kunstforeningen 1828*, Copenhagen, Thieles Bogtrykkeri, 1828, pp. 3–15; Poulsen 1991 (cited in note 4), pp. 21, 85. For Reynolds see N. Penny, 'An ambitious man: the career and the achievements of Sir Joshua Reynolds', in N. Penny (ed), *Reynolds*, London, Royal Academy of Arts, 1986, p. 17. For Graff see Fehlmann and Verwiebe 2013 (cited in note 18), p. 13.
21. Fehlmann and Verwiebe 2013 (cited in note 18), p. 13; J.G. Sulzer, 'Bis in der Innere der Seele', in *Allgemeine Theorie der Schönen Künste*, vol. 2, Leipzig, M.G. Weidmanns Erben und Reich, 1779, p. 449.
22. Letter from Charles Bonnet to M. Meuron, 20 August 1777: 'L'artiste, dont il s'agit, exerce son talent avec une supériorité étonnement et scait rendre également l'ame et le corps, et ce que vous surprendra, il ne lui faut que trois séances, dont la plus longue n'est pas de 3 heures', from the copybook of Charles Bonnet in Bibliothèque Publique, Geneva, cited in H. Glarbo, 'Nogle supplerende oplysninger om de danske kunstnere i Genève', in *Kunstmuseets Aarsskrift 1940*, Copenhagen, Gyldendalske Boghandel, 1940, p. 66.
23. A. Reynolds, L. Peter and M. Clayton, *Portrait of the Artist*, London, Royal Collection Trust, 2016.
24. Monrad 1996 (cited in note 5), p. 4.
25. M. Postle (ed.), *Joshua Reynolds: The Creation of Celebrity*, London, Tate Publishing, 2005, p. 73.
26. Fehlmann and Verwiebe 2013 (cited in note 18), p. 28.
27. Poulsen 1991 (cited in note 4).
28. Ibid. As Ellen Poulsen expresses in the preface: 'To prepare a complete and final catalogue of Juel's oeuvre is not possible – additional paintings continue to emerge, and many others are still missing. Now however, after half a century's compilation of material, the endeavour is brought to its conclusion – whatever its flaws and imperfections.' The exhibition at Frederiksborg Castle in 1996 presented six paintings not listed in the catalogue: Christensen 1996 (cited in note 5).
29. Poulsen 1991 (cited in note 4), nos. 1–18; Monrad 1996 (cited in note 5), pp. 5–7.
30. M. North, *Art and Commerce in the Dutch Golden Age*, New Haven, Yale University Press, 1997, p. 104; M. North, *Material Delight and the Joy of Living: Cultural Consumption in the Age of Enlightenment in Germany*, Aldershot, Ashgate, 2008, p. 113.
31. In the entries for the first paintings in the *catalogue raisonné*, Poulsen 1991 (cited in note 4) notes a provenance with references to the following collectors: Wengraf, London; Baupolizeiinspector Bargum, Hamburg; O.C. Gaedechens (1791–1856), Hamburg; Lord Glenconner, England.
32. Colding 1972 (cited in note 14).
33. J. Svenningsen, *Samlingssteder, Udenlandsk kunst i danske samlermiljøer 1690–1840*, PhD dissertation, Aarhus, Aarhus University, 2015.
34. Poulsen 1991 (cited in note 4), p. 18; M. Woodall, *Thomas Gainsborough: His Life and Works*, London, Phoenix House, 1949.
35. K. Monrad, 'Med Jens Juel på arbejde', *Kunstmuseets Aarsskrift* 71, 1993, pp. 40–49.
36. Monrad 1996 (cited in note 5), p. 39. Currently in the collection of the National Gallery, London.
37. Svenningsen 2015 (cited in note 33), p. 103.
38. Ibid., p. 125.
39. G. Hvidberg-Hansen, S. Miss and B. Zacho (eds), *Aftenlandet. Motiver og stemninger i dansk landskabsmaleri omkring år 1800*, Copenhagen, Thorvaldsens Museum/Odense, Fyns Kunstmuseum, 2011, p. 10.
40. Johan Frederik Schultz: 'som han i ledige Timer aflyst udøvede', in N.H. Weinwich, *Maler-Billedhugger-Kobberstiks-Bygnings og Stempelskærer Kunstens Historie i Danmark*, Copenhagen, 1811, p. 187.
41. A. Kold, 'Ej blot af lyst og i ledige stunder: to landskaber af Jens Juel på Thorvaldsens Museum', in *Meddelelser fra Thorvaldsens Museum*, Copenhagen, Thorvaldsens Museum, 1989, pp. 42–53; Hvidberg-Hansen *et al.* 2011 (cited in note 39); G. Oelsner, 'The democracy of nature', *Romantik: Journal for the Study of Romanticisms* 1(1), 2012, pp. 69–101.
42. Poulsen 1991 (cited in note 4), pp. 137, 159.
43. Invoice from Jens Juel to Queen Caroline Mathilde, 27 February 1769, Rigsarkivet, Partikulærkammeret, Dronning Caroline Mathilde, Bilag til Kasseregnskaber 1766–1772, 1769, 94–4.
44. Poulsen 1991 (cited in note 4), no. 73 (1769); no. 542 (1790); no. 615/619 (1795); no. 685 (1799).
45. Ibid., nos. 216/217/218 (1781); no. 235 (1782); nos. 301/302 (1784).
46. Ibid., no. 711 (1799); no. 746 (1799).
47. Ibid., no. 221 (1784); no. 386 (1786).
48. H. Bjerre, *Rammens Kunst*, Copenhagen, Statens Museum for Kunst, 2008.

49. H. Glarbo, 'Nogle undersøgelser om Jens Juels slægt og barndomshjem', in *Kunstmuseets Aarsskrift 1926–28*, Copenhagen, Gyldendalske Boghandel, 1929–30, p. 214.
50. P. Thestrup, *Mark og skilling, kroner og øre. Pengeenheder, priser og lønninger i Danmark i 350 år (1640–1989)*, Copenhagen, Rigsarkivet, G.E.C. GAD, 1991, pp. 29–33.
51. H. Hansen, 'Portrætmalerens Dagbog' (1793–1797), in J. Clausen and P.F. Rist, *Memoirer og Breve IV*, Copenhagen, Gyldendalske Boghandel, Nordisk Forlag, 1907, p. 31.
52. L. Bobé, *August Hennings' dagbog under hans ophold i København 1802*, Særtryk af Danske Magazin 7. rk, vol. 1, Copenhagen, Gyldendalske Boghandel, 1934, p. 42.
53. J. Bülow, *Sumarisk Beregning paa det som jeg eier ved dette Aars Slutning d. 31 Dec.* Bilag 9: Skilderier og malerier med Oliefarve. Johan von Bülow's Manuscript Collection at Academy Library, 84 D, 1790. Transcribed in Svenningsen 2015 (cited in note 33), p. 335.
54. See for instance Høyen 1828 (cited in note 20).
55. This is one of the topics which the current PhD project aims to address.
56. B. Scott, 'The Danish Reynolds, Jens Juel (1745–1802)', *Apollo* 304, 1987, pp. 411–415.
57. Johan von Bülow's Manuscript Collection at Sorø Academy Library, Kasse XI, 84 E 8. Johan Conrad Spengler to Lorenz Spengler, 2 October 1788: 'Bey dem President der Königl. Mahler Academie, Sir Josuah [original spelling] Reynolds, erster Portrait Mahler alhier, oder mit andere worten der Englische Juel, bin ich dieser Tagen auch gewesen. Sein Portraits sind aber so schön als wie sie gleich sind, und seine historischen Vorstellungen von Familienstücke sind besonderes artig. Es ist aber zu bedauern daß er nicht sorgen der Wahl seiner Farben hat, indem alle die Stücke die ich von ihm gesehen habe und einige Jahren alt sind, sind die Farben ganz ausgeblühen.' Transcribed and provided to the author courtesy of art historian Jesper Svenningsen.
58. A. Gent, A. Roy and R. Morrison, 'Practice makes imperfect: Reynolds' painting technique', *National Gallery Technical Bulletin: Joshua Reynolds in the National Gallery and the Wallace Collection* 35. London, Yale University Press, 2014, pp. 12–31; L. Davis and M. Hallet (eds), *Joshua Reynolds: Experiments in Paint*, London, The Wallace Collection, 2015; M. Kirby-Talley, '“All good pictures crack”: Sir Joshua Reynolds' practice and studio', in Penny 1986 (cited in note 20), pp. 55–70.
59. K. Mösl, 'Maltechnische Untersuchungen an ausgewählten Werken Anton Graffs', in Fehlmann and Verwiebe 2013 (cited in note 18), pp. 307–313.
60. E. Poulsen and K. Monrad, *Jens Juel, malerier i privat eje, Kunstforeningen 16.november til 12.december 1982*, Copenhagen, Kunstforeningen, 1982, p. 30; Poulsen 1991 (cited in note 4), p. 17; Christensen 1996 (cited in note 5), p. 68.
61. Slotsgaard 2014 (cited in note 3).
62. M. Stols-Witlox, 'Grounds, 1400–1900', in J.H. Stoner and R. Rushfield (eds), *Conservation of Easel Paintings*, New York, Routledge, 2012, pp. 161–188.
63. Filtenborg 2014 (cited in note 3).
64. P.O. Runge, *Hinterlassene Schriften, Herausgegeben von dessen ältesten Bruder Daniel Runge*, vol. II, Hamburg, Friedrich Perthes, 1840/41, p. 155. Letter from Philip Otto Runge to Johann Daniel Runge: 'Ich werde euch nächstens ein Päckel Pastellfarben für den Prof. Juel senden, das ihr wohl an ihn über Lübeck oder Kiel spedirt; er kann sie dort nicht haben, auch wird er wohl künftig von dem hiesigen Malertuch gebrauchen, das sehr gut ist', cited in V. Möckel and S. Castro, 'Zur Maltechnic Philip Otto Runges', in M. Bertsch and J. Howolt (eds), *Kosmos Runge: Das Hamburger Symposium*, Munich, Hirmer Verlag, 2013, pp. 89–115. Kindly indicated by Kristina Mösl, Head Conservator, Alte Nationalgalerie, Berlin.
65. P. Betthausen, *Philipp Otto Runge, Briefwechsel*, Leipzig, A.E.Seemann Verlag, 2010. Letter to Johann Wolfgang Goethe, 23 August 1801: 'Er hat indes itzt eine Manier, die Bilder herauszubringen, die, wie ich glaube, nicht zu recommendieren ist: er retouschiert sie fast von vorne an and bringt sie zum Teil heraus, man weiß selbst nicht wie, and man muß sich wundern, wie schön es doch zuletzt wird.'
66. J-B. Oudry, 'Discours sur la Pratique de la Peinture et ses Procédés Principeau: ébaucher, peindre à fond et retoucher', delivered to the Académie royale, 2 December 1752, Los Angeles, The Getty Conservation Institute, 2008, pp. 1–33.
67. Berckenhagen 1967 (cited in note 18), p. 20.

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SMUDGES, SPONGES AND 17TH-CENTURY DUTCH PAINTING

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ABSTRACT In line with growing scholarly attention currently being given to painters' tools, this paper examines a hitherto unstudied candidate: the sponge. Textured areas depicting moss and foliage in paintings by late 17th-century Dutch artists have led to the assumption that these were painted with a sponge or moss – without questioning the natural properties, availability, and both practical and conceptual connotations of such potential tools. This paper addresses those questions in order to determine more precisely if, and why, a sponge might have been used. From a wide variety of primary sources, two tentative patterns emerge: firstly, a substantial difference in the presence of sponges between Italy and the Netherlands due to their distinct geographies; secondly, an increase in the number of records and references referring to sponges in the Netherlands towards the end of the 17th century coinciding with a shift in their conceptual connotations. The sources support the hypothesis that the sponge could have been used as a painters' tool, although its apparent overall scarcity raises further questions as to the implications of such potential use.

Prologue: Protogenes' sponge

The 'scrupulously devoted' ancient Greek painter Protogenes, Pliny tells us in a famous passage from his *Natural History*, spent a particularly long time on a picture of the Rhodian hunter Ialysos and his dog. The painting would, eventually, be executed splendidly, 'as if it were of miracle, since chance, and not art alone, went to the painting of it'. A shared effort between art and chance because, when the artist could not satisfyingly and convincingly evoke the foam on the panting dog's mouth with any of his brushes, Protogenes threw a sponge at the locus of his frustration, serendipitously achieving what he previously could not:

Chafing with anxiety, for he aimed at absolute truth in his painting, and not a makeshift, he had wiped it out again and again, and changed his brush without finding any satisfaction. At last, enraged with the art which was too evident, he threw his sponge at the hateful spot, and the sponge left on the picture the colours it had wiped off, giving the exact effect he had intended, and chance thus became the mirror of nature.¹

Given Pliny's emphasis on the participation of fortune it is not surprising that modern scholarship usually invokes this passage when contemplating the interrelations between art and nature. But, we might wonder, what was Protogenes doing with a sponge in the first place?

Introduction: *Fettpresse*, moss or sponge?

Was the sponge – prehistoric animal and modern household staple – a common painters' tool? Its great potential can be imagined: it is soft and compressible when wet, able to both absorb and disperse liquids, and it can be handled in a variety of ways (dabbing, swiping, throwing etc.). It can be cleaned, it is durable, and it is easily manipulated or controlled by a practised hand. Its shape, size and surface can vary, and be altered, and it has an interestingly irregular internal structure. Depending on the amount of pressure exerted, its malleability allows it to not only follow the shape of the painting's support, but also that of the artist's hand, becoming an extension of it.

The sponge has been associated with the smudgy, textured paint surfaces found in a number of Dutch 17th-century paintings (Figs 1 and 2). Otto Marseus van Schrieck's (1614/20–1678) *sottoboschi*, depicting forest floors filled with creepy crawlies and fluttering butterflies, almost always incorporate impasto webs of pasty paint, heightening the illusion of a mossy environment. Very similar paint structures are seen in the works of some of his fellow artists including those of Melchior d'Hondecoeter (1636–1695) and Rachel Ruysch (1664–1750). Another, different, application of paint that recalls the texture of a sponge is found in the suggestion of foliage depicted by Jan van der Heyden (1637–1712). Noticing these smudgy surfaces and agreeing that it would have been impossible to paint them with a regular brush, conservators, scholars, and scientists over the years have



Fig. 1 (a) Otto Marseus van Schrieck, *Still Life with Thistle and Snake*, 1663, oil on canvas, 60.5 × 50.5 cm, Statens Museum for Kunst, Copenhagen, inv. no. KMSst276. (b) Melchior d'Hondecoeter, *The Menagerie*, c.1690, oil on canvas, 135 × 116.5 cm, Rijksmuseum, Amsterdam, inv. no. SK-A-173. (c) Jan van der Heyden, *View of a Pavilion at the Huis ten Bosch*, oil on panel, 22.1 × 29.5 cm. (Photo: Elke Walford © Hamburger Kunsthalle/bpk.)

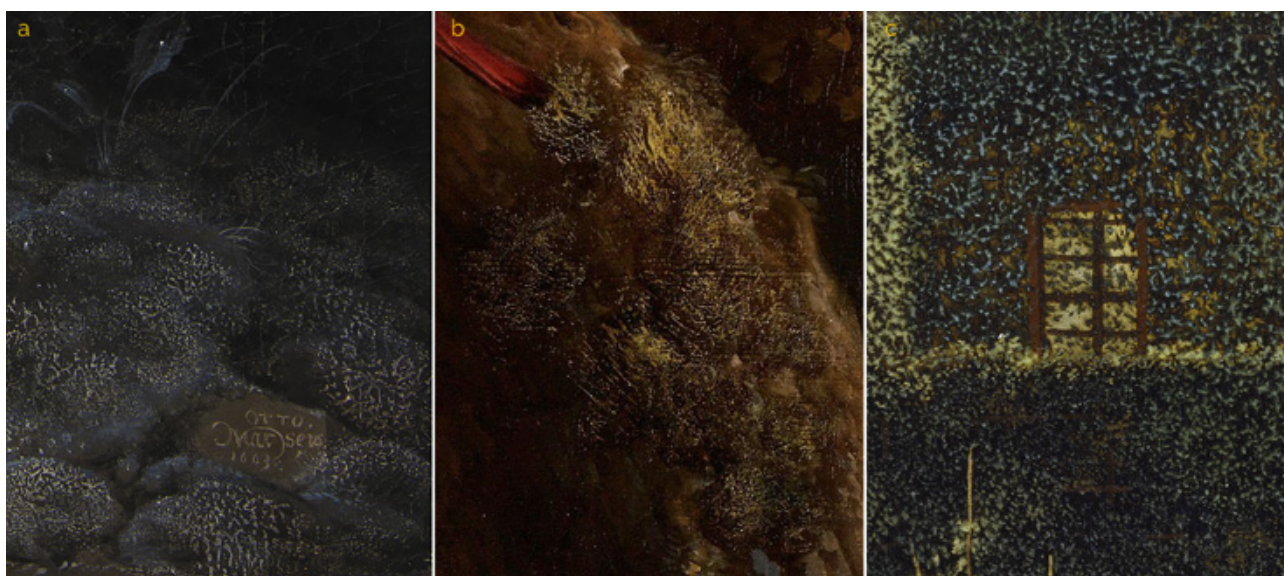


Fig. 2 Moss and foliage details from (a) Otto Marseus van Schrieck, *Still Life with Thistle and Snake*, (b) Melchior d'Hondecoeter, *The Menagerie* and (c) Jan van der Heyden, *View of a Pavilion at the Huis ten Bosch*.

commented on their making. The three main explanations put forward are that these artists worked with actual moss, a sponge or a method referred to as *Fettpresse*.

In 1987, Bodo Beier suspected that the German artist Johann Falch (1687–1727), employing a technique borrowed from Otto Marseus, created an illusion of moss by using lichen (of the genus *Cladonia*) to apply an ochre yellow paint over a dark blue layer.² Shortly thereafter, Gregor Weber argued that Marseus's follower Ruysch created moss effects not only by using actual moss, as Beier had argued, but by 'pressing a [flat] object coated with a coarse-grained paint against the canvas and then removing it: numerous small burrs of impasto colour are formed, which after drying are painted again, with a darker colour, and then wiped out again.'³

Susanna Steensma, in her 1999 dissertation on Otto Marseus, proposed a variation of that process, calling it *Fettpresse*:⁴ (1) over the ground layer, the designated area is covered with a dark blue, (2) a piece of paper, leaf or a cut potato is pressed onto the paint while it is still wet, (3) when

it is then pulled away it leaves behind the desired strands of viscous paint, (4) this process is repeated with yellow but on a separate surface which, finally, is pressed wet-in-wet against the blue layer, partially covering the darker paint with a similarly patterned lighter one, mixing into the desirable green. She dismissed the use of actual moss because it would produce a punctuated impression as only the outer parts of its three-dimensional structure would transfer paint onto the painting support.⁵

In the meantime, the sponge theory surfaced in Dutch art literature. Annelies van Loon, in her study of d'Hondecoeter, argued against Steensma's *Fettpresse* theory. Like Ruysch, d'Hondecoeter had painted a number of *sottoboschi* à la Otto Marseus before he settled on painting larger animals – but even in those works he continued to depict small patches of moss. Examining these areas with a stereomicroscope and analysing a cross-section, van Loon observed that on the dark brown ground there seemed to be only one pasty paint layer, in yellow, with a green glaze on top (Fig. 3).⁶ The alternative to



Fig. 3 (a) Melchior d'Hondecoeter, *A Pelican and other Birds near a Pool, Known as 'The Floating Feather'*, c.1680, oil on canvas, 159 × 144 cm, Rijksmuseum, Amsterdam, inv. no. SK-A-175, with cross-section R67/2 obtained by Arie Wallert, photographed and examined with light microscopy by Annelies van Loon (bottom left corner, 3.7 × 9.4 cm) seen in (b) dark field, ×500 magnification and (c) UV light, ×200 magnification.

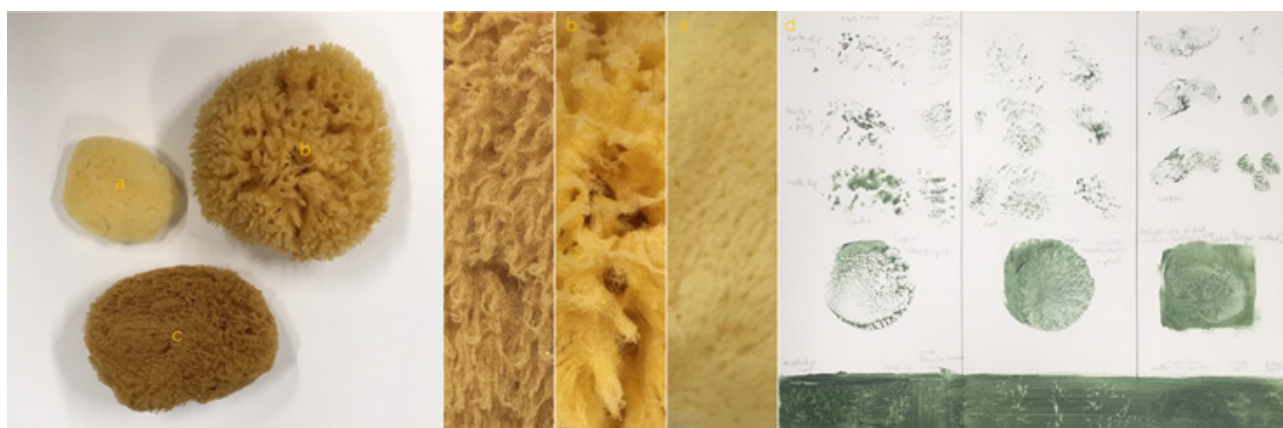


Fig. 4 The three sponges illustrated are assumed to be (a) *Spongia officinalis*, Mediterranean, (b) *Hippospongia lachne*, Florida, (c) *Hippospongia communis*, Mediterranean, (d) reconstruction results: a white paint was dabbed with the three types of natural bathing sponges, a glass muller and a paint mixture consisting of green earth and varying amounts of bleached, raw linseed oil.

the wet-in-wet *Fettpresse* method that she proposed was that the green moss was created by applying a yellow paint onto the ground layer with the aid of a stamping device such as a 'little sponge' (*sponsje*), which was then followed by the application of a green glaze.⁷ This glaze seems to have been applied only locally in order to achieve a versatile, lifelike effect.⁸

The moss/*Fettpresse*/sponge discussion is ongoing. Arie Wallert, in an article on Ruysch, stated that the artist had used a 'trick with sponges', and in an essay on the painting technique of Jan van der Heyden he hypothesised that the painter 'probably used a stamp in the form of a fine sponge

or, more likely, of lichen or moss'.⁹ Recently, in a 2017 exhibition catalogue devoted entirely to Otto Marseus, curator Gero Seelig, acknowledging the various theories, concluded that it was most likely 'that the artist roughened the still wet paint surface with moss or a sponge'.¹⁰

Interestingly, while most of these authors based their findings on hands-on experience with the materials and methods, they nevertheless arrived at conflicting conclusions. This is perhaps surprising, but not unfathomable, and the potential validity of both the sponge and the *Fettpresse* method was confirmed by a preliminary experiment using three different

types of sponges and a glass muller (Fig. 4). The results of that experiment justified further research by underscoring the practicality of the methods as well as the apparent relevance of the respective effects, simultaneously exposing the complexity of the issue.¹¹

The effects obtained with sponges and the glass muller, respectively, were varied enough to suggest that future, more encompassing technical analysis and reconstruction should be able to yield more definitive conclusions as to which of the aforementioned candidates (sponge, *Fettpresse* or lichen) were used by which artists. Such research should take into account not only the tools themselves, but also the properties and suitability of specific pigments and binders, and the role and build-up of the various layers. Some of the parameters for the creation of a smudgy moss-like surface can already be proposed. Van Loon, for instance, recently noted that lead-tin yellow – observed in the d'Hondecoeter cross-section – is often used by artists for highlights. It is relatively stiff and therefore an excellent choice for a painter seeking to create impasto effects.¹²

To accompany such technical analysis, this paper presents a study of the sponge's historical context, adding to our knowledge of the significance of a painter's choice of materials. The difference between the use of, for example, moss or a sponge, could be relevant for our understanding of their work: not only for pragmatic reasons – they look, feel and therefore work differently, and some species are native while others are not – but also because each tool would have had different connotations. Consequently, the choice to work with a sponge or moss has implications for our understanding of artists' attitudes towards their materials and tools, and their reasons for choosing them.

Weber, for instance, notes that Ruysch's choice of method resulted from her 'quest for the greatest fidelity to nature'.¹³ Furthermore, Eric Jorink suggested that the 'moss painted with moss' in Otto Marseus's work exposes a meaningful relationship between painting and tool.¹⁴ He built on Karin Leonhard's demonstration of that same artist's interest in juxtaposing in his paintings thesis and antithesis, poison and cure (e.g. depicting a snake alongside a Maria thistle, Fig. 1a), and his effort to paint 'rock with rock pigments; earth with earth, and herbs with herbal dyes'.¹⁵ This symbolic reading of the potential use of moss as a tool only holds true if indeed it was moss that was used, and not a sponge or the *Fettpresse* method (or something else). In order to be able to assess the significance of the use of a sponge, both practical and conceptual references are discussed below.

Leaving moss aside, for now, this paper will contextualise that other candidate – the sponge – which none of the abovementioned authors seem to have approached critically. Questions will be raised and partially answered on the availability of the sponge, its practical purposes and its conceptual connotations. A wide variety of written and visual source materials was consulted, often spanning slightly more than just the 17th century and the Netherlands: trade records, shop inventories, news articles, dictionaries, letters, recipe books, collectors' cabinets and numerous images of maids, artists' studios, kitchen scenes, school classes and still-lives. Surprisingly few mention or depict a sponge.

Two tentative patterns emerged from that source material. First, there seems to have been a substantial difference in sponge presence between Italy and the Netherlands and secondly, the number of records and references related to sponges in the Netherlands increased substantially towards the end of the 17th century and into the 18th, coinciding with a shift in its conceptual connotations.

Availability of bathing sponges

Having established the potential validity of the sponge theory, the first question should be whether sponges were available in the Netherlands during the 17th century and, if so, which kinds? Out of the over 7000 currently known sponge species, only some are considered useful for household purposes.¹⁶ It is that group of so-called 'bathing sponges' that are interesting in the context of art making, for the same reasons that make them useful in and around the house, but those species are not native to the Netherlands. The species that do grow in Dutch waters, such as *Ephydatia fluviatilis* (Fig. 5), belong to a different family, and are generally unsuitable for any practical use because they are too small and soft.¹⁷

The family of bathing sponges, too, consists of many different species, as the three tested varieties exemplify (Fig. 4a–c): the smaller one is probably a Mediterranean *Spongia officinalis*, the larger ones a *Hippospongia lachne* from Florida and a *Hippospongia communis*, also found in the Mediterranean.¹⁸ Each of their structures and textures are evidently different, which would result in distinct, somewhat characteristic patterns if used for painting.

Overseas trade and commerce

In Italy, close to one of the most important sources of bathing sponges (the Mediterranean Basin), the sponge regularly occurs in early modern written and visual sources. In the Netherlands, on the other hand, early 17th-century sources referring to sponges are very rare. One source that does locate sponges on the Amsterdam market in 1646 concerns the Venetian diplomat Domenico Condulmer, who was sent to the Netherlands from Munster where ambassador Contarini and his entourage were stationed for the peace negotiations leading up to the Treaty of 1648. Condulmer was asked by his colleagues to do some of their shopping while he was in the Netherlands. Among the hats, buttons, lacework, spurs, an atlas from Blaeu and a coach were sponges.¹⁹ Apparently, sponges of satisfactory quality could be bought in Amsterdam but not in Munster.

In the Amsterdam City Archives, only two 17th-century notarial records have been found that link Dutchmen to sponges, both of which concern small amounts present in Russia. One of these documents, possibly related to fur hunting, records 'some sponges' in a Dutch warehouse in Archangel in 1620; the other deals with the wares of a Dutch merchant in Moscow in 1646, listing sponges among saffron,



Fig. 5 A sponge species native to the Netherlands (*Ephydatia fluviatilis*) growing on a bike in the Schinkel river in Amsterdam, collected to be tested in future experiments. (Photo: Arie Pappot and Lisa Wiersma.)

anise oil and mother of pearl.²⁰ Despite efforts to locate 17th-century records concerning the import and wholesale of sponges to and in the Netherlands, these have yet to be found, if indeed they exist.²¹ Newspapers from the 18th century, however, do provide us with information on sponges in the Netherlands and where to buy them.²²

Sponges that made it to the Netherlands in the 17th century probably came from the Mediterranean. Although bathing sponges could also have been imported from elsewhere, its relative proximity, together with the long-established trade routes between the Netherlands and southern Europe, make this the most likely source for at least an important part of however many sponges found their way to the north. A late 17th-century French travel journal corroborates this. In a brief comment, the merchant Jean-Baptiste Tavernier names Athens as the centre of trade where sponges are to be found.²³

Commercial records from the 18th century are, again, more profuse. These documents confirm that the Levant – more specifically the ports of Smirna (current Izmir, Turkey) and Patras (Greece) – was an important, if not the most important, source of bathing sponges at that time. One such document is a 1734 tax regulation for all goods coming from Istanbul, listing ‘sponge’ in between stockings and ox hides. The tax value of these goods indicates that by then 100 sponges were comparable to 10 pairs of stockings or to one ox skin, suggesting that although they were not among the most valuable items, they were not the cheapest.²⁴ Presumably a purchaser would take good care of their sponge, ironically prolonging its lifetime.

While it is likely that further archival research will yield more evidence regarding the availability and use of sponges, at this point the increasingly rich documentation of sponges towards and throughout the 18th century suggests that demand for, and use of, sponges in northern Europe was growing.

Shopping for painters’ supplies

The same inference can be made when comparing shop inventories in the Netherlands. During the 17th century, some grocers started to specialise in painters’ materials, among them Crijn Hendricksz. Volmarijn in Rotterdam. The 56 pages of a 1648 inventory indicate that, although he still carried a typically varied stock of grocer’s goods, many of his products were geared towards artists. He sold panels, pigments, oils, brushes, and all kinds of other painters’ supplies, but not sponges.²⁵ Similarly, the 1677 inventory of Cornelis van Bolenbeeck’s shop in Dordrecht, which also specialised to some extent in artists’ materials, does not list sponges.²⁶

However, sponges are found among the goods of another, next generation, Rotterdam shop owner (Fig. 6). Abraham Lambertsz. van Bubbesson was even more specialised, selling nothing but painters’ materials. In the 1673 inventory of his shop, listed under ‘weighed commodities’ (*winkelwaaren gewogen*) and in between ‘36 jugs of oil’ and ‘two millstones’ we find ‘three quarters of a pound of sponge’ (*spongie*), which equals approximately 60 of the largest sponge illustrated in Fig. 4.²⁷ Their placement in the inventory, which seems to follow the shop’s organisation, does not reveal much about their use, although they were not listed among brushes or other tools used for painting. Most importantly, however, the inventory reveals that around 1673, Rotterdam artists would certainly have had easy access to sponges.

Interestingly, the date of Van Bubbesson’s inventory corresponds to the professional activity of most of the artists whose work has been associated with sponges: d’Hondecoeter, Van der Heyden and, slightly later, Ruysch, all of whom were active during the final quarter of the 17th century. Otto Marseus started earlier, but he had spent a significant amount of time in Italy.



Fig. 6 Pages 466–467 of the 1676 inventory of Van Bubbesson's shop, with 'drie vierde pond spongeje,' listed towards the bottom of the L/H page.



Fig. 7 Samuel van Hoogstraten, *Trompe l'Oeil Still-Life*, 1655, oil on canvas, 92.3 × 72.2 cm, Gemäldegalerie der Akademie der Bildenden Künste, Vienna, inv. no. GG-1406.

It can be deduced that sponges were certainly available to artists by at least the 1670s. However, the dearth of references to sponges in sources where we would have expected them – especially from the early 17th century – is significant, even if it does not prove an absence of sponges altogether. No matter how common a product the sponge may seem to us, since bathing sponges are not indigenous to the Netherlands they had to be imported, sold, moved and bought – and the more sponges that were available in the Netherlands, the more we would expect to find at least some records of these processes taking place. The increase of the occurrence of sponges in primary sources dating to the late 17th century/early 18th century, therefore, may be connected not only to an increase in the documentation of such processes but also to a wider availability of sponges as the century progressed. Perhaps more documents are waiting to be found, but in the meantime we should consider the possibility that the presence of sponges in the Netherlands during the early-to-mid-17th century was not a given, which raises further questions on the implications of the use of sponges by artists. In order to gain a better understanding of the implications it is necessary to know more about the contemporary connotations.

Practical connotations

Of course, sponges would have been suitable for a variety of practical purposes – of which painting may have been but



Fig. 8 Claes Jansz. Visscher, *Afkomst seyt niet*, in Roemer Visscher, *Sinnepoppen*, 1614, Rijksmuseum, Amsterdam, inv. no. BI-1893-3539-113.

one – but sources that document such use in the place and period under discussion are, again, scarce.

Hygiene

Samuel van Hoogstraten's 1655 *Trompe l'Oeil Still-Life*, now in the Gemäldegalerie der Akademie der Bildenden Künste in Vienna, presents an exceptionally rare, lifesize and life-like depiction of a sponge (Fig. 7). Hanging from a luxurious toothpick (or perhaps a toenail excavator?) stuck into the lower pocket of a gilt leather pouch, the preciously large sponge (probably a *Hippospongia communis*) appears among a gentleman's personal toiletries that include a brush, comb, mirror and towel.²⁸ This work visualises at least one of the sponge's associations, but the 'Dutch-ness' of this picture is debatable – it was painted in Vienna, for an Austrian audience, after the artist had spent some time in Italy.

It is not surprising that sponges were used in relation to personal hygiene. In the *Iliad*, Hephaistos used a sponge to make himself presentable: 'and with a sponge he wiped his face and both his hands, and his mighty neck and shaggy breast'.²⁹ As an object associated with hygiene, the sponge seems to have had a paradoxical reputation, as both an item of luxury – internationally sourced and used by diplomats and listed among exotic spices and ornamental materials in archival records³⁰ – and as a common tool that was used for 'vile and sordid tasks'.³¹ The travel journal of Cornelis de Bruyn (1698), too, suggests that sponges were used to scrub one's buttocks.³²

Several 17th-century Dutch sources underscore a discrepancy in the use of sponges between Italy and the Netherlands

by only mentioning sponges in an Italian context. So far, the only found (and barely) 17th-century Dutch newspaper item mentioning a sponge comes from a 1699 description of the treatment of a sick pope (Innocentius XII) in the Vatican, which required the twice daily dabbing of his affected skin with a sponge dipped in Hungary Water.³³ In January the next year the same newspaper reported on the Vatican's ceremony and procession welcoming in the new millennium, during which fragrant water was disseminated using 'twelve very large sponges'.³⁴

In an Italian image of a woman at her toilet, attributed to Francesco Villamena (1564–1624), she bleaches her hair with a small sponge on a stick.³⁵ In contrast, women at their toilet in related Dutch imagery usually hold a comb. Likewise, where Italian emblems draw on the audience's familiarity with sponges – as in, for instance, Andreae Alciato's *Quod non capit Christus, rapit fiscus* – Dutch emblems depict brushes and brooms front and centre. Roemer Visscher's illustration to the legend *Afkomst seyt niet*, or 'pedigree counts for nothing', has a humble brush represent burgher and Calvinist sympathies (Fig. 8). Jan Luyken's series *Het Leerzaam Huisraed* (The Tutelary Household), illustrating moral lessons via a variety of cleaning utensils and other household effects, puts to use all kinds of brushes, but no sponges.³⁶

Art making

Artists may have been secretive about some of their techniques, or uninterested in recording them, but there are nevertheless a variety of written sources that enlighten us as to their working methods, in addition to archival records

and material evidence presented by the objects themselves. For instance, we might expect to find references to sponges in early modern recipe books. But, whereas a southern French late 16th-century manuscript³⁷ contains at least 12 instances in which the use of a sponge is recorded or recommended – in roles varying from that of a sieve, separator, rubbing tool, liquid dispenser and liquid absorber – Dutch recipe books rarely refer to the tool, if at all.³⁸ It is not until Chomel's mid-18th-century household dictionary appears that readily available references are finally found to sponges as both a species and a tool. But, even then, sponges are often accompanied by potential substitutes, such as a piece of linen or wool.³⁹ It seems that for all of the sponge's purposes, other tools could have been equally suitable, and in the Netherlands, those would have been more easily and locally available. Protogenes, in Pliny's story, appears to have used the sponge as an eraser. For that purpose, too, other tools, such as a piece of cloth, could have been used.⁴⁰ many 17th-century Dutch images of artists' studios or painters at work illustrate the use of pieces of cloth rather than sponges.⁴¹

An Italian variation on Pliny's Protogenes anecdote is found in Leonardo da Vinci's treatises, when he cites Sandro Botticelli expressing his disinterest in landscape painting: 'Because by just throwing a sponge full of different colours at the wall, you leave a stain, in which you can see a beautiful landscape.'⁴² Perhaps in Italy where, besides oil painting, the much wetter fresco painting technique was commonly practised, sponges were not uncommon, but even then, this passage would have been understood primarily as a reference to Pliny's anecdote. It is noteworthy, however, that Pliny's account evolves around the collaboration between nature and art, whereas this 15th-century Italian variation turns the issue into a judgement of a painter's technical skill. In both cases, the sponge's irregular and malleable features are essential to the story, but the sponge itself is easily overlooked in favour of the larger issues at stake.

While the sponge anecdote was not the most famous story concerning Protogenes – an honour that goes to him competing with his colleague Apelles in painting the finest line – it did find its way into Dutch 17th-century art theoretical publications. In fact, the vast majority of references to a sponge in those treatises appear in retellings of this anecdote.⁴³ The most entertaining and elaborate passage on sponges appears in Van Hoogstraten's *Inleyding*, when he expresses a mild complaint on the lack of information provided by Pliny: 'We know of some [Greek painters], who used a sponge, to erase this or that mistake, but this gives us no certainty about the nature of their paint; since one can remove both oil paint and watercolour, and even gum-based paint if it is heated, with a sponge.'⁴⁴

It is interesting to note his certainty in stating that various types of paint can be removed with a sponge, and the casual addition of the necessity of heat, which suggests that he had hands-on experience. The passage also implies that Van Hoogstraten, in line with his contemporaries, had a greater interest in ancient paint composition rather than tools, which is nevertheless interesting to consider in relation

to the sponge-like textural effects that rely equally on paint composition.

Apart from erasing, at least one other function of the sponge in relation to painting is mentioned in an early modern Dutch source. In an intriguing letter, sent around 1652 by Willem van de Velde's agent to a potential Swedish buyer, Le Blon describes Van de Velde's unusually large drawings, or pen paintings: 'white canvases or panels which are prepared such that they can be hung in the rain and the wind, and can be washed with a sponge, just like oil paintings.'⁴⁵ Apparently, a distinctive property of paintings, as opposed to drawings, was that their binding medium, oil and their varnish allowed for them to be 'washed'.

It is unclear what exactly this 'washing,' referred to by Van de Velde and his agent, entailed. It could mean that, prior to the application of a varnish, a work was cleaned with 'a sponge wet with water,' as William Salmon advises in relation to the restoration of oil paintings (which should be done 'but seldom'). Or, it could refer to the application of a varnish, as in an anonymous Dutch notebook from c.1620, which provides instructions 'to make a varnish with which one can make paintings beautiful.'⁴⁶ But, again, such 17th-century examples of recipes that refer explicitly to the use of sponges seem to be an exception. Furthermore, in our interpretation of such recipes, we should also take into account that these were often copied from other sources and therefore may not always reflect local customs.

If artists used sponges, we could perhaps expect to find them in their estate inventories. But among the belongings of some obvious suspects, such as Otto Marseus and Van der Heyden, no sponges are listed.⁴⁷ And although Rembrandt (1606–1669) is known to have had a collection of indigenous props and naturalia, his 1656 inventory of insolvency makes no mention of any sponge.⁴⁸ The artist did depict a sponge in a basin in one of his renderings of the *Toilet of Bathsheba*, now at the Metropolitan Museum of Art in New York, but its biblical context and indistinct shape reveal little about contemporary Dutch practice or his personal familiarity with the object.⁴⁹

Sponge imagery

It might be expected that images of sponges would provide further enlightenment on their presence and use, but actual depictions of sponges in 17th-century Dutch art are surprisingly rare, not only in prints but also in paintings – Rembrandt's *Bathsheba* and Van Hoogstraten's Viennese painting are exceptions.⁵⁰ Sponges do not appear in artists' studio pictures or in the many paintings of maids cleaning their pots (whatever tool they may have used is obscured in their closed fists). Children may have used slates and sponges in school, but if they did these are not depicted. In northern Christian imagery, Mary Magdalene occasionally used her hair to rub Christ's feet, whereas Christ himself needed nothing but his hands to wash his disciples' extremities.

The small sponge used by a servant to wash a woman's feet in a work by Johannes Voorhout (1647–1717) is a very late



Fig. 9 (a) Abraham Bloemaert, *The Lamentation of Christ*, black chalk, pen in brown, brown wash, heightened with white, squared in black chalk, 231 × 378 mm, Museum Boijmans Van Beuningen, Rotterdam, inv. no. MB 2001/T1 (PK). (b) Abraham Bloemaert, *The Lamentation of Christ*, c.1625, oil on canvas, 170 × 127 cm, Museum Boijmans Van Beuningen, Rotterdam, inv. no. 2062 (OK): detail of the sponge and bowl.

17th-century example.⁵¹ The few earlier known occasions on which a bathing sponge is recognisably depicted are found in religious images including or relating to the Arma Christi or, interestingly, in the occasional illustration of an anatomy lesson. In these images, as will be seen, the sponges seem to be present primarily for their conceptual connotations even if they are being put to practical use (Figs 9–11).

Conceptual connotations

If the physical presence of sponges in the Netherlands during the early 17th century is debatable, their conceptual presence certainly is not: relatively speaking, there are many sources in which the sponge, or one of its properties, is used to refer to something else.

Analogies

René Descartes, for instance, seems to have been a fan of sponge analogies. One of his many letters, dated 1638, beautifully demonstrates how the sponge could be called upon to function in an analogy. In a comment on light passing through air, he philosophises on the metonymic relationship between air and subtle matter, equating it with that between water and a sponge: ‘when we say that someone wets their hair with a sponge, or that they wash themselves with a towel, we hear about the liquid with which this towel or sponge was wetted, and not their actual material, form, or substance.’⁵² Another quality of sponges that Descartes happily utilised was their clearly visible porosity and their demonstrable ability to increase and decrease the size of those pores upon absorbing or releasing water: ‘for there is nothing, it seems to me, more easy to conceive than the way a sponge expands in the water, and tightens when drying.’⁵³

The ways in which Descartes refers to sponges in his letters are typical of the bulk of sponge references and recall its connotations in antiquity: their practical use; the debate as to whether they are plants or animals, or a combination thereof; the mystery of their pores and things within; their usefulness in similes based on their porosity, elasticity or compressibility. Apparently it is not only air that resembles the sponge: so does, for example, a human spleen. The question remains as to whether it would have been necessary to have seen or handled sponges in order to speak of, or understand, such metaphors.

Religion

There is no question that most people in the Netherlands would have been familiar with the sponge given its presence in religious texts and imagery as one of the Arma Christi. In northern images of the Lamentation (Fig. 9) the sponge acquired a dual role: practical as an aid with which to tend to Christ’s wounds, but simultaneously and more importantly, as one of the Arma Christi, scattered along the foreground. Furthermore, the sponge’s added practical function allowed for the incorporation of a bowl (not a part of the Arma Christi), solving what could have been a painter’s dilemma presented by the potentially indistinct appearance of a sponge: how to distinguish its lumpy brownish shape from that of a stone?

Science

Strikingly similar to the sponge-and-bowl combination in Abraham Bloemaert’s (1566–1651) *Lamentation* is that found in *Anatomy Lesson of Dr. Willem van der Meer* (Fig. 10) by Michiel Jansz. van Mierevelt (1566–1641) and Pieter van Mierevelt (1596–1623). At first, and in combination with the bowl of water and its proximity to the



Fig. 10 Michiel Jansz. van Mierevelt and Pieter van Mierevelt, *Anatomy Lesson of Dr. Willem van der Meer*, 1617, oil on canvas, 144 × 198 cm, Museum Prinsenhof Delft, PDS 275.



Fig. 11 Cornelis de Man, *Anatomy Lesson of Dr. Cornelis's Gravensande*, 1681, oil on canvas, 173 × 212 cm, Museum Prinsenhof Delft, inv. no. PDS 276.

exposed organs, this sponge seems to have had a practical role during the dissection, but the correlation between this image and the bowls with sponges seen in Lamentation scenes suggests that perhaps there was also a symbolic connotation, exposing early modern ties between medicine and religion.

Some 65 years after the *Anatomy Lesson of Dr. Willem van der Meer*, Cornelis de Man (1621–1706) portrayed the next generation of medical practitioners in Delft in the *Anatomy Lesson of Dr. Cornelis's Gravensande* (Fig. 11). A sponge is held prominently by Johan de Geus in the centre of the composition. Its practical function is not as clear: no bowl, no water, no blood stains, and no proximity to the opened chest. Perhaps the sponge's significance is, in this case, scientific rather than pragmatic. The spleen had been the subject of dissections, as indicated in a letter from Antonie van Leeuwenhoek⁵⁴ (who is portrayed on the surgeon's left), and ever since at least Hippocrates the organ had been described as having a 'spongy and porous texture'.⁵⁵



Fig. 12 Antonie van Leeuwenhoek (with anonymous draughtsman), *Observations on Pumice Stone, Coral, and Sponge*, 1705, The Royal Society, London, inv. no. EL/L3/85.

Furthermore, the spleen is located in the chest, behind the left lung, at just about the same place as is indicated by both's Gravesande's left hand and the scalpel in his right. Even the way in which De Geus handles it seems to suggest a hands-on study of its soft and malleable consistency (and, had it been a spleen, its alarming size).

If De Man's *Anatomy Lesson* is supposed to evoke medical discussion and discovery concerning the spleen, the sponge is surely meant to be a reference to its substance, which would have been recognisable to a learned audience. Building on the *Anatomy Lesson* by Michiel Jansz. and Pieter van Mierevelt, which De Man certainly knew well, the isolation of the sponge, separated from its bowl, may signal a shift in connotations, foregrounding the scientific instead of the practical and religious.

In another letter from Van Leeuwenhoek – who was frequently asked to report on his microscopic observations – the sponge and sponge stone (pumice) were discussed and described, accompanied by a red chalk drawing (Fig. 12).⁵⁶ The sketch labelled 'fig. 6' records his microscopic analysis of the beehive-like structure that is typical of bathing sponges.⁵⁷ In the letter Van Leeuwenhoek himself proves to be most interested in the growth of sponges, attempting to explain how bits of shell, stone and coral came to be irrevocably trapped inside them. But the letter also provides us with some interesting information on the acquisition and origin of sponges.



Fig. 13 (a) Jan van Vianen after Romeyn de Hooghe, Frontispiece to Levinus Vincent, *‘Wondertooneel der Nature’*, 1706, engraving and etching, 212 × 146 mm, Rijksmuseum, Amsterdam, inv. no. RP-P-OB-15.661, perhaps including, among other things, the collector’s ‘Cabinet met veelerley keurlyke Zee-Boompjes, Hesters, Coral, Spons en Steengewassen, alle op Voetjes.’ (b) Illustration of sponges in the collection of Albertus Seba, published in his *Thesaurus*, 1734–65, vol. 3, 490, pl. 95. (Photo courtesy of the Smithsonian Libraries.)

According to Van Leeuwenhoek, he obtained the sponges from ‘two shops, where they sell sponges’ and from ‘those who sell sponges’; he also ‘spoke with a colour salesman’ (*veruwverkoop*) who sold pumice stones. Perhaps one of these shops resembled that of Van Bubbesson in Rotterdam, or possibly Van Leeuwenhoek purchased the sponges from an apothecary – apothecaries played an important role in the dissemination of not only medical accoutrements, but also a variety of curiosities.

Van Leeuwenhoek wonders whether at least one of the sponges he examined had come from the Mediterranean because of the piece of coral trapped within it, which suggests that both he and his contemporaries knew more about coral than sponges. Coral was in high demand as a European commodity for the export market and was equally interesting to artisans.⁵⁸ It was popular among collectors of *naturalia* for its natural and encyclopaedic, foreign and alchemical connotations. Coral and sponges are often linked, so it is not surprising that if a collector showed an interest in sponges, they were found close to each other. The famous cabinets of Levinus Vincent and Albertus Seba present two prominent Dutch examples that certainly included sponge species (Fig. 13), but those are from the 18th century.⁵⁹

during the early decades may not have been as palpable. Consequently, artists’ use of sponges is less self-evident than has often been assumed, and although, by the 1670s painters such as Otto Marseus and Van der Heyden would have had access to them, we must wonder whether the apparent scarcity of sponges affected their work.

The practical connotations of a sponge have remained largely the same since antiquity, but for all such purposes other tools may have been just as suitable and in the Netherlands more readily available. Conceptual connotations, on the other hand, seem to have shifted. But whether such issues affected artists in their work remains to be determined. The materials presented in this article will hopefully provide inspiration and a foundation for our interpretation of the textured, smudgy areas found in some artists’ works. Future reconstructions and technical analysis will have to determine whether the effects achieved with various kinds of sponges are indeed similar to those found in the works of artists such as Otto Marseus and Van der Heyden. If so, this seems to have been a purposeful and unusual choice, so we can further hypothesise about their individual reasons for choosing a sponge.

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Conclusions

Based on the source materials presented in this paper – relatively scarce, yet rich and varied – we can tentatively conclude that while the phenomenon and physical properties of sponges were certainly known throughout the 17th century, their physical presence in the Netherlands

Notes

1. Pliny the Elder, *The Elder Pliny's Chapters on the History of Art*, K. Jex-Blake (tr.) and E. Sellers (ed.), London, Macmillan, 1896, pp. 137–139. Pliny adds that the painter Nealces, likewise, threw a sponge at his depiction of a horse's mouth.
2. B. Beier, "Contre-Épreuves" in der barocken Stillebenmalerei', *Maltechnik Restauro* 1, 1987, pp. 35–39.
3. Translated from German by the author; G.J.M. Weber, *Stilleben alter Meister in der Kasseler Gemäldegalerie Staatliche Kunstsammlungen Kassel*, Melsungen, Verlag Gutenberg Melsungen, 1989, pp. 35–36 and cat. no. 31; G.J.M. Weber, 'Stilles Leben am Erdboden', *Kunst und Antiquitäten* 1(2), 1993, pp. 24–29.
4. She derived this term from *Fettdruck* used in chaos theory to describe a natural mechanism by which a dendritic structure is formed: S. Steensma, *Otto Marseus van Schrieck. Leben und Werk*, Hildesheim/Zurich/New York, Georg Olms Verlag, 1999, pp. 71–75, pl. 6–7.
5. She based this observation on experiments ('Der Versuch ergibt ...'), but she does not explain (either in text or imagery) what such experiments consisted of: Steensma 1999 (cited in note 4), p. 71.
6. A. van Loon, 'Melchior de Hondecoeter (1636–1694) en "Het drijvend veertje"', unpublished thesis, 2000, pp. 21–24, figs 3.17–3.23. She rightfully draws connections between d'Hondecoeter and the circle of Otto Marseus, which also included Rachel Ruysch and Willem van Aelst. I would like to thank Annelies van Loon for allowing access to her unpublished work and for re-examining the cross-section with me, confirming her previous observations (7 June 2018, Rijksmuseum, Amsterdam). The layers, visible and marked in Fig. 3, are respectively (1) a relatively dark brown ground; (2) a very thin brown layer on top of it; (3) a light, impasto yellow layer, probably lead-tin yellow, with some blue verditer and possibly also other green particles mixed in; (4) a relatively even green glaze. The third, yellow layer is the one that seems to provide the texture and the top two layers have not mixed.
7. Van Loon 2000 (cited in note 6), pp. 47–48.
8. Annelies van Loon, personal communication, 7 June 2018.
9. M. van Eikema Hommes and A. Wallert, 'Een evenwichtige wemeling: Over de schildertechniek van Rachel Ruysch', *Kunstschrift* 44(1), 2000, pp. 39–44; A. Wallert, 'Refined techniques or special tricks?', in P.C. Sutton (ed.), *Jan van der Heyden (1637–1712)*, New Haven and London, Yale University Press, 2006, p. 98.
10. Translated from German by the author. Seelig based his remark on information provided by the conservator Jakob Wedemeyer: G. Seelig, 'Otto Marseus van Schrieck: Spiegelungen von Kunst, Natur und Wissenschaft', in G. Seelig (ed.), *Die Menagerie der Medusa: Otto Marseus van Schrieck und die Gelehrten*, Munich, Hirmer, 2017, p. 22.
11. The top three rows in the image (Fig. 4d) contain the results of working with the various sponges (left to right) and varying wetness of the paint (top to bottom). Below are the results obtained with a glass muller and, at the bottom, the effect achieved when pressing a sponge into previously applied wet paint. The results obtained from working with the various sponges were closer to the foliage-like patterns seen in the work of Van der Heyden than those of moss found in the paintings of Otto Marseus. On the other hand, the results from a technique similar to the *Fettpresse* method – using the muller as a stamp – yielded burrs reminiscent of the latter. The sponges, which were soft and malleable once wetted with water or oil, were certainly easy to work with and proved practical for the purpose of quickly covering a relatively large area with a pattern of paint and, depending on the shape and size of the sponge and the artist's skill, potentially precisely. However, the stiffness of the glass muller's surface – a key factor for this type of paint application – required a very different handling. I would like to thank Lisa Wiersma for her contributions and valuable insights during these experiments. We have not yet tried our hand at lichen. For the identification of the sponges see note 18.
12. Annelies van Loon, personal communication, 7 June 2018. The relevance of the stiffness for our understanding of Van der Heyden's suggestion of foliage with discrete, irregular blob-like specks of paint was further stressed by one of the anonymous reviewers of this paper.
13. Weber 1989 (cited in note 3), pp. 35–36.
14. Similarly, and famously, Otto Marseus used real butterfly wings in his paintings: E. Jorink, 'Snakes, fungi and insects: Otto Marseus van Schrieck, Johannes Swammerdam and the theory of spontaneous generation', in K.A.E. Enenkel and P.J. Smith (eds), *Zoology in Early Modern Culture: Intersections of Science, Theology, Philology, and Political and Religious Education*, Leiden, Brill, 2014, pp. 197–234.
15. K. Leonhard, 'Painted poison: venomous beasts, herbs, gems, and baroque colour theory', *Nederlands Kunsthistorisch Jaarboek* 61, 2011, pp. 116–147.
16. J.N.A. Hooper and R.W.M. van Soest, 'Systema Porifera: a guide to the classification of sponges', in J.N.A. Hooper and R.W.M. van Soest (eds), *Systema Porifera: A Guide to the Classification of Sponges*, New York, Springer, 2002, pp. 1–7.
17. The species visible in Fig. 5 were identified based on these photos by Rob van Soest, personal communication, 18 June 2018.
18. Rob van Soest, personal communication, 18 June 2018. The small sponge could also be a *Spongia obliqua* as the two species are difficult to distinguish visually. Based on visual appearance alone, these identifications of the three sponges are tentative.
19. Cited in P.C.A. Geyl, 'Troepen lichten en schepen huren in de dagen van Frederik Hendrik', *Bijdragen voor Vaderlandsche Geschiedenis en Oudheidkunde* 5th series 5, 1918, p. 200.
20. Stadsarchief Amsterdam (SAA), Notarieel Archief (NA), Nots. P. Capoen, no. 1573, f. 659, and SAA, NA, Nots. F. van Banchem, no. 284/259, 12 May 1620. These are the only appearances of 'sponges' in SAA 30452, Archief van S. Hart: (gedeeltelijke) toegang op de notariële archieven.
21. I would like to thank Maarten Prak, Maartje van Gelder, Clé Lesger and Daniel Koster – experts in the field of 17th-century trade and commerce in the Netherlands – for checking their notes and for their advice and suggestions. I relied primarily on their knowledge and data, as well as digitised archival sources accessible online. While this exploration of archival materials was by no means exhaustive, its results do seem to be indicative and realistic.
22. A series of mid- and late 18th-century advertisements in the *Leydsche Courant* announced the auctioning of sponges in, for instance, a tavern in Amsterdam, together with goods such as liquorice (*drop*), green earth and drugs: 'Advertentie', *Leydse courant te Leyden*, 7 November 1746: <https://www.delpher.nl/> (accessed 18 June 2018). The sponges in this advertisement were defined as 'large and fine', revealing how they were judged for purpose and/or quality.
23. 'The Commodities which Foreigners export from thence, are, Silks, Wool, Sponges, Wax, Cordivan-Leather, and Cheese': J. Tavernier, *The Six Voyages of John Baptista Tavernier ...*, London, 1677, p. 122.
24. J.G. Nanninga, *Bronnen tot de geschiedenis van den Levantschen Handel. Derde deel: 1727–1765*, The Hague, Martinus Nijhoff, 1952, pp. 56–59, doc. 55. While in this list the sponges are

- counted per piece (or, actually, a thousand pieces), others deal with them by weight or volume: see *op. cit.* p. 790 and J.G. Nanninga, *Bronnen tot de geschiedenis van den Levantschen Handel. Vierde deel: 1765–1826*, The Hague: Martinus Nijhoff, 1964, pp. 224–225, 999, 1357, 1442–1443.
25. Stadsarchief Rotterdam (SAR), Weeskamerarchief (WK), 16_430, ff. 348–405. See also J. Levy-van Halm, 'Productie en distributie van verfwaren in Nederland in de 17e eeuw', unpublished thesis, University of Amsterdam, 1983; X. Henny, 'Hoe kwamen de Rotterdamse schilders aan hun verf? 't Hemelrijck, leverancier van schildersbenodigdheden', in N. Schadee (ed.), *Rotterdamse meesters uit de Gouden Eeuw*, exh. cat. Rotterdam, Historisch Museum, 1994, pp. 43–53; J. Kirby, 'The painter's trade in the seventeenth century: theory and practice', *National Gallery Technical Bulletin* 20, 1999, pp. 5–49. The sponge is not listed in the index to J. Cannon, J. Kirby and S. Nash (eds), *Trade in Artists' Materials: Markets and Commerce in Europe to 1700*, London, Archetype Publications, 2010.
 26. Gemeente Archief Dordrecht (GAD), ONA_20_224, ff. 71r–128r.
 27. SAR, WK, 16_461 (cited in note 25), pp. 442–483. Unfortunately, no value was given in the inventory. I would like to thank Arie Wallert for bringing this inventory to my attention.
 28. I would like to thank Rob van Soest for confirming this identification of the sponge species (personal communication, 24 October 2018).
 29. Homer, *Iliad, Volume II: Books 13–24*, book 18, A.T. Murray (tr.) and W.F. Wyatt (rev.), Loeb Classical Library 171, Cambridge MA, Harvard University Press, 1925, pp. 316–317; E. Voultziadou, 'Sponges: an historical survey of their knowledge in Greek antiquity', *Journal of the Marine Biological Association of the United Kingdom* 87, 2007, p. 1760.
 30. See also a record of goods imported into London on *The Hercules* (1588), carrying goods that included cotton, wool and yarn, various types of spices, nuts, etc., but also luxury goods such as porcelain and mirrors. '1 Bag sponges' is listed in between '13 Turkish carpets' and '1 box of china', suggesting, like their amount, that the objects were classified among the luxury goods: cited in T.S. Willan, 'Some aspects of English trade with the Levant in the sixteenth century', *The English Historical Review* 70(276), 1955, pp. 408–409.
 31. R. Hooke, *Micrographia: Some Physiological Descriptions of Minute Bodies Made by Magnifying Glasses with Observations and Inquiries Thereupon*, London, 1665, pp. 487–501.
 32. C. de Bruyn, *Reizen van Cornelis de Bruyn door de vermaardste deelen van Klein Asia ...*, Delft, Krooneveld, 1698, p. 93.
 33. 'Italien', *Oprechte Haerlemsche courant*, 14 May 1699: <https://www.delpher.nl/> (accessed 17 June 2018). It is possible that more material on sponges can be found in newspaper advertisements and articles, given that the database is neither complete nor completely searchable at this point.
 34. 'Italien', *Oprechte Haerlemsche courant*, 16 January 1700: <https://www.delpher.nl/> (accessed 17 June 2018).
 35. Rijksprentenkabinet, Amsterdam, inv. no. Rp-P-H-H-770.
 36. It is surprising that in the widely read and frequently reprinted 18th-century Dutch household manual *The Experienced and Knowledgeable Dutch Householder*, the usefulness of sponges is not mentioned.
 37. BnF Ms Fr 640, studied in the course of the 'Making and Knowing' project under the direction of Prof. Pamela H. Smith.
 38. A rare, nearly identical, example concerning the preparation of paper is given by W. Goeree, *Verlichterie-kunde, of recht gebruyck der water-verwen*, Middelburg, Wilhelmus Goeree, 1670, p. 35 and Simon Witgeest (possibly a pseudonym of Wilhelmus Goeree), *Het verbeterd en vermeerderd natuurlyk toover-boek. Of 't nieuw speel-toneel der konsten*, Amsterdam, Jan ten Hoorn, 1698, pp. 352–353. Additionally, in W. Goeree, *Inleydinge tot de Al-ghemeene Teycken-Konst*, Middelburg, Wilhelmus Goeree, 1670, p. 84, the same author recommends using a sponge to prepare coloured paper, covering the entire surface with a mixture of water and soot, ink or a different colour. Another such singular example is found in a 16th-century Dutch recipe book by S. Andriessen, *Een schoon tractaet van sommige werckingen der Alchemische dinghen ...*, Rees, Derick Wylicx van Santen, 1581, f. xxiiiir.
 39. M. Noel Chomel, *Huishoudelyk woordboek, vervattende vele middelen om zyn goed te vermeerderen, en zyne gezondheid te behouden*, Leiden and Amsterdam, 1743.
 40. How to erase was rarely a topic of discussion in painters' 'How to' books. In a passage on drawing from the 1643 publication of J. Bate's *The Mysteries of Nature and Art*, London, 1643, pp. 107–108, white breadcrumbs are recommended to correct mistakes in a chalk drawing. Easy to obtain, cheap and available in various aerated textures, bread could actually be another interesting candidate to consider as a painting tool in order to achieve a moss-like effect.
 41. I would like to thank Katja Kleinert for confirming that sponges are not found in Dutch studio pictures. A beautiful example of a painter's cloth is seen in Judith Leyster's *Self-Portrait* at the National Gallery of Art in Washington DC (inv. no. 1949.6.1).
 42. Cited from S. Pierguidi, 'Botticelli and Protogenes: an anecdote from Pliny's *Naturalis Historia*', *Source: Notes in the History of Art* 21(3), 2002, pp. 15–18; Leonardo da Vinci, *Libro di Pittura: Codex Urbinat lat. 1270 in the Apostolic Vatican Library*, C. Predetti (ed.) (2 vols), vol. I, Florence, Giunti, 1995, p. 174.
 43. Karel van Mander (1604) mentions the sponge in his retelling of Pliny's accounts of Protogenes and Nealces, and in two anecdotes on contemporary artists working in Italy; Samuel van Hoogstraten (1678) only mentions sponges in relation to antiquity; Johan de Brune (1644) refers to Protogenes. I have not found sponges in Cornelis Biens (1636), Willem Goeree (1697), Willem Beurs (1692) or Houbraken (1718–21).
 44. S. van Hoogstraten, *Inleyding tot de hooge schoole der schilderkonst: anders de zichtbaere werelt*, Rotterdam, Francois van Hoogstraeten, 1678, p. 331.
 45. Le Blon, letter sent to Carl Gustav Wrangel, undated but folded into a letter from the same, dated 10/20 February 1652, Riksarkivet Stockholm (RS), Skokloster Samlingen (SS), vol. E8401. Van de Velde himself repeated this characteristic of his work in another letter, without mentioning a cleaning utensil: see Willem van de Velde the Elder to Carl Gustav Wrangel, RS_SS_vol.E8401.
 46. W. Salmon, *Polygraphice: or the Arts of Drawing, Engraving, Etching, Limning, Painting*, London, 1685, p. 192; Anon. [Notebook], c.1620, in Het Utrechts Archief, Archief Des Tombe, inv. no. 1070. I would like to thank Maartje Stols-Witlox for bringing these sources to my attention.
 47. SAA, NA, Nots. C. van Poelenburgh, no. 3440A, 1678, ff. 207–217 and SAA, NA, Nots. Joh. Backer, no. 4669, 1712, ff. 175–193.
 48. Rembrandt's estate inventory does list a group of unspecified sea animals and, on the next page, 'seegewassen' among his collection of curiosities (ff. 33r, 33v), SAA, Desolate Boedelkamer, no. 364, 25–26 July 1656, ff. 29r–38v.
 49. Again, the feet of bathing biblical women (such as Bathsheba and Susanna) in Dutch painting are more often tended using a white cloth instead of a sponge.
 50. If the sponge is hanging from a toenail excavator, it may be interesting to note that the sponges in both Rembrandt's and Van Hoogstraten's works are associated with foot hygiene. In this context see the scene depicting a Charlatan by Jan Victors (in the Musée des Beaux Arts in Budapest, inv. no. 1331), where

the protagonist is tending to a bloody foot with what may be a sponge on the table behind him. Another singular example of a depicted sponge is found in a surgical scene by Egbert I van Heemskerck (1634/35–1704) in the Museum voor Schone Kunsten in Ghent, dated c.1670 (inv. no. 1953-L). This depiction could corroborate the hypothesis that by around 1670 sponges had become more easily available with their association with medical practices, discussed below. I would like to thank Isabella Lores-Chavez for bringing both the Rembrandt and the Van Heemskerck to my attention.

51. Johannes Voorhout, *A Lady in an Interior*, undated (The Cobbe Collection, CC16). I would like to thank Gregor Weber for bringing this source to my attention.
52. Letter from René Descartes to Jean-Baptiste Morin, 13 July 1638. Other letters in which this (or a closely related) analogy is used are two directed at Marin Mersenne, dated 25 February 1630 and (especially) 11 October 1638. See also Descartes to Marin Mersenne, 3 May 1632, and Descartes to William Cavendish, dated 23 November 1646: <http://ckcc.huygens.knaw.nl/epistolarium> (accessed 16 June 2018).
53. Descartes to Denis Mesland, May 1645: <http://ckcc.huygens.knaw.nl/epistolarium> (accessed 16 June 2018).
54. Antoni van Leeuwenhoek, letter from 1 June 1706: <http://ckcc.huygens.knaw.nl/epistolarium> (accessed 16 June 2018).
55. In addition to the spleen, Hippocrates also compares the lungs and breasts to the sponge: Hippocrates, *Ancient Medicine. Airs, Waters, Places. Epidemics 1 and 3. The Oath. Precepts. Nutriment*, W.H.S. Jones (tr.), Loeb Classical Library 147, Cambridge MA, Harvard University Press, 1923, pp. 58–59. See also Voultsiadou 2007 (cited in note 29), p. 1762.
56. Van Leeuwenhoek to the Royal Society, London, 29 December 1705: <http://ckcc.huygens.knaw.nl/epistolarium/> (accessed 16 June 2018).
57. Rob van Soest, personal communication, 18 June 2018. I would like to thank Marlise Rijks for bringing this letter to my attention. See also the microscopic image of a sponge published in R. Hooke, *Micrographia: or Some Physiological Descriptions of Minute Bodies Made by Magnifying Glasses with Observations and Inquiries Thereupon*, London, The Royal Society, 1665, sch. IX.
58. M. Rijks, “‘Unusual excrescences of nature’: collected coral and the study of petrified luxury in early modern Antwerp,” in *Dutch Crossings: Journal of the Low Countries Studies*, 41, 2017, pp. 1–29.
59. Unfortunately, we do not know whether Hendrik d’Acquet, depicted in the bottom right corner of De Man’s group portrait, also had sponges in his well-known collection.

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FOUND IN TRANSLATION: EXPLORING DUTCH INFLUENCE ON 18TH-CENTURY BRITISH LANDSCAPE PAINTING

Kari S. Rayner

ABSTRACT The onset of the industrial revolution, the explosion in international trade and increased migration between European countries had profound effects on artistic production in 18th-century Great Britain. The tangential rise of artists' colourmen during this time period, particularly in London, is widely recognised to have resulted in artists' increased reliance on pre-prepared materials. The nascent genre of British landscape painting was particularly impacted by continental influence and by these economic phenomena. This paper explores how three British painters adopted 17th-century Dutch landscape pictorial conventions and painting technique yet adapted them for locally available materials and personal preferences. Thomas Gainsborough's efforts to recreate certain aesthetic effects are examined through the lens of the author's technical analysis and reconstruction of his *Peasant and Donkeys*. Other early paintings by Gainsborough, as well as examples of relevant works by lesser-known English painters George Morland and Samuel Scott, were also examined and are discussed. Although emulating Dutch artworks, these artists generally utilised slightly different materials and processes, and in translation, the resulting paintings gained a distinctive essence.

Introduction

Thomas Gainsborough's (1727–1788) admiration for 17th-century Dutch landscape painters is well established in art-historical scholarship.¹ Gainsborough frequently chose to make iconographical and stylistic references to Dutch landscape painting, especially in his work from the 1750s, when he was living in Ipswich and studying the British countryside. Note, for example, the artist's emphasis on naturalistic detail, focus on rural peasant life and his imitation of characteristic Dutch compositional devices in *Old Peasant and Donkeys outside a Barn*, *Ploughshare and Distant Church* from c.1755 (Fig. 1).

A reconstruction of *Peasant and Donkeys* (Fig. 2) created by the author at the Hamilton Kerr Institute, University of Cambridge in 2016 and examination of numerous early landscapes by Gainsborough provided enlightening information on Gainsborough's painting technique. This new evidence draws clear connections between these works and Dutch landscape painting. This also provided the impetus to consider the social, economic and political context that made the adoption of particular 17th-century Dutch landscape painting techniques possible in Britain.

The indirect transmission of painting methods is of particular interest: how did British painters come into contact with continental works of art and how did they interpret and adapt the painting techniques used in these foreign works according to personal artistic preferences, objectives and locally available materials? The reconstruction after Gainsborough's *Peasant and Donkeys* was a particularly appropriate means of studying these questions as it paralleled the activities of an artist seeking to copy or emulate another's artwork. We may consider 'translation' an appropriate term for this process: although a painter may faithfully mimic a work's visual characteristics in producing a copy, certain other characteristics of the original work are unavoidably 'lost' or altered. The artist copying another's work will unconsciously introduce their own 'interpretation', involving new materials, potentially different painting techniques and aesthetic preferences.

Gainsborough was not alone in his emulation of Dutch landscapes: works by two other lesser-known British painters, Samuel Scott (1702–1772) and George Morland (1763–1804), provide evidence of the sustained interest in Dutch landscape painting in Britain over the course of the 18th century. Scott was a London-based artist known mostly for his



Fig. 1 Thomas Gainsborough, *Old Peasant and Donkeys outside a Barn, Ploughshare and Distant Church*, c.1755, oil on canvas, 49.5 × 59.7 cm, Gainsborough's House, Sudbury, inv. no. 2015.006. (Photo: Chris Titmus, Hamilton Kerr Institute, University of Cambridge © Gainsborough's House Society, Sudbury, Suffolk.)



Fig. 2 Kari Rayner, *Reconstruction of Peasant and Donkeys*, 2016, oil on canvas, 51 × 61 cm, Gainsborough's House, Sudbury, inv. no. 2016.014. (Photo: Kari Rayner © Gainsborough's House Society, Sudbury, Suffolk.)

townscapes, river scenes and seascapes, while Morland's work typically features rural peasant life and farm animals. While clear connections to Dutch landscape paintings are evident in the imagery these artists used, like Gainsborough, close examination also yielded information regarding the transmission of Dutch painting techniques. Additional research conducted between 2016 and 2019 at the National Gallery of Art, Washington DC on the supports and grounds generally used by British 18th-century painters provided the means to consider Gainsborough, Morland and Scott's use of materials within this context.

The landscape genre in Britain

The landscape genre was introduced to Britain as early as 1606 by texts such as Henry Peachem's *The Art of Drawing with a Pen and Limning in Water Colours*. British artists and patrons increasingly came into contact with Dutch landscape paintings, specifically, due to a growth in trade and a massive wave of immigration from Holland. The second half of the 17th century saw hundreds of Dutch craftsmen, including painters, fleeing to England to escape economic recession, among them Willem van de Velde (I) (c.1611–1693) and Willem van de Velde (II) (1633–1707).² Dutch immigration was also actively encouraged by British royalty. Charles II issued an invitation in 1672 for immigrants from the Low Countries to settle in Britain: this was intended to encourage craftsmen and merchants to bring their families, goods, businesses and trade networks, thus enriching the economy.³

French and Italian landscape conventions also influenced the development of British landscape painting. Imports from these countries as well as the popularity of the Grand Tour played a role in this, as artists with sufficient resources made these journeys and often spent a great deal of time abroad. In addition to bringing back artworks, artists had the opportunity to collect art materials: for instance, Sir Thomas Lawrence (1769–1830) borrowed pigment samples from Anton Raphael Mengs (1728–1779) in Rome and had them analysed upon his return to London.⁴ The landscape painters Richard Wilson (1714–1782) and John Wootton (1682–1764) spent time in Venice and Rome respectively, and throughout their careers primarily produced romanticised classical landscapes, often of the Italian countryside. Generally speaking, British artists equally admired French landscape painters, notably Claude Lorrain (1604/5–1682) and Nicolas Poussin (1594–1665).⁵

In spite of the British artistic sphere's growing familiarity with continental landscape painting traditions, the artist and author Jonathan Richardson claimed in 1715 that 'Common nature is no more fit for a Picture than plain Narration is for a Poem.'⁶ This statement reflects the prevailing notion that landscape was an unworthy subject for painters. Portraiture was still the dominant genre in Britain at the time, with history painting gaining traction later in the century; however, the aforementioned continental influence encouraged British artists to expand their subject matter to include the genres of landscape, marine, animal and still-life painting. The

dismissive attitude represented by Richardson's statement therefore dissipated by the 19th century. Gainsborough, Scott and Morland were among those at the forefront of this trend, and while they were clearly aware of the development of the landscape genre across Europe, their landscape paintings largely emulated Dutch pictorial conventions and painting techniques at formative stages in their careers.

Collecting and copying in Britain

Although studying and copying old master works would have been viewed in the 18th century as integral to an artist's training in established continental academic traditions, this practice was not necessarily emphasised in Britain until later in the century. William Hogarth (1697–1764), the founder of St Martin's Lane Academy in London (established 1735), believed that one should learn by studying nature rather than producing copies.⁷ This attitude shifted by the founding of the Royal Academy of Arts in 1768, although its president Sir Joshua Reynolds (1723–1792) still cautioned in his second *Discourse*: 'instead of copying the touches of those great masters, copy only their conceptions. Instead of treading in their footsteps, endeavour only to keep the same road.'⁸ Therefore, educational motivations would have played a part in the myriad copies British artists made of old master works during this period.

Gainsborough, Scott and Morland are known to have undertaken numerous copies of Dutch landscapes and seascapes. In order to make these copies and to learn about Dutch painting techniques, they would have had to rely on close examination of foreign works whenever possible, since the translation and trade of artists' manuals from abroad did not become prevalent until the 19th century.⁹ They would also have had the opportunity to view paintings from the Continent hanging in the estates of wealthy patrons or in sale rooms and, once they had the means, to collect old master artworks themselves.

Samuel Scott collected drawings and studies by Van de Velde (I) and his son Van de Velde (II), and a number of his earliest pictures are either inspired by or copied from works by these two artists.¹⁰ George Morland, meanwhile, is said to have extensively copied old master paintings at a young age under his father's instruction, and George Dawe, who knew the artist personally, recalls that 'it was the works of the Dutch masters ... which made the greatest impression on him as a boy.'¹¹

Gainsborough was paid to restore Dutch paintings early in his career, even perhaps inserting figures into a landscape painting by Jan Wijnants (1632–1684).¹² He may also have had more direct contact with immigrant Dutch painters during this formative time in his life: Rica Jones suggests that as a child, Gainsborough worked in Suffolk with immigrant Dutch artists.¹³ Gainsborough's awareness of some Dutch techniques, such as the optical effect of using black instead of blue in skies and adding calcite to his colours for transparency, may support this theory.¹⁴ Gainsborough's incorporation of

ground glass into his paint mixtures is another studio tradition found in the Netherlands.¹⁵

As with Scott and Morland, it seems that Gainsborough also learned a great deal through producing copies. He made at least 22 known copies after the works of old masters and most frequently copied 17th-century Dutch artists, noting towards the end of his life in 1788, 'I feel such a fondness for my first imitations of little Dutch landscapes.'¹⁶ Moreover, the contents of Gainsborough's studio upon his death contained mainly landscapes, including by Van de Velde, Wijnants and Jacob van Ruisdael (1628–1682), among others.¹⁷

Foreign influence on the British art market

Market forces would also have encouraged the production of artworks emulating old master paintings. In addition to affecting the rate of migration, political upheavals across the Continent and fluctuating economic conditions accelerated the circulation of cultural heritage and affected the scope of trade between Britain and continental Europe. The 1674 Treaty of Westminster between Britain and the Netherlands was in large part responsible for the influx of Dutch paintings into London in the late 17th century, as Dutch merchants took advantage of peacetime and Britain's more relaxed import rules.¹⁸

Economic studies further note that the 18th-century art market in England developed in a similar manner to the Netherlandish art market in the previous century.¹⁹ The market centred around London in the first half of the century, and paintings were primarily bought and sold through auction, a Dutch method of exchange.²⁰ Demand was particularly high for old master paintings, and picture dealers began to specialise in importing collections from the Continent.²¹ By the early 1720s, almost weekly auctions were being held in London with paintings attributed to artists such as Claude, Poussin, Titian (1490–1576), Anthony van Dyck (1599–1641) and Peter Paul Rubens (1577–1640), although many of these were likely painted 'in the style of' or workshop-produced.²² Among works by Dutch artists, Rembrandt (1606–1669) and Aelbert Cuyp (1620–1691) were especially popular.²³

Early in the century, contemporary English works sold for considerably less at auctions than European paintings, especially old master works.²⁴ Native artists commonly had to rely on portrait commissions and had to engage in other related activities for supplemental revenue, such as sign or decorative painting.²⁵ These early conditions provided the motivation for British artists to imitate continental old master painters, and the market was flooded with replicas and forgeries.²⁶

These economic forces surely played a role in Gainsborough, Scott and Morland's activities as copyists. It is likely that they incorporated what they had learned from copying exercises into their paintings in a bid to compete with old master paintings on the market. It must be noted, however, that it may have been more lucrative to produce classical landscapes in the style of Lorrain: this implies that aside from commercial motivations, these three artists may have simply had an affinity for the Dutch landscape style.²⁷

British artists' suppliers and local materials

Although these three British artists may have sought to emulate Dutch paintings, it is important to understand that the materials at their disposal would have created fundamental differences in terms of construction. The 18th century was a pivotal moment of transition with regard to the availability and distribution of artists' materials in Great Britain. Previously, grocers or apothecaries had provided a limited supply of pigments, canvas and other equipment for painting.²⁸ Subsequently, in tandem with the economic boom and expanding art market, businesses specialising solely in artists' materials began to professionalise and proliferate. In addition to commercially prepared canvases, brushes and other tools, artists could buy pigments ground in oil.

A number of these early artists' suppliers were foreigners, and the business of providing pre-prepared canvases may have been introduced by French or Flemish immigrants.²⁹ According to the artist James Northcote in his biography of Sir Joshua Reynolds, when Gottfried Kneller (1646–1723) set up a studio in London in 1674 he brought a man with him to prepare his materials and 'afterwards set him up as a colour-maker for artists.'³⁰ Northcote asserts that 'this man's success, he being the first who kept a colour shop in London, occasioned the practice of it as a trade.'³¹

By the latter half of the 18th century, the great majority of artists, suppliers, dealers, printmakers, framers and auction houses were all located in the Haymarket and St Martin's Lane, comprising a close network that maximised convenience and provided ready access to materials.³²

Choice of supports and priming

By the 18th century, panel was rarely used as a support for paintings in Britain.³³ While a range of standard size canvases became increasingly available from artists' suppliers, these formats were developed for portraiture and were generally quite square with relatively low aspect ratios, or ratios of length to width.³⁴ Among countries with more established landscape painting traditions, typical aspect ratios of supports varied. Dutch standard sizes varied by city and genre, but generally tended to have squarer formats as well.³⁵ Italian and French landscapes, in contrast, usually exhibited greater aspect ratios.³⁶

Perhaps looking to the elongated formats of French and Italian landscapes, the majority of British landscape painters, such as the aforementioned Richard Wilson, seem to have regularly eschewed the more practical option of simply using a standard size canvas turned horizontally. This would have involved modifying a standard size canvas or using a support of customised dimensions. Approximately one-third of the 18th-century British landscapes examined for this study were executed on standard size canvases, compared to works of other genres, of which over two-thirds are standard size.³⁷

Samuel Scott often used a more panoramic format with aspect ratios ranging from 1.5 to 2, which corresponds more



Fig. 3 Philippe-Jacques de Loutherbourg, *Landscape with Horse and Oxen Cart*, 1770–80, oil on panel, 31.8 × 47.6 cm, Yale Center for British Art, New Haven, inv. no. B1981.25.220. (Photo © the Yale Center for British Art, Paul Mellon Collection.)

closely to the typical aspect ratios of French and Italian canvases.³⁸ In contrast, Gainsborough and George Morland habitually used standard size canvases in a horizontal orientation for their landscapes.³⁹ Although practicality and convenience were probably the dominant reasons for this, Gainsborough and Morland could also have considered it unnecessary to modify the dimensions as the formats of British standard size canvases were relatively close to those of many of the Dutch works they sought to emulate.

A painting on canvas, of course, inevitably possesses fundamentally different physical and visual characteristics than works on panel. The distinction between these two supports grows more significant when we consider that the choices made by some Dutch 17th-century landscape painters using panel, specifically ‘tonal’ landscape painters, enabled the wood to play a role in the final image in terms of both colour and texture. It would have been typical in the 17th century for Dutch panels to be primed with relatively thin, often near-translucent grounds that, in interacting with the colour of the wood, resulted in a pinkish hue and allowed the variation in the wood grain to show through (Fig. 3).⁴⁰ Painters such as Jan van Goyen (1569–1656) and Esaias van de Velde (1587–1630) often thinly applied subsequent paint layers and left the priming exposed to some degree. This meant that the pink tonality had a strong influence on the overall hue of the finished painting, and the wood grain could be used to stand in for compositional elements such as rippled water.⁴¹

Starting in the 1740s, Gainsborough sometimes used canvases with pink priming similar in colour to the pinkish hue of translucent grounds on panel.⁴² This contrasted with standard practice: most British painters, including Scott and Morland, used primarily grey or white grounds between the 1730s and the 1750s.⁴³ Gainsborough’s choice to use pink grounds may initially have been a conscious attempt to



Fig. 4 Thomas Gainsborough, *Peasant and Donkeys*: detail of the sky showing the exposed pink ground. (Photo: Kari Rayner © Gainsborough’s House Society, Sudbury, Suffolk.)

mimic the underlying coloration, if not the materials, of 17th-century Dutch paintings on panel.⁴⁴ In *Peasant and Donkeys*, Gainsborough utilises the pink ground to great effect, economically allowing it to show through thinner passages of paint and suffusing the sky with a warm glow (Fig. 4). The significance of this underlying tonality and the extent to which it affects colour relationships became clear in the course of fabricating the reconstruction of this painting.

Furthermore, a minutely striated texture is found frequently in the grounds of British paintings of this period, which the literature suggests is linked to the priming technique of artists’ suppliers.⁴⁵ These striations are commonly found in Gainsborough’s paintings, including *Peasant and Donkeys*. Tests undertaken at the Hamilton Kerr Institute to reconstruct the ground layers in *Peasant and Donkeys* clarified the method of the texture’s facture and provided the



Fig. 5 Thomas Gainsborough, *Major John Dade, of Tannington, Suffolk*, c.1755, oil on canvas, 76.2 × 64.8 cm, Yale Center for British Art, New Haven, inv. no. B1993.30.9: an example of striated priming texture. (Photo: Kari Rayner © Yale Center for British Art, Paul Mellon Collection.)



Fig. 6 Thomas Gainsborough, *Peasant and Donkeys*: detail of striations. (Photo: Kari Rayner © Gainsborough's House Society, Sudbury, Suffolk.)



Fig. 7 Thomas Gainsborough, *Wooded Landscape with a Cottage and Shepherd*, 1748–50, oil on canvas, 43.2 × 54.3 cm, Yale Center for British Art, New Haven, inv. no. B1976.2.1: detail of striations. (Photo: Kari Rayner © Yale Center for British Art, Paul Mellon Collection.)

means to consider its function within the picture. The striations are due to the particular type of palette knife, ground stratigraphy, weight of canvas and priming viscosity: as the

priming is applied over the canvas parallel to the threads, minute ridges result.⁴⁶ Figure 5 shows an example of the texture that this priming method can produce.

British 18th-century painters were highly attuned to the texture of canvas and ground, and such texture may have generally been regarded unfavourably by artists.⁴⁷ The 1795 *Practical Treatise for Painting in Oil Colours* advises adding an additional ground layer when marks resulting from the commercial application of priming are visible.⁴⁸ Moreover, Sir John Barrow's 1754 *A Supplement to the New and Universal Dictionary of Arts and Sciences* and Robert Dossie's 1758 *Handmaid to the Arts* both suggest pumicing a primed canvas once dry to make it smooth.⁴⁹

It is therefore significant that Gainsborough generally chose not to modify the ground texture or cover it with thick applications of paint. While this texture may have become more prominent over time, the striations of the priming were visible through thin paint layers in the 2016 reconstruction of *Peasant and Donkeys*, so the texture would probably have been discernible in Gainsborough's works even when freshly painted. One reason Gainsborough may have left the texture is that the ridged surface would have facilitated the quick application of paint.⁵⁰ In addition, the striations also play a subtle visual role, introducing variation and slight skips in the overlying paint (Fig. 6). In this sense, the resulting minute texture functions visually much like exposed or barely concealed wood grain in Dutch landscapes on panel insofar as providing variation. This texture is even more explicit in *Wooded Landscape with a Cottage and Shepherd*: whether or not it was an effect intended by the artist, the striations of the ground effectively mimic tree bark (Fig. 7).

Based on visual examination under the microscope, most of the works by George Morland examined for this study were painted on standard size canvas with white or off-white grounds; however, there are at least three instances of his use of panel, each primed with moderately thick pink oil grounds, which Morland allowed to show through thinner passages of paint.⁵¹ While the ground thickness limits the visibility of the wood grain, this material choice perhaps shows a motivation on Morland's part to imitate a similar aesthetic to that of Gainsborough's or of 17th-century Dutch landscapes on panel.

Adaptation of painting technique

Gainsborough, Morland and Scott all appear to have emulated the painting techniques of different Dutch 17th-century artists associated with particular subgenres of Dutch landscape painting. Each of these painters' techniques are discussed in turn and compared with findings on relevant Dutch painters. In general, Samuel Scott's works emphasise specific ships, locations or historic occasions. In paintings examined at the Yale Center for British Art (Newhaven CT), Scott used rather extensive underdrawing, and his final paint application tends to consist of opaque layers, contrasting crisp detail with blended brushstrokes. Little to no impasto was noted in

the paintings studied. Kingzett suggests that Scott may also have ‘absorbed’ something from Jan van der Heyden (1637–1712):⁵² the precisely rendered architectural detail observed in many of Scott’s paintings, such as in *A View of the Tower of London*, 1771, at the Yale Center for British Art, may support this theory.⁵³

Scott’s painting technique also suggests that he was familiar with Dutch marine paintings such as those by Ludolf Bakhuizen (1630–1708) and the Van de Veldes. These painters frequently depicted specific ships or events, often dramatic occasions such as ships weathering storms and battles at sea. This generally involved precise and detailed observation of ship structure and rigging, requiring the artist to plan out the composition in the initial stages. However, in contrast to the carbon-based underdrawing seen in several of Scott’s paintings, the Van de Veldes usually sketched out their compositional designs and underpainting with a transparent brown paint.⁵⁴ In works by Bakhuizen examined at the Rijksmuseum (Amsterdam) and the National Gallery of Art (Washington DC), the artist similarly used a transparent brown for underdrawing and underpainting. Bakhuizen and the Van de Veldes also tended to use more opaque final applications of paint rather than utilising transparent glazes. They blended and feathered paint wet-in-wet to minimise the appearance of brushstrokes, but they also sometimes incorporated texture, utilising low impasto for highlights and stippling paint to represent ocean spray or smoke.

George Morland’s painting techniques provide a contrast to Scott’s. The artist appears to have relied very little on underdrawing, instead working out the composition directly in paint. Morland often left parts of these early paint layers exposed in the finished painting, and he played with paint texture, applying dabs of impasto to contrast with thinner passages. There are numerous instances in which he appears to have used his fingers to manipulate, ‘sponge’ or subtract the paint, such as in the puffs of smoke from the hunters’ guns in the painting *Pheasant Shooting* (Fig. 8).

The emphasis on naturalistic representation and the preliminary painting stages in Morland’s works are reminiscent of the tonal Dutch style, developed by artists such as Van Goyen and Salomon van Ruysdael (c.1600/03–1670).⁵⁵ The composition in these landscape paintings was usually executed directly through a painted sketch, instead of relying on traditional carbon-based underdrawing. Thin brown washes of paint were typically used at this stage and often deliberately exposed in the final image. Tonal landscape painters also emphasised the texture and materiality of the paint, leaving the brushwork visible.⁵⁶ In Dutch 17th-century landscapes more generally, the application of paint texture was sometimes carried out with materials such as sponges, as in Jacob van Ruisdael’s *Country House in a Park* of c.1675 (Washington DC, National Gallery of Art).⁵⁷ An emphasis on texture was taken to the extreme in the work of Otto Marseus van Schrieck (1619/20–1678), who (although not considered a tonal artist) often stippled or sponged on paint, supposedly with materials such as moss.⁵⁸

However, there are several significant ways that Morland departs from the tonal style and painting technique. The



Fig. 8 George Morland, *Pheasant Shooting*, c.1790, oil on canvas, 40.3 × 52.1 cm, Yale Center for British Art, New Haven, inv. no. B2001.2.277: detail of thumbprint texture. (Photo: Kari Rayner © Yale Center for British Art, Paul Mellon Collection.)

colour of the landscape in Morland’s works is naturalistic, while the palette used in tonal works was generally limited almost to the point of being monochromatic. Moreover, while painters such as Van Goyen often added figures wet-in-wet, Morland tended to position figures and animals on top of paint layers that were already dry. Small figures and animals, in particular, were added late in the painting process. This practice is more in line with those of Dutch landscape specialists such as Wijnants and Meindert Hobbema (1638–1709) who generally added figures and animals only after they had largely completed the landscape.⁵⁹

Gainsborough’s technique is similar to Morland’s in some aspects but deviates in other ways. In the early works examined for this study, there is no evidence that Gainsborough used traditional underdrawing, although he may have employed white chalk or another medium not detected in infrared reflectography. Instead, he painted directly on the ground using a limited palette to work out the composition wet-in-wet. Technical analysis of *Peasant and Donkeys* suggests that in the initial stages of the painting, Gainsborough blocked out the sky and laid in a first monochromatic layer of warm brown paint in the foreground, on top of which he thinly brushed varied brown and muted green tones wet-in-wet. He deliberately left the ground, as well as this thin painted sketch, exposed in places so that it would play a role in the final image. His work *Landscape with Gipsies* of c.1753–54 (London, Tate Britain) reinforces the plausibility of this outlined approach, as the left side of the background is unfinished and shows similar thinly applied zones of colour. As discussed above, this method of compositional development resembles Morland’s and the practices employed in tonal Dutch landscapes.

Yet, figures and animals often feature prominently within Gainsborough’s landscape compositions, giving them a narrative significance.⁶⁰ In order to highlight selected animals or figures and ensure that they became a focal point, Gainsborough left reserves for them and heavily exploited the ground colour, as in *Landscape with Milkmaid* (Fig. 9). This is reminiscent of Cuypp’s practice: for example, in *River*



Fig. 9 Thomas Gainsborough, *Landscape with Milkmaid*, 1754–56, oil on canvas, 76.2 × 101.6 cm, Yale Center for British Art, New Haven, inv. no. B1981.25.292: detail of a cow showing how Gainsborough relied on the pink ground as a mid-tone. (Photo: Kari Rayner © Yale Center for British Art, Paul Mellon Collection.)



Fig. 10 Thomas Gainsborough, *Landscape with Milkmaid*: infrared reflectogram showing two cows and a milkmaid in the foreground painted in reserve, while a cow pictured farther into the distance is painted on top of the landscape. (Photo: Kari Rayner © Yale Center for British Art, Paul Mellon Collection.)

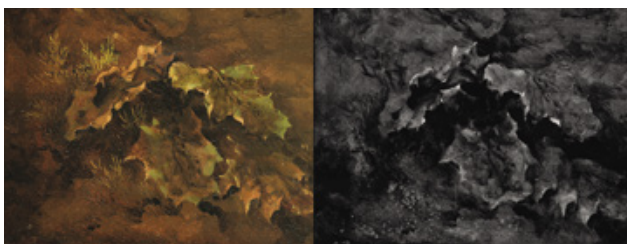


Fig. 11 Thomas Gainsborough, *Peasant and Donkeys*: detail showing a sponged texture in normal light (left) and for comparison an infrared reflectogram of the same area (right). (Photo: Chris Titmus, Hamilton Kerr Institute, University of Cambridge © Gainsborough's House Society, Sudbury, Suffolk.)

Landscape with Cows from 1645–50 (Washington DC, National Gallery of Art), the artist left a reserve for the cows, with the brown tone of the painted sketch in the foreground also serving as an underlayer for those animals.⁶¹ Other figures



Fig. 12 Thomas Gainsborough, *Wooded Landscape with Herdsmen Seated*, 1746–47, oil on canvas, 49 × 65.5 cm, Gainsborough's House Society, Sudbury, inv. no. 1990.087: detail of sponged texture. (Photo: Kari Rayner © Gainsborough's House Society, Sudbury, Suffolk.)



Fig. 13 Thomas Gainsborough, *Peasant and Donkeys*: detail of foliage. (Photo: Kari Rayner © Gainsborough's House Society, Sudbury, Suffolk.)

or animals placed at a greater distance, or those he wished to visually recede, were painted on top of the landscape (Fig. 10).

The emphasis on texture found in landscape paintings from Gainsborough's early career also show similarities to the Dutch paintings discussed. In the aforementioned *Wooded Landscape with a Cottage and Shepherd*, 1748–50 (New Haven CT, Yale Center for British Art), Gainsborough stippled, sponged on, or otherwise manipulated the paint texture throughout different compositional elements and within different paint layers. In *Peasant and Donkeys*, the infrared reflectogram indicates that sponging or some other sort of textural manipulation was carried out in the underpaint at the lower left (Fig. 11). Sponging of the foliage in the trees is also evident in *Wooded Landscape with Herdsmen Seated* (Fig. 12). However, the texture of the trees in *Peasant and Donkeys* appears to have been produced in a different manner (Fig. 13). In attempts to recreate this part of the painting in

the 2016 reconstruction, the dark brown textural brushwork present in the underpainting of the trees could be approximated with the use of stand oil to provide body, and the subsequent application of greenish paint was mostly stippled and feathered. Although appearing to be randomised, as with a sponged application, the final touches of dark paint on top could not be obtained with a brush or sponging method alone. This texture appears to deviate from standard foliage painting, suggesting that Gainsborough was experimenting with novel techniques. The texture could be approximated by dabbing on paint thickened with stand oil with the edge of a cloth, and then manipulating the resulting markings with a small brush to achieve greater linearity. Although this may not be the method Gainsborough used, attempts to model Gainsborough's paint application in the reconstruction, in a way in which the artist himself would have done in looking to Dutch paintings, underscored how it could be possible to achieve similar effects with different methods.

Conclusions

The introduction of Dutch landscape painting to Britain was crucial for a nation that had little native landscape painting tradition. Although copying such works could have been considered a component of artistic training, rapidly evolving market conditions in the early 18th century and demand for old master paintings provided economic motivation for British artists to emulate these types of works. Thomas Gainsborough, Samuel Scott and George Morland all copied and collected Dutch landscape paintings and 'translated' different Dutch 17th-century landscape painting techniques in many of their own works. Although Scott tended to use more panoramic formats, he looked to the thorough compositional planning, smoothly blended paint, and meticulous detail of Jan van der Heyden and Dutch marine artists, including Bakhuizen and the Van de Veldes. Gainsborough and Morland, meanwhile, may have attempted to imitate the typical look of tonal Dutch landscapes on thinly primed panel by using pink grounds. They were also influenced by tonal Dutch landscape painting techniques: the ways in which they emulated these works include similarities in terms of compositional development, exposure of preparatory paint layers and emphasis on paint texture.

Close examination of paintings by Gainsborough, Scott and Morland allowed these comparisons, and the technical analysis and reconstruction of Gainsborough's *Peasant and Donkeys* was an especially appropriate and revealing way to advance understanding of Gainsborough's painting techniques. In the works discussed, each artist retained a number of recognisable characteristics of 17th-century Dutch landscapes but showed selectivity and creativity in choosing to mimic certain artists and aesthetic effects, often with different materials and techniques. Gainsborough, in particular, maintained a distinctive personal technique while emulating these works and showed a great willingness to experiment by applying paint texture using novel techniques. The paintings

discussed in this paper can therefore be said to exist as products of the exchange and interactions between British artists and people, paintings, materials and methods from the Netherlands, demonstrating that Dutch influence impacted Britain's artistic sphere in profound and long-lasting ways.

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Notes

1. J. Hayes, *The Landscape Paintings of Thomas Gainsborough: A Critical Text and Catalogue Raisonné* (2 vols), vol. 1, London, Sotheby Publications, 1982, p. 44. Comparisons have been made by numerous other authors, most recently in the exhibition *Thomas Gainsborough: The Modern Landscape* at the Hamburger Kunsthalle (2–27 March 2018).
2. K. Wagner, J. David and M. Klemenčič, *Artists and Migration 1400–1850: Britain, Europe and Beyond*, Newcastle upon Tyne, Cambridge Scholars Publishing, 2017, p. 32; S. Karst, 'Off to a new Cockaigne: Dutch migrant artists in London, 1660–1715', *Simiolus* 37, 2014, pp. 25–26.
3. J. Warren and A. Turpin, *Auctions, Agents, and Dealers: The Mechanisms of the Art Market 1660–1830*, Oxford, Beazley Archive, Archaeopress, 2008, p. 18.
4. J. Hamilton, *A Strange Business: A Revolution in Art, Culture, and Commerce in 19th century London*, New York and London, Pegasus Books, 2015, p. 197.
5. Hamilton 2015 (cited in note 4), p. 138.
6. Hayes 1982 (cited in note 1), p. 5.
7. R. Jones, 'The artist's training and techniques', in E. Einberg (ed.), *Manners and Morals*, London, Tate Gallery, 1987, p. 21.
8. J. Reynolds, *The Discourses of Sir Joshua Reynolds to which are Added His Letters to 'The Idler' with an Introduction by Austin Dobson Hon. L.D. Edin.*, H. Frowde (ed.), London/New York/Toronto, 1908, p. 16.
9. See A.W. Moore, *Dutch and Flemish Painting in Norfolk: A History of Taste and Influence, Fashion and Collection*, London, HMSO, 1988, p. 152 (Appendix I: The early Norwich artists: their techniques and the Dutch example).
10. R. Kingzett, 'A catalogue of the works of Samuel Scott', *The Volume of the Walpole Society* 48, 1980–82, p. 2.
11. G.C. Williamson and R. Richardson, *George Morland: His Life and Works*, London, 1907, pp. 11–12.
12. S. Foister, R. Jones and O. Meslay, *Young Gainsborough*, London, National Gallery Company Ltd, 1997, p. 7.
13. R. Jones and M. Postle, 'Gainsborough in his painting room', in M. Rosenthal and M. Myrone (eds), *Gainsborough*, London, Tate Publishing, 2002, pp. 29–30.
14. Foister Jones and Meslay 1997 (cited in note 12), p. 8.

15. Jones and Postle 2002 (cited in note 13), p. 30.
16. J. Hayes, *The Letters of Thomas Gainsborough*, New Haven, Yale University Press, 2001, p. 174. For a discussion of Gainsborough's production of copies see K. Mandy, 'Thomas Gainsborough as a copyist', *Hamilton Kerr Institute Bulletin* 6, 2016, pp. 7–8.
17. Anon., 'Gainsborough's collection of pictures', *The Burlington Magazine* 84(494), 1944, pp. 106–110: it is unclear from the listing in this article whether Willem van de Velde refers to Van de Velde (I) or Van de Velde (II), and there are no dates associated with the paintings to provide clues.
18. T. Bayer and J. Prage, *The Development of the Art Market in England: Money as Muse, 1730–1900*, London, Pickering & Chatto, 2011, p. 17.
19. Bayer and Prage 2011 (cited in note 18), p. 4.
20. Ibid., p. 17.
21. Warren and Turpin 2008 (cited in note 3), p. 113; D. Marshall, S. Russell and K. Wolfe, *Roma Britannica: Art Patronage and Cultural Exchange in Eighteenth-century Rome*, London, British School at Rome, 2011, p. 113.
22. Bayer and Prage 2011 (cited in note 18), p. 75.
23. M. Spring and L. Keith, 'Aelbert Cuyp's "Large Dort": colour change and conservation', *National Gallery Technical Bulletin* 30, 2009, p. 72.
24. Bayer and Prage 2011 (cited in note 18), p. 4. It should be noted that while 'old master' paintings sold for large sums, the prices of 'lesser' foreign works were usually modest: 'the work of the Dutch migrants of the standard auctions sometimes fetched no more than a couple of shillings'; see Karst 2014 (cited in note 2), p. 37.
25. Ibid., p. 44. For discussion of a similar 'coarse painting' trend in Holland, see P. Bakker, M. van Eikema Hommes and K. Keune, 'The coarse painter and his position in 17th and 18th century Dutch decorative painting', in H. Evans and K. Muir (eds), *Studying 18th-Century Paintings and Works of Art on Paper*, 2015, London, Archetype Publications, pp. 70–82; P. Bakker, 'United under one roof: artist painters and coarse painters and their relations in seventeenth-century Leiden', *Early Modern Low Countries* 1(2), 2017, pp. 318–349.
26. Hamilton 2015 (cited in note 4), p. 138; Bayer and Prage 2011 (cited in note 18), p. 96.
27. 'Eighteenth-century English taste overwhelmingly favoured the idealized, classical landscape of Claude Lorrain and Gaspar Dughet, and their Northern imitators': Foister *et al.* 1997 (cited in note 12), p. 4.
28. J. Kirby, 'The painter's trade in the seventeenth century: theory and practice', *National Gallery Technical Bulletin* 20, 1999, p. 33.
29. L. Goldsmith, *Topographical Painting in Seventeenth-century London: An Investigation into the Materials and Techniques of Eight Painted Views of the City with Reference to the Supply of Artists' Materials*, PhD dissertation, Courtauld Institute of Art, University of London, 1993, p. 9.
30. W. Whitley, *Artists and their Friends in England 1700–1799*, vol. 1, New York, Benjamin Blom, 1968, p. 330.
31. Whitley 1968 (cited in note 30), p. 330.
32. K. Wedd, L. Peltz and C. Ross, *Creative Quarters: The Art World in London from 1700–2000*, London, Merrell Publishers, 2001.
33. R. Jones, 'Sir Joshua Reynolds (1723–1792): George IV when Prince of Wales 1785', in S. Hackney, R. Jones and J.H. Townsend (eds), *Paint and Purpose: A Study of Technique in British Art*, London, Tate Publishing, 1999, p. 146.
34. J. Simon, "'Three-quarters, kit-kats and half-lengths": British portrait painters and their canvas sizes, 1625–1850', London, National Portrait Gallery, 2013. Available at: <https://www.npg.org.uk/research/programmes/artists-their-materials-and-suppliers/three-quarters-kit-kats-and-half-lengths-british-portrait-painters-and-their-canvas-sizes-1625-1850/> (accessed 31 August 2018).
35. A. Wallert (ed.), *Still Lifes: Techniques and Style. The Examination of Paintings from the Rijksmuseum*, Amsterdam, Rijksmuseum, 1999, p. 8.
36. 'The British size is the squarest, the French less so, the Italian least of all, being the tallest in proportion to its width ... In London the dominant requirement of the market was for canvas for portraits. In Rome and Paris, where there was also a demand for subject pictures and landscapes, the situation was somewhat different': Simon 2013 (cited in note 34).
37. Of 60 landscapes surveyed, 20 were determined to be of standard size (approx. 33%); contrastingly, 170 of 266 paintings surveyed from other genres were found to be standard size (approx. 75%). These results may be affected by the smaller sample size of landscape paintings studied.
38. The average aspect ratios cited here are based on the study of Samuel Scott's paintings in the collection of the Yale Center for British Art.
39. There are some notable exceptions. Gainsborough experimented with more panoramic pictures in the 1740s or early 1750s, one example being *Landscape with a View of a Distant Village*, 1740s–1750s, oil on canvas, 75 × 151 cm, National Galleries Scotland, Edinburgh, inv. no. NG 2174.
40. Artists' manuals from the time suggest applying size to the wood then a lead white-containing oil layer, or alternatively, a first layer consisting of chalk and animal glue followed by a lead white oil layer: see M. Stols-Witlox, *A Perfect Ground: Preparatory Layers for Oil Paintings 1550–1900*, London, Archetype Publications, 2017, p. 124.
41. E.M. Gifford, 'Material as metaphor: non-conscious thinking in seventeenth-century painting practice', in M. Spring (ed.), *Studying Old Master Paintings: Technology and Practice*, London, Archetype Publications, 2011, pp. 168–169.
42. In addition to using other ground colours such as grey or beige, Gainsborough began painting on canvases with pink priming of various hues in the 1740s, and he occasionally returned to this colour throughout his career. Gainsborough's pink grounds vary in hue from salmon to pale rose.
43. See Foister *et al.* 1997 (cited in note 12), p. 19. Eighteenth-century English artists' manuals also generally recommended priming canvases with light grounds according to Stols-Witlox 2017 (cited in note 40), p. 138.
44. Rica Jones theorises this as well in Jones and Postle 2002 (cited in note 13), p. 29. There are at least two examples of paintings by Willem van de Velde (II) painted in England with pink priming on canvas: *Before the Storm*, c.1700, oil on canvas, 25.8 × 43.4 cm, National Gallery of Art, Washington DC, inv. no. 2016.22.7 and *An Action Between English Ships and Barbary Corsairs*, c.1695, oil on canvas, 32.1 × 49.2 cm, Yale Center for British Art, New Haven, inv. no. B1981.25.641. Paintings such as these may also have influenced British painters.
45. Jones and Postle 2002 (cited in note 13), p. 29.
46. Maartje Stols-Witlox postulates that a large curved knife with a raised handle similar to that recommended in the De Mayerne manual was used for priming in Stols-Witlox 2017 (cited in note 40), pp. 113–114. As no curved knife was available to use for priming the reconstruction of *Peasant and Donkeys*, bending the palette knife upwards during priming application helped mitigate the creation of furrows in the wet ground.
47. For examples of how British artists were attentive to texture, see L. Stevenson, 'The technique of Sir Henry Raeburn examined in the context of late eighteenth-century British portraiture', in A. Roy and P. Smith (eds), *Painting Techniques:*

- History, Materials, and Studio Practice*, London, International Institute for Conservation of Historic and Artistic Works, 1998, p. 194; Whitley 1968 (cited in note 30), p. 334.
48. L. Carlyle, *The Artist's Assistant: Oil Painting Instruction Manuals and Handbooks in Britain 1800–1900 with Reference to Selected Eighteenth-Century Sources*, London, Archetype Publications, 2001, p. 174; Stols-Witlox 2017 (cited in note 40), p. 118.
 49. Carlyle 2001 (cited in note 48), pp. 423–424.
 50. Jones and Postle 2002 (cited in note 13), p. 29.
 51. These paintings by George Morland are: *A Soldier's Return* (no date), oil on panel, 17.5 × 27 cm, Yale Center for British Art, New Haven, inv. no. B2001.2.102; *Old Horses with a Dog in a Stable*, c.1791, oil on panel, 29.8 × 38.1 cm, Yale Center for British Art, New Haven, inv. no. B1981.25.451; and *Rocky Landscape with Two Men on a Horse*, c.1791, oil on panel, 25.1 × 30.2 cm, Yale Center for British Art, New Haven, inv. no. B1981.25.453.
 52. Kingzett 1980–82 (cited in note 10), p. 2.
 53. Samuel Scott, *A View of the Tower of London, Supposed on his Majesty's Birthday*, 1771, oil on canvas, 101 × 193 cm, Yale Center for British Art, New Haven, inv. no. B1976.7.147.
 54. *The Art of the Van de Veldes: Paintings and Drawings by the Great Dutch Marine Artists and their English Followers*, exh. cat., London, National Maritime Museum, 1982, pp. 27–31.
 55. E.M. Gifford, 'Jan van Goyen and the practice of naturalistic landscape', in C. Vogelaar (ed.), *Jan van Goyen*, exh. cat., Leiden, Stedelijk Museum De Lakenhal, 1996, pp. 70–79, 81.
 56. E.M. Gifford, 'Style and technique in Dutch landscape painting in the 1620s', in A. Wallert, E. Hermens and M. Peek (eds), *Historical Painting Techniques, Materials, and Studio Practice*, Los Angeles, Getty Conservation Institute, 1995, p. 146.
 57. Jacob van Ruysdael, *Country House in a Park*, 1675, oil on canvas, 76.3 × 97.5 cm, National Gallery of Art, Washington DC, inv. no. 1960.2.1. See also R. Landsman, 'Smudges, sponges and 17th-century Dutch painting', in this volume, pp. 63–76.
 58. D. Hildebrecht, *Otto Marseus Van Schrieck (1619/20–1678) and the Nature Piece: Art, Science, Religion, and the Seventeenth-Century Pursuit of Natural Knowledge*, PhD dissertation, Department of Art History, University of Michigan, 2004, pp. 137–138.
 59. Meindert Hobbema's *A Wooded Landscape with Figures*, c.1658, oil on panel, 53.34 × 67.31 cm, National Gallery of Art, Washington DC, inv. no. 2015.143.13 serves as an example of a painting with the figures added later. See also E.M. Gifford, 'Evocation and representation: Rembrandt's landscape painting technique', in C. Vogelaar and G. Weber (eds), *Rembrandt's Landscapes*, exh. cat. Leiden, Stedelijk Museum De Lakenhal/Kassel, Staatliche Museen Kassel, Gemäldegalerie Alte Meister, 2006, p. 121.
 60. Hayes notes, 'one of the few important differences between Ruysdael and early Gainsborough lies in the extent to which the English painter built up a substantial repertory of little figures and animals with which to people and fill out his compositions': Hayes 1982 (cited in note 1), p. 51.
 61. Aelbert Cuyp, *River Landscape with Cows*, 1645–50, oil on panel, 68 × 90.2 cm, National Gallery of Art, Washington DC, inv. no. 1986.70.1.

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LONDON, 1600–1800: TRADING ARTISTS' MATERIALS WITH EUROPE AND WORLDWIDE

Jacob Simon

ABSTRACT The sourcing and supply of artists' materials has traditionally been an international business. This study explores the developing trade in finished materials over two centuries and looks at suppliers in London and their international trade. This trade developed from what was mainly an import business into one where exports to colonial and European markets were important. In recent years the 16th-century wholesale trade has been studied using evidence from import records, guild records, inventories and legal documents. In contrast, this paper focuses on the retail trade between named suppliers and individual artists, using advertisements, account books and correspondence. Several themes emerge: the movement of artists and manufacturers, the rise of the specialist artists' colourman, import substitution and the encouragement of exports, innovation and the use of natural resources, and the importance of trading links.

The trade in materials, 1600–1680

In 17th-century London artists might have bought colours from an apothecary, panels from a joiner and canvas from a linen draper.¹ Many such materials were imported. Here the limited evidence is considered for the years from 1600 to 1680 before the rise of the artists' colourman.² The period witnessed a great increase in demand for portraits accompanied by the growing availability of ready-primed canvas. At that time there were large numbers of Flemish, Dutch and other immigrant artists and craftsmen at work in London:³ neither nationality nor religion necessarily being a barrier to employment despite some resistance from native-born artists.

The supply of colours for artists in London is poorly documented, unlike in Munich, where painting materials were stocked centrally for use in the court in the 1580s,⁴ or in Copenhagen, where Det Kongelige Farvekammer (the Royal Colour Chamber) housed materials for use by court artists in the 1610s and 20s.⁵ The trade in materials in London was less developed than in such thriving centres of artistic activity as Holland, Antwerp and Venice.⁶

Documents providing information on the supply of colours to individual painters in the early 17th century are rare. We know little about the links between colourmen and individual artists in London although the Swiss physician, Theodore de Mayerne (1573–1655), does name certain obscure colour sellers in his copious writings on technical

practice.⁷ However, in the case of smalt, imported into Britain in huge quantities, there is some evidence from court proceedings in 1613 in which Christian Wilhelm (fl. 1604–1638), an immigrant smalt manufacturer, was backed by a petition by some 20 members of the Painter-Stainers' Company, including Thomas Cappe (c.1572–1635), Henry Diamond (c.1555?–1614), John Grinkin (fl. 1592, d.1620) and others responsible for decorative painting.⁸ He is the only colour maker of the time who can be linked to individual painters.

The trade in supports for paintings is another poorly documented area. Oak panels were still in use by artists in the early 17th century, most of which according to dendro-chronological analyses were made from trees that grew in the eastern Baltic. One example is the portrait, *Thomas Sackville, 1st Earl of Dorset*, formerly attributed to John de Critz (Fig. 1).⁹ In contrast to Antwerp, information is not available on panel makers in London, but in any case by the 1630s panels had largely been replaced by canvas from Germany and the Netherlands as the preferred support for easel paintings.¹⁰

The trade in linen in the 16th and early 17th century has been studied using import records and other archival documents,¹¹ but we rarely know where individual artists obtained their canvas. Information given to De Mayerne by the Dutch painter George Portman (fl. 1621–1639) suggests that primed canvases were available from specialist suppliers by the early 1630s.¹² One such supplier was Fenn 'the Liegeois' (fl. 1651–1655), who is documented as having provided canvas to the

portrait painter Robert Walker (1599–1658) in the early 1650s and who also sold colours.¹³ Other Flemish or French suppliers in London included a 'Monsieur Molon', whose method for priming canvas was spelled out in a manuscript treatise in the 1650s.¹⁴ By 1668 it was publicly acknowledged that canvas could 'be bought ready primed cheaper and better than you can do it your self. Few Painters ... prime it themselves, but buy it ready done,'¹⁵ but how many leading artists actually purchased ready primed canvas remains undocumented.

The trade in ready primed canvas was encouraged by the standardisation of canvas sizes for portrait painting that coincided with, and facilitated, the establishment of specialist outlets.¹⁶ The obvious reason for this standardisation was convenience for the artist, for the artists' supplier and for the frame maker. The standard canvas sizes varied slightly depending on the country of origin: artists moving from one country to another generally adopted the local standard, as did three leading portrait painters in London: Peter Lely (1616–1680) from Holland, Godfrey Kneller (1646–1723) from Germany and Michael Dahl (1659?–1743) from Sweden.¹⁷

Mary Beale (1633–1699), England's first successful female painter (Fig. 2) and the only artist whose supplies are well documented, provides insights into the sourcing of materials at the time. Detailed records survive courtesy of her husband, Charles (1632–1705), an occasional artist himself and at one stage a clerk in the Patents Office. He acted as her studio manager and prepared colours for both her use and other artists.¹⁸ He also recorded the progress of her work, and his purchases and preparation of her painting materials (Fig. 3).¹⁹

Charles Beale prepared some colours himself, especially red lake, made from imported cochineal, detailing his processes in a notebook, 'Experimental Secrets', in 1659.²⁰ He acquired other colours and materials from suppliers or fellow artists, examples being a batch of 'the best and finest ground smalt that ever came into England' in 1676 and a supply of the 'best Flemish Linseed Oile' the following year.²¹ With regard to canvases, he bought lengths of materials from linen drapers, such as John Dod (fl. 1672?–1681) and Owen Buckingham (c.1649–1713), and primed them himself rather than using a specialist primer of the kind mentioned above: in 1677 he primed as many as 175 supports and a similar number in 1681.²² Of the eight types of cloth recorded, three appear in name to be imported: Dutch cloth, Gentish Holland and Oznabrug. The first two were probably linen fabrics from the Netherlands, while Oznabrug was a commonly found linen originating from Osnabrück in Germany, described in a well-informed survey in 1695 as a 'coarse Linnen ... the white is very much used for Shirts and Shifts, the brown for Painting'.²³

Buckingham, later Sir Owen Buckingham, is known more widely for his political activities. An energetic merchant who made his fortune from trading in hemp and other materials, he became a Member of Parliament in 1698 and then Lord Mayor of London. He proposed a scheme for making sailcloth in England at a time when most linen was imported from abroad.²⁴ Import substitution, by encouraging local production, was widely practised. Import duties on French, Flemish and Dutch linens were increased several times in the 18th



Fig. 1 Unknown artist, *Thomas Sackville, 1st Earl of Dorset*, 1601, oil on oak, reverse, 110.5 × 87.6 cm, National Portrait Gallery, London.



Fig. 2 Mary Beale, *Self-portrait*, c.1666, oil on canvas, 109.2 × 87.6 cm, National Portrait Gallery, London.

century.²⁵ As a result, Irish, Scottish and English linens made considerable inroads into the home market, largely replacing foreign imports over the course of the century.²⁶

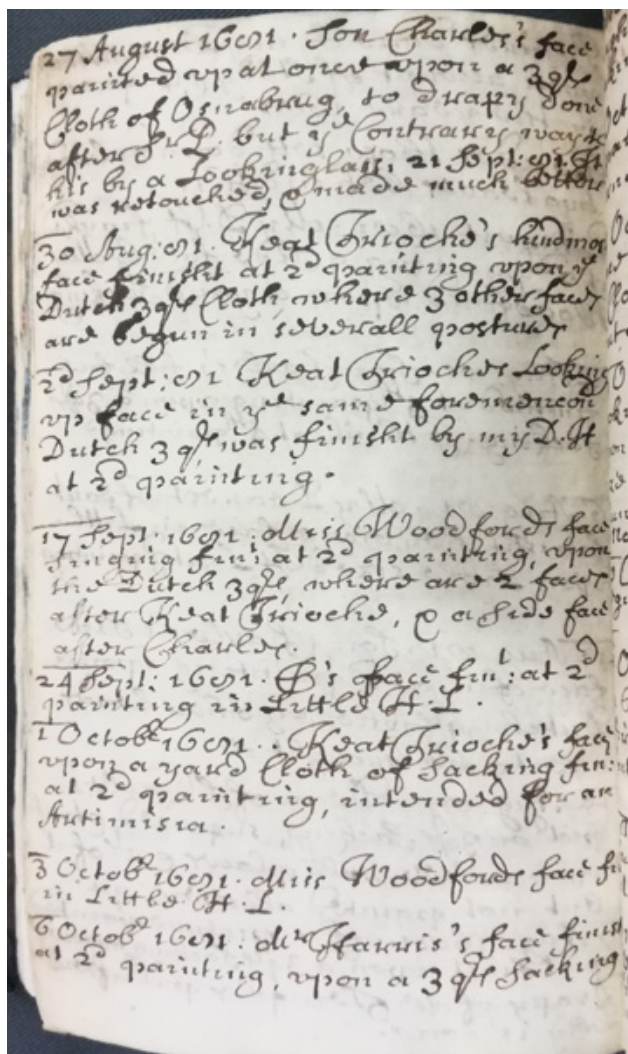


Fig. 3 Charles Beale, manuscript notebook, diary and studio record: page recording the preparation of different types of canvas, August–October 1681, interleaved in the printed annual almanac for 1681, National Portrait Gallery, London.

The rise of the artists' colourman, 1670–1750, and the early export trade

It took time for the specialised business of the artists' colourman to become fully established in London and with it the beginnings of an export trade. Leading this development were Alexander Browne (fl. 1659, d.1706), John Calfe (c.1669–1720), Edward Cooper (fl. 1682, d.1725) and Robert Keating (fl. 1717, d.1758). In order to make a living at this early date, colourmen needed to combine the trade in artists' materials with other activities, such as trading in groceries, print selling or frame making.

Alexander Browne (Fig. 4) was a miniaturist, drawing master and print publisher. In 1675, he advertised his colours and other materials in an appendix to his manual, *Ars pictoria*, in what is probably the earliest extant advertisement for artists' colours in England.²⁷ Browne makes it clear that some of these colours were imported:

Because it is very difficult to procure the Colours for Limning rightly prepared, of the best and brisk-



Fig. 4 Arnold de Jode (after Jacob Huysmans), *Alexander Browne*, 1669, engraving, 26.0 × 16.7 cm, National Portrait Gallery, London.

est Colours, I have made it part of my business any time these 16 years to collect as many of them as were exceeding good, not only here, but beyond the Seas. And for those Colours that I could not meet with all to my mind, I have taken the care and pains to make them my self.²⁸

In the next generation John Calfe traded both as a colourman and a teaman. His trade card, depicting St Luke with palette and easel, described him as a 'Colour Seller' and advertised 'all sorts of Colours, Oyles, Varnish, Brushes, pencils [fine brushes] for all sorts of painting, prim'd Cloths' (Fig. 5).²⁹ Another early 18th-century colourman, Edward Cooper, a leading print seller and auctioneer, supplied colours, primed canvas and varnish for painting. One of his best customers appears to have been Michael Dahl, as revealed by his post-mortem inventory of 1725.³⁰ There is no evidence that Cooper traded internationally but clearly some of the colours advertised in his post-mortem sale,³¹ such as ultramarine, would have been imported.

If any one individual can claim to have been the leader in the development of the role of the artists' colourman in London – and indeed in promoting an export trade – it was Robert Keating, who traded for more than 40 years, from at least 1717, in Long Acre in an area increasingly populated by artists. In 1747 he was listed in Campbell's *The London Tradesman*:

His chief Business consists in furnishing the Liberal Painters with their fine Colours. A painter may go into his Shop and be furnished with every Article he uses, such as Pencils, Brushes, Cloths ready for drawing on, and all manner of Colours ready prepared, with



Fig. 5 John Calfe, trade card, used 1711. (Photo © Trustees of the British Museum.)



Fig. 6 Arthur Pond, *Self-portrait*, 1739, etching, 18.9 × 14.1 cm, National Portrait Gallery, London.



Fig. 7 Letter from John Smibert to Arthur Pond (detail), 1749, British Library, Add. MS 23725.

which he cannot be supplied either in such Quality or Quantity in any or all the shops in London.³²

In 1730 Keating advertised his paints in one of the first detailed listings of commercially available artists' colours.³³ However, his descriptions are imprecise, as for example in his offer of a 'fine Green, not inferior to Ultramarine in its kind, for Body, Beauty and Duration, fit for Painting and Glazing,

and therefore nam'd Green Ultramarine'. The interest of the advertisement lies in Keating's engagement in the export market: he claimed that 'as there is a greater Want of these Colours Abroad than at Home, Merchants and others may be supplied with any Quantities for Exportation'.

The wider export trade in artists' materials is documented only in a few isolated instances. In America, for example, most artists' materials had to be imported.³⁴ In 1698 the lawyer and



Fig. 8 Arthur Pond (attr.), *Rhoda Delaval*, c.1750, oil on canvas, 76.8 × 68.6 cm, National Portrait Gallery, London.

plantation owner, William Fitzhugh (1651–1701), ordered his London agent to send various materials to Virginia including ‘colours for painting with pencils, Walnut Oyl & Lynseed Oil proportionable, together with half a do[zen] 3 quarter clothes to set up a painter’, together with six burnished frames to this size.³⁵ As an artist’s canvas, this cloth, called a three-quarters, was normally 30 × 25 inches (76.2 × 63.5 cm) and suitable for a half-length portrait.

Fitzhugh’s was a modest order in contrast to the needs of the Scottish portrait painter, John Smibert (1688–1751), who set up shop in Boston, selling colours, brushes and frames, which he advertised from 1734.³⁶ Between then and his death in 1751, he imported numerous primed canvases, various paints and some brushes. From at least 1743 he depended on his fellow artist in London, Arthur Pond (1701–1758) (Fig. 6), to arrange his supplies, as is evident from his regular orders. For example, in 1749 he ordered six dozen primed canvases of various sizes, ‘pencils’ and ‘fann brushes’, palette and stone knives, and also colours by the pound including large quantities of Prussian blue of four differing grades, brown pink and carmine (Fig. 7).³⁷ In one instance Smibert directed Pond to obtain his Prussian blue directly from the maker, a Mr Mitchell in Hoxton on the fringes of London. Presumably Smibert obtained other colours locally in New England.

Smibert also traded extensively in stationery, gold and silver leaf, and decorative fan papers. The fact that he practised both as a portrait painter and as a colourman and stationer shows the flexibility that was required to succeed in a developing market. The mechanics of the trade necessitated not only a trusted contact in London but also insurance in case a cargo should be lost at sea. On one occasion in 1744, Smibert’s order letter went astray when a vessel was captured by the French. But the following year he was able to purchase

gold leaf at a so-called ‘vendue sale’ in New England, when the contents of a ship captured by the British were put up for sale.³⁸ Obtaining prepared materials for resale was essential to retailers of artists’ materials but is rarely as well documented.

The international trade in pastels, 1720–1790

The fashion in Britain for pastel portraits in the 18th century – or crayon portraits as they were generally called – demonstrates the impact of imported works on local producers. Once British patrons abroad started bringing home their portraits in pastel, mainly from Venice but also from Rome and Paris, artists in London and Bath, such as Arthur Pond, William Hoare (1707–1792) and George Knapton (1698–1778), responded by producing portraits in crayon.³⁹ Furthermore, as the century progressed, colourmen in London began manufacturing their own crayons to compete with the imported product.

Small-scale portraits in crayons are found in England from the 1670s but larger scale pastels only really became fashionable from the 1720s when young men on the Grand Tour started sitting for Rosalba Carriera (1675–1757) in Venice,⁴⁰ thereby stimulating a home market. For example, the sons of the prime minister, Sir Robert Walpole (1676–1745), had their portraits painted by Carriera: the eldest Robert in about 1722, Edward in 1730 and Horace in 1741. But Sir Robert’s daughter, Mary, never visited Italy so, to complete this set of pastel portraits of his children, in 1740 he turned to one of the few British artists with Italian experience, Arthur Pond.⁴¹ Pond supplied French crayons to one of his amateur lady pupils and various materials to another (Fig. 8).⁴² His suppliers are not recorded in detail but he is known to have obtained prints from the Huguenot print seller, James Regnier (1692?–c.1754), who was offering ‘Dry Crayons, or Pastels’ in 1729,⁴³ and from another immigrant, William De La Cour (fl. 1740, d.1767), who advertised, ‘a great Choice of very fine Pastels or Crayons, of the most beautiful and useful Colours’ in 1743.⁴⁴

By the mid-1750s the superior quality of Swiss crayons, especially those made by Bernard Stoupan in Lausanne, meant that they came to be particularly esteemed in London as elsewhere in Europe.⁴⁵ They were stocked successively by the little known print seller, William Darres in 1756,⁴⁶ by the merchants Pache & Davis from 1758, who advertised their Swiss crayons in 1760 as made by Stoupan and recommended by ‘that famous Painter Liotard’,⁴⁷ and by Pache’s successor, the linen draper John James Bonhote (fl. c.1760–1780), in 1766, who promoted ‘the noted pastels, or Swiss crayons, by Bernard Stoupan, recommended for the best in Europe.’⁴⁸ Trading links often depended on trusted personal contacts. It is worth noting that both the Pache and Bonhote families were members of the Swiss church in London and, according to Bonhote, Charles Pache (fl. 1773–1775) had been a partner with Stoupan at Lausanne.

The success of Stoupan’s crayons stimulated suppliers in London to produce better quality pastels and by 1773

Bonhote's so-called 'Swiss crayons', Swiss only in name, were being made by Pache in London.⁴⁹ In 1784 these crayons were being produced locally by John David Galliard (fl. 1779–c.1790) marketed as 'Galliard's Original Swiss Crayons', which he offered for export (Fig. 9).

Innovation and a developing export market, 1750–1800

There were three main markets for British-made artists' materials in the later 18th century, all of which were expanding in size: the home, the colonial and the European, examined here in turn. The substantial growth in trade was driven by changes in an increasingly wealthy society, by the expansion of empire and by innovations and technological advances. The period saw the foundation of several exhibiting societies, including the Royal Academy in 1768. These institutions gave status to the artist and encouraged the market in paintings.

Another innovation was the establishment in 1754 of the Society for the Encouragement of Arts, Manufactures and Commerce, founded by a group of concerned individuals to 'embolden enterprise, to enlarge science, to refine art, to improve our manufactures and extend our commerce'.⁵⁰ Philosophically it stood against the old tradition of monopolies and trade secrets in favour of open competition, and encouraged better quality products by offering prizes or 'premiums' for a wide range of innovations, including improvements in artists' materials.

The Society offered awards for pastels, colours, papers and inks: in 1766 Robert Stanley's crayons were advertised as having been approved by the Society,⁵¹ and in 1773 Charles Pache was awarded a premium for establishing a manufactory of crayons.⁵² Thomas and William Reeves's short-lived partnership as colour makers was marked by an award in 1781 for the invention of the watercolour cake.⁵³ A later writer in the *Repository of Arts* credited the invention to William Reeves (1739?–1803), who 'turned his attention to the preparation of water colours, and, by his successful experiments, produced the elegant invention of forming them into cakes. Until this period, every artist was obliged to prepare his own colours'.⁵⁴ Another colourman, George Blackman (c.1764–c.1819), received an award in 1794 for his method of making oil colour cakes.⁵⁵ Awards were also granted for paper for copper plate printing paper, eventually reducing dependence on the import of French and Genoese papers.⁵⁶

From the mid-18th century on, outstanding products began to be marketed by retailers both at home and abroad by the manufacturer's name, prefiguring modern advertising: examples include Stoupan's crayons, Reeves's watercolours and Brookman's pencils. Another leading pencil maker, John Middleton (fl. c.1750, d.1795), specifically advertised that he marked his pencils with his name.⁵⁷ It became more common for picture frame makers to label their frames on the reverse and the practice of marking prepared artists' canvas with the producer's name was introduced in 1785 as a legal requirement which endured until 1831.⁵⁸



Fig. 9 John David Galliard, trade card, 1784. (Photo © Trustees of the British Museum.)

The home market

Thomas Mortimer (1730–1810) in his *Universal Director* in 1763 described the trade of the artists' colourman, listing several individuals 'whose art consists in mixing and properly preparing the finer Colours, for the use of the Painters, for whom they likewise prepare Canvasses of all sizes, ready-stretched on frames'.⁵⁹ The growing demand encouraged a new generation of colourmen such as Nathan Drake (established by 1750), Charles Sandys (1755), John Middleton (c.1775), the Reeves brothers (by 1780), John Scott (1782), James Newman (1784) and James Poole (1785). On a visit to Rome in 1757 the Scottish portrait painter, Allan Ramsay (1713–1784), commented that his supply of Sandys's 'London light oker' was the best he had seen there, being 'somewhat brighter than the Roman, and ... of a stronger body', a rare example of an artist comparing the colours of one country with another.⁶⁰

There was a thriving business in the import and export of artists' materials. John Scott (c.1752–1838), watercolour preparer, entered into a two-way trade in materials, claiming in 1784 to have 'fixed a correspondence abroad for a supply of most Foreign Articles used in Drawing'.⁶¹ Drawing materials in London were often advertised by nationality including Swiss crayons and crayon pencils, Italian crayon pencils and coloured pencils, Italian and French black, red and white chalks, and Dutch and French drawing paper. The best brushes came from France. Many colours in their raw form were imported, as a handbook published in 1785 makes clear.⁶²

If articles were not imported, they might be made by immigrant manufacturers, whether German, French, Flemish or Italian. Various continental entrepreneurs settled in London, attracted by the wealth of the city and, in some cases, its political and religious freedoms. From Germany, Lewis Berger (1741–1814), born Louis Steigenberger, set up as a colour manufacturer in 1780, in Homerton, then on the edge of London – an operation that expanded to become a major wholesale business. Rudolph Ackermann (1764–1834), a carriage designer by training, abandoned his native Saxony and moved to London in about 1787, opening his celebrated *Repository of Art* in the Strand in 1797 (Fig. 10).

From France, Constant de Massoul (1755–1813), a refugee from revolutionary Paris, set up a short-lived manufactory of



Fig. 10 *Ackermann's Repository of Arts*, 1809, etching and aquatint, 13.2 × 22.2 cm. (Photo © Victoria and Albert Museum.)

superfine colours in 1794 and three years later published the first artists' manual of its kind to be produced by a manufacturing colourman.⁶³ He had a later connection with a Paris *marchand de couleurs*, P.C. Lambertye.⁶⁴ From Flanders, the brush maker, Derveaux, was described in about 1789 as dealing in 'Lyon's tools & fitch pencils'.⁶⁵ His brushes were used by leading artists including Joseph Wright of Derby (1734–1797), Philip Jacques de Loutherbourg (1740–1812), John Trumbull (1756–1843) and probably John Hoppner (1758–1810), at whose premises he resided for a time.

From Italy, the colour merchant, Sebastiano Grandi (fl. 1789–1822?), described by the chemist, George Field (1777–1854), as 'a most ignorant Italian quack in Colours', was in London by 1789 and awarded a medal in 1806 from the Society for the Encouragement of Arts, Manufactures and Commerce for his painting colours and materials. In 1797 he was among those offering to instruct Royal Academicians in the notorious 'Venetian process', a system of painting with a secret medium which would allow them to achieve a similar effect to Venetian old master paintings.⁶⁶ Benjamin West (1738–1820) and other artists explored the process, finding it disappointing, leading James Gillray (1756–1815) to caricature their gullibility (Fig. 11).

Of these immigrant manufacturers, only Berger and Ackermann had a lasting impact on the market – otherwise the trade in London in artists' materials was dominated by British businesses.

Colonial markets

The colonial market can be seen as a captive extension of the home market. Legal restrictions obliged the colonies

to trade with Britain which meant, for example, that when Quebec became a British colony in 1763, trade switched from France to Britain.⁶⁷ There were frequent advertisements in the American press for artists' materials newly arrived from London and these continued into the 19th century. The trade involved a wide range of materials, sometimes in large quantities. There were two means by which artists obtained materials: direct order through a London agent or supplier, or through an American retailer stocking imported materials.

Much as John Smibert had done a generation earlier, American-born John Singleton Copley (1738–1815) ordered materials directly through a contact in London in 1771. These included 30 canvases of different sizes, brushes, Italian white and black chalk, vermilion and poppy oil.⁶⁸ On an earlier occasion in 1762 he had been intent on obtaining a set of the best Swiss crayons directly through the artist, Jean-Étienne Liotard (1702–1789), in Geneva.⁶⁹

Brushes were in demand and were ordered both by artists and retailers. In 1789 the Quebec artist, François Baillairgé (1759–1830), asked for paint brushes to be sent from London,⁷⁰ and in 1790 John Trumbull on his return to America received a large variety of brushes from the aforementioned Derveaux.⁷¹ In 1806 an English ship brought the Boston merchant, Samuel Tuck, 450 gross of artists' brushes and 12 dozen canvases for portrait painting.⁷²

The export of colours to India and North America formed an important part of the trade of William and Thomas Reeves (although it is not easy to distinguish which brother was involved after their short-lived partnership ended in 1783).⁷³ Reeves's colours were available for sale in Calcutta in 1787 and 1790.⁷⁴ Their watercolours were widely advertised in North America and the West Indies: in Philadelphia from 1786, New York from 1787, Charleston from 1790, Grenada from 1790,

Jamaica from 1791, Quebec from 1791, Baltimore from 1792 and Boston from 1799.⁷⁵ The miniaturist, Archibald Robertson (1765–1835), writing from New York in September 1800, stated that the colours he used were all from Reeves except for white which he prepared himself.⁷⁶

The story that midshipman Isaac Smith (1752–1831) carried a box of Reeves colours around the world on Captain Cook's voyage to Australia in 1770 is difficult to verify;⁷⁷ the earliest evidence for the export of materials to Australia is not found until about 1805.⁷⁸

European markets

European markets were different – artists' canvases, paints and brushes were generally sourced locally, at least until the 19th century when the market became more international. Specific British materials were, however, in demand owing to their exceptional quality, including copper plates, lead pencils, certain papers and watercolour paints.

In the 17th century, copper plates for engraving in London were imported from the Continent, generally from the Dutch Republic as one of the large centres of engraving.⁷⁹ The evidence is limited but by the mid-18th century the direction of this trade had probably reversed as British copper plates came to be prized for their excellence.⁸⁰ As more and more prints were published in London, the standard of locally produced plates increased, encouraged by improvements in production methods. The exceptionally large plates, almost a metre across, required in Paris in 1767 for the series, *The Victories of the Emperor Qianlong*, were ordered from London,⁸¹ while Goya used plates made in London by William and Russell Pontifex & Co for his *Disparates* and *Tauromaquia* series in the early 19th century.⁸² William Pontifex's partner, Richard Jones (fl. 1772, d.1788), advertised in the 1780s his 'New Invented Machine for Polishing Copper Plates for Callico printers, Engravers, which makes them exceeding smooth & level' (Fig. 12). Innovations of this kind helped coppersmiths to produce plates of improved quality at competitive prices.

In his *Italianische Reise*, an account of his visit to Italy in 1786–88, Johann Wolfgang von Goethe (1749–1832) refers to the 'excellent English pencils' used by his artist friend, Christoph Heinrich Kniep (1755–1825).⁸³ A few years earlier, in 1775, Father John Thorpe (1726–1792) had written from Rome to his patron, Lord Arundell, claiming that the only good black lead pencils came from England.⁸⁴ Their reputation was built on the quality of the manufactured product which in turn depended on the supply of 'black lead' from mines in Cumberland. One leading London supplier, Nicholas Middleton (1728?–1804), advertised in 1779 that the finest vein of lead ever remembered had been found in the Cumberland mines.⁸⁵ Later, between 1815 and 1820, his son of the same name advertised his pencils in French, implying an export market.⁸⁶ But by then inroads into the market were being made by Nicolas-Jacques Conté's pencils, a French innovation driven by wartime conditions when English pencils were unavailable.

John Scott advertised in 1783 that his colours were on sale in Paris on the quai des Morfondus,⁸⁷ but his claims are



Fig. 11 James Gillray, *Titianus Redivivus; or the Seven-Wise-Men Consulting the New Venetian Oracle*, 1797, etching, 55.1 × 42.5 cm, National Portrait Gallery, London.

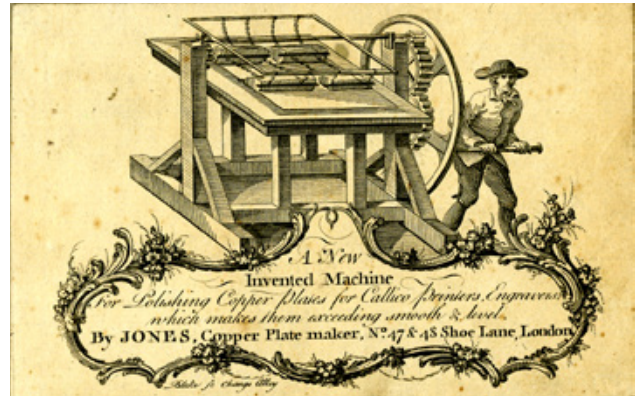


Fig. 12 Richard Jones, trade card, 1780s. (Photo © Trustees of the British Museum.)

difficult to corroborate. We do know, however, that in the post-Napoleonic era, British colours regularly became available in Paris and elsewhere in Europe.⁸⁸

Considerable quantities of Dutch and French papers had long been imported into Britain but by the late 18th century James Whatman's drawing paper was of such good quality that it began to be exported and was used in France, for example, by Louis Carrogis Carmontelle (1717–1806) for his transparencies in the 1780s.⁸⁹ Such was its reputation that forged 'Whatman' paper was made in Austria and France in the early 19th century.⁹⁰

It was a matter of the quality of the product that led to artists' materials being traded across borders. Trade remained

two-way: for example, French brushes enjoyed a high reputation in London. By 1803, following the renewal of hostilities with France, Thomas Lawrence (1769–1830), future president of the Royal Academy, was ‘wishing for Paris brushes’, according to his artist friend, Joseph Farington (1747–1821).⁹¹ It was not until the end of the Napoleonic wars that the European trade opened up again.⁹² The 18th century had witnessed a transformation in the business of the artists’ colourman in London, which meant that English companies were well placed to market their products internationally in the century that followed.

Conclusions

The themes discussed here – the movement of artists and manufacturers, import substitution and the encouragement of exports, innovation and the use of natural resources, and the importance of trading links – do not just apply to one city, London, at one period, the 17th and 18th centuries, but are of enduring validity across countries and times. What is particular to this account is the growing scale of the home market as the demand for paintings increased, the importance of colonial markets as they expanded in the 18th century and the growth of a European market for exceptional products as the century progressed. By the mid-18th century, the artists’ colourman was established as a specialist trade stocking all that a painter might need. There was a thriving business in the import and export of materials supported by a developing network of trading links. Outstanding products began to be marketed at home and abroad under the name of the manufacturer prefiguring modern advertising.

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Notes

- For the 16th century in London, see J. Kirby, ‘Trade in painters’ materials in sixteenth-century London’, in J. Kirby, S. Nash and J. Cannon (eds), *Trade in Artists’ Materials: Markets and Commerce in Europe to 1700*, London, Archetype Publications, 2010, pp. 339–355.
- Biographical details for suppliers mentioned in this article can be found in ‘British artists’ suppliers, 1650–1950’ on the National Portrait Gallery website: www.npg.org.uk/research/.
- See especially S. Kollmann, *Niederländische Künstler und Kunst im London des 17. Jahrhunderts, Studien zur Kunstgeschichte* 135, Hildesheim/Zurich/New York, Georg Olms, 2000.
- U. Haller, ‘“Administrator of Painting”: the purchase and distribution book of Wolf Pronner (1586–1590) as a source for the history of painting materials’, in Kirby *et al.* 2010 (cited in note 1), pp. 325–335.
- A.H. Christensen, ‘The Royal Danish Colour Chamber and the 17th-century trade in artists’ materials’, in S. Eyb-Green, J.H. Townsend, S. Kroustallis, K. Pilz and I. van Leeuwen (eds), *Sources on Art Technology: Back to Basics*, London, Archetype Publications, 2010, pp. 158–159.
- For Holland, see A. Wallert, ‘Unpublished 17th-century documents relevant to the production of artists’ pigments’, in Eyb-Green *et al.* 2010 (cited in note 5), p. 134. For Antwerp, see J. Kirby, ‘The painter’s trade in the seventeenth century: theory and practice’, *National Gallery Technical Bulletin* 20, 1999, pp. 33–35. For Venice see, J.A. Delancey, ‘“In the streets where they sell colors”: placing *vendecolori* in the urban fabric of early modern Venice’, *Wallraf-Richartz-Jahrbuch* 72, 2011, pp. 193–232.
- British Library, Ms Sloane 2052, f. 84v; see also Kirby 1999 (cited in note 6), pp. 11–15.
- For the smalt trade in London, see R.D. Harley, *Artists’ Pigments c. 1600–1835: A Study in English Documentary Sources*, London, Butterworths, 1970, pp. 183–190 and N. Costaras, ‘Early modern blues: the smalt patent in context’, in Kirby *et al.* 2010 (cited in note 1), pp. 401–414. For individual painters, see E. Town, ‘A biographical dictionary of London painters, 1547–1625’, *Walpole Society* 76, 2014.
- For this portrait see ‘Tudor and Jacobean portraits database’ on the National Portrait Gallery website: www.npg.org.uk/collections/.
- To take the example of the National Portrait Gallery collections database, 70% of portraits dating to 1590–1620 are on panel compared to 8% of those dating to 1630–1660. The transitional decade, 1620–1630, has been excluded from this analysis.
- M. Hayward, ‘The London linen trade, 1509–1641, and the use of linen by painters in royal service’, in Kirby *et al.* 2010 (cited in note 1), pp. 375–385.
- M.K. Talley, *Portrait Painting in England: Studies in the Technical Literature before 1700*, London, Paul Mellon Centre for Studies in British Art, 1981, pp. 132, 136. Portman was recorded in the return of aliens of 1639 as a Dutch painter living in the parish of St Martin-in-the-Fields: I. Scoulodi, *Returns of Strangers in the Metropolis 1593, 1627, 1635, 1639: A Study of an Active Minority*, Quarto series of the Huguenot Society of London 57, 1985, p. 328.
- M. Beal, *A Study of Richard Symonds: His Italian Notebooks and their Relevance to Seventeenth Century Painting Techniques*, PhD thesis, University of London, 1978, Ann Arbor and London, University Microfilms International, 1980, pp. 88, 307, 311; Talley 1981 (cited in note 12), p. 204.
- British Library, Add. Ms 12461, f. 52, Daniel King, ‘Miniatura or the Art of Limning’, for which see Talley 1981 (cited in note 12), pp. 218–219. This manuscript includes technical material on painting pictures on canvas and panel.
- Anon., *The Excellency of the Pen and Pencil*, London, D. Newman and R. Jones, 1668, p. 92.
- J. Simon, ‘“Three-quarters, kit-kats and half-lengths”: British portrait painters and their canvas sizes, 1625–1850’, London, National Portrait Gallery, 2013. Available at: <https://www.npg.org.uk/research/programmes/artists-their-materials-and-suppliers/three-quarters-kit-kats-and-half-lengths-british-portrait-painters-and-their-canvas-sizes-1625-1850/>.
- For the adoption of standard sizes by these and other artists, see Simon 2013 (cited in note 16).
- The best technical study is Talley 1981 (cited in note 12), pp. 270–305. Beale’s experience as a clerk may help explain his meticulous care in recording his wife’s work and materials.

19. Charles Beale recorded his observations in a long series of commercially available printed annual almanacs. He interleaved these almanacs with paper to take his manuscript notes. The series is known to have started in 1661 but only two survive – those for 1677 and 1681 – in the Bodleian Library, Oxford, and the National Portrait Gallery, London.
20. M. Bustin, 'Experimental secrets and extraordinary colours', in T. Barber, *Mary Beale: Portrait of a Seventeenth-Century Painter, Her Family and Her Studio*, London, Geffrye Museum Trust, 1999, pp. 45–46. Beale's notebook, 'Experimental Secrets', does not form part of the series of almanacs referred to in note 19.
21. G. Vertue, 'Vertue note books, vol. IV', *Walpole Society* 24, 1936, p. 174; Bodleian Library, University of Oxford, Ms Rawl. 8°, 572, Beale notebook, 12 June 1677.
22. Talley 1981 (cited in note 12), pp. 282–283.
23. Anon. ('J.F.'), *The Merchant's Ware-House Laid Open: Or, the Plain Dealing Linnen-Draper*, London, J. Sprint and G. Conyers, 1695, p. 32.
24. E. Cruickshanks, S. Handley and D.W. Hayton, *The History of Parliament: The House of Commons 1690–1715*, vol. 3, London, History of Parliament Trust, 2002, pp. 389–390.
25. N.B. Harte, 'The rise of protection and the English linen trade, 1690–1790', in N.B. Harte and K.G. Ponting (eds), *Textile History and Economic History: Essays in Honour of Miss Julia de Lacy Mann*, Manchester, Manchester University Press, 1973, pp. 74–112.
26. Ibid.
27. Harley 1970 (cited in note 8), p. 17.
28. A. Browne, *Ars Pictoria: Or an Academy Treating of Drawing, Painting, Limning, Etching*, London, A. Tooker and W. Battersby, 1675, p. 39.
29. Calfe's card includes a list of disbursements on the reverse for the period 1709–1712.
30. The National Archives, PROB 3/24/190.
31. *Daily Post* 8 May 1725.
32. R. Campbell, *The London Tradesman. Being a compendious view of all the trades, professions, arts, both liberal and mechanic, now practised in the cities of London and Westminster*, London, Thomas Gardner, 1747, p. 105.
33. *London Evening Post* 15 October 1730.
34. For an account of the American market, see L. Mayer and G. Myers, *American Painters on Technique: The Colonial Period to 1860*, Los Angeles, J. Paul Getty Museum, 2011, pp. 1–5.
35. R.B. Davis (ed.), *William Fitzhugh and his Chesapeake World, 1676–1701: The Fitzhugh Letters and other Documents*, Chapel Hill, University of North Carolina Press, 1963, pp. 366–367.
36. R.H. Saunders, *John Smibert: Colonial America's First Portrait Painter*, New Haven and London, Yale University Press, 1995, p. 100, quoting the *Boston Newsletter* 10–17 October 1734.
37. Saunders 1995 (cited in note 36), pp. 255, 257–261.
38. H.W. Foote, *John Smibert, Painter*, Cambridge MA, Harvard University Press, 1950, p. 92, noting the purchaser at the sale as 'Smibert'.
39. For a fuller discussion, see J. Simon, 'The production, framing and care of English pastel portraits in the eighteenth century', *The Paper Conservator* 22, 1998, p. 10.
40. For the market in pastel portraits and in copies after Carriera, see C. Whistler, 'Rosalba Carriera e il mondo britannico', in G. Pavanetto (ed.), *Rosalba Carriera, 1673–1757: Atti del Convegno internazionale di studi*, 2007, Verona, Scripta, 2009, pp. 181–206.
41. See Simon 1998 (cited in note 39), pp. 10–11. These portraits at Houghton Hall, Norfolk are reproduced in A.W. Moore, *Norfolk & the Grand Tour*, Norwich, Norfolk Museums Service, 1985, pp. 23, 88–89, 133.
42. Simon 1998 (cited in note 39), p. 11, for Pond's supply of French crayons to a pupil in 1735.
43. *Daily Courant* 3 February 1729.
44. *Daily Advertiser* 26 April 1743.
45. For Stoupan's international trade, see Neil Jeffares, *Dictionary of Pastellists before 1800*. Available at: www.pastellists.com/Articles/STOUPAN.pdf (accessed 16 April 2019); see also C. Gombaud and L. Sauvage, 'Liotard, Stoupan and the colours available to 18th-century European artists', in Eyb-Green *et al.* 2016 (cited in note 5), pp. 115–123.
46. *Public Advertiser* 5 January 1756.
47. *Public Advertiser* 30 April 1760.
48. Shakespeare Centre Library, Stratford-upon-Avon, Leigh MSS. DR.18/5; see Simon 1998 (cited in note 39), p. 14, n. 31.
49. *London Evening Post* 8 April 1773.
50. D.G.C. Allan, 'The life of William Shipley, 1715–1803', *Journal of the Royal Society of Arts* 113, 1965, p. 921.
51. *Public Advertiser* 6 September 1766.
52. *London Evening Post* 24 May 1774.
53. M. Goodwin, *Artist and Colourman*, Enfield, the author, 1966, pp. 18–19.
54. Anon., 'Observations on the rise and progress of painting in water colours', *Repository of Arts* 9, 1813, p. 91.
55. 'Polite arts', *Transactions of the Society of Arts* 1794, pp. 271–279; see also L. Carlyle, *The Artist's Assistant: Oil Painting Instruction Manuals and Handbooks in Britain 1800–1900*, London, Archetype Publications, 2001, pp. 113–114.
56. J. Krill, *English Artists' Paper*, 2nd edn, Delaware, Oak Knoll Press/Winterthur, Winterthur Museum, 2002, pp. 71–72.
57. For example, *Public Advertiser* 20 September 1773.
58. S. Woodcock, 'Excise stamps on artists' canvases: lost threads and loose ends', in A. Wallert (ed.), *Painting Techniques: History, Materials and Studio Practice*, Amsterdam, Rijksmuseum, 2016, p. 192.
59. T. Mortimer, *The Universal Director*, part 2, London, J. Coote, 1763, p. 25.
60. National Galleries of Scotland, D4878, Ramsay's Italian sketchbook, 'Observations upon Colours', Rome, 3 March 1757.
61. *General Evening Post* 6 January 1784.
62. Anon., 'A compendium of colours, &c.', *The Artist's Repository and Drawing Magazine* 3, 1785, pp. 17–75.
63. C. De Massoul, *A Treatise on the Art of Painting*, London, the author, 1797. For this manual, see Harley 1970 (cited in note 8), p. 25 and Carlyle 2001 (cited in note 55), p. 283.
64. See N. Jeffares, 'Constant de Massoul: soldier, émigré and colourman'. Available at: <https://neiljeffares.wordpress.com/2017/02/11/constant-de-massoul-soldier-emigre-and-colourman/> (accessed 16 April 2019).
65. E.E. Barker, 'Documents relating to Joseph Wright of Derby (1734–97)', *Walpole Society* 71, 2009, p. 130.
66. K. Garlick and A. MacIntyre (eds), *The Diary of Joseph Farington*, New Haven and London, Yale University Press, 1979, p. 811; see also J. Gage, 'Magilphs and mysteries', *Apollo* 80, 1964, pp. 38–41, for the role of Anne Provis.
67. See P.-O. Ouellet, 'The market of art materials in Quebec at the end of the 18th century: a study into the Canadian artist François Baillairgé's *Journal* (1784–1800)', in this volume, pp. 99–110.
68. G. Jones (ed.), *Letters & Papers of John Singleton Copley and Henry Pelham, 1739–1776*, Boston, Massachusetts Historical Society, 1914, pp. 115–160.
69. Jones 1914 (cited in note 68), p. 26.
70. R.S. Levenson, 'Materials and techniques of painters in Québec City, 1760–1850', *Journal of Canadian Art History* 7, 1983, p. 10. For Baillairgé, see Ouellet 2019 (cited in note 67).
71. Mayer and Myers 2011 (cited in note 34), p. 5.

72. *Independent Chronicle*, Boston, 4 December 1806.
73. Goodwin 1966 (cited in note 53), pp. 26–27.
74. *Calcutta Chronicle* 25 October 1787; *India Gazette* 10 May 1790.
75. *Pennsylvania Packet*, Philadelphia, 16 May 1786; *New York Packet*, 25 May 1787; *City Gazette*, Charleston, 23 April 1790; *St George's Chronicle*, Grenada, 19 November 1790; *Daily Advertiser*, Kingston, 21 October 1791; Levenson 1983 (cited in note 70), pp. 9, 39 for Quebec; *Baltimore Evening Post*, 18 July 1792; *Columbian Centinel*, Boston, 20 February 1799.
76. E. Robertson (ed.), *Letters and Papers of Andrew Robertson*, 2nd edn, London, Eyre and Spottiswoode, 1897, pp. 21, 37.
77. Reeves did not produce paintboxes until the decade following Cook's voyage. For Smith's paintbox (Museum of London), see Goodwin 1966 (cited in note 53), p. 20, reproduced opposite p. 28.
78. E. Burgess and P. Dredge, 'Supplying artists' materials to Australia 1788–1850', in A. Roy and P. Smith (eds), *Painting Techniques History, Materials and Studio Practice*, London, International Institute for Conservation, 1998, p. 199.
79. Richard Symonds in the 1650s refers to a coppersmith near St Paul's Cathedral who stocked ready polished plates from Holland: see Beal 1980 (cited in note 13), p. 204. Holland is again identified as the source for copper plates in 1668: see Anon. 1668 (cited in note 15), p. 55.
80. A. Griffiths, *The Print before Photography: An Introduction to European Printmaking 1550–1820*, London, British Museum Press, 2016, p. 29.
81. T. Szrajber, 'The Victories of the Emperor Qianlong', *Print Quarterly* 23, 2006, p. 41.
82. N. Glendinning, 'La problemática historia de los Disparates y su interpretación carnalesca', in *Francisco de Goya. Grabador: instantáneas: Disparates*, Madrid, Caser, 1992, p. 19, n. 1. From the trading name and address, Pontifex's plates were probably manufactured between 1805 and 1813.
83. J.W. Goethe, *Italian Journey [1786–1788]*, W.H. Auden and E. Mayer (trs), Harmondsworth, Penguin Books, 1970, pp. 217, 304.
84. Paul Mellon Centre, Brinsley Ford archive, RBF/1/714, letter, 11 February 1775.
85. *Morning Post* 24 August 1779.
86. British Museum, Banks, 89.20, trade card.
87. *General Evening Post* 23 December 1783.
88. J. Simon, 'London 1815–1914: importing and exporting artists' materials and the role of immigrant suppliers', in *Migrants: Art, Artists, Materials and Ideas Crossing Borders*, London, Archetype Publications, forthcoming.
89. L. Chatel de Brancion, *Carmontelle's Landscape Transparencies: Cinema of the Enlightenment*, Los Angeles, J. Paul Getty Museum, 2008, pp. 24–25.
90. P. Bower and R. Hills, 'British watermarks: forgeries of Whatman marks', *The Quarterly. The Review of the British Association of Paper Historians* 17, 1996, pp. 1–4.
91. Garlick and MacIntyre 1979 (cited in note 66), p. 1988.
92. Simon forthcoming (cited in note 88).

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THE MARKET OF ART MATERIALS IN QUEBEC AT THE END OF THE 18TH CENTURY: A STUDY OF CANADIAN ARTIST FRANÇOIS BAILLAIRGÉ'S *JOURNAL* (1784–1800)

Pierre-Olivier Ouellet

ABSTRACT At the end of the 18th century in Quebec City, François Baillairgé (1759–1830) was the principal artist of the British colony in North America. After the completion of his studies at the Royal Academy of Painting and Sculpture in Paris, he pursued a diversified career, particularly as a painter. His *Journal* (diary) or 'livres des dépenses et affaires', compiling his studio's activities, income and expenses between 1784 and 1800, lists and attests to the various activities conducted by the artist in his quest for suitable painting materials. In fact, Baillairgé dealt with retail networks and established diverse relationships in the local art market. In this regard, sharing a geographical proximity with his suppliers, he also developed friendships and assumed the role of godfather for a merchant's son. Moreover, in the form of reciprocity of services, the artist responded to orders from his suppliers – he even interfered in the market by selling painting materials himself. Finally, aiming for a certain autonomy in a market largely dependent on cargo from the British ships, Baillairgé was creative in attempting to employ locally available natural resources.

Introduction and context

Following the British conquest of 1759–60 and the end of the Seven Years' War (1756–63), Canada experienced a new sociopolitical situation.¹ In 1763, with the Treaty of Paris, New France's vast territory, that extended roughly from the Gulf of Saint-Laurent to the Gulf of Mexico, passing by the Great Lakes, was largely ceded by France to England. Shortly thereafter, with the Royal Proclamation of 1763, the 60,000 inhabitants of the former French colony became British subjects.² They witnessed the reduction of their territory to the St. Lawrence Valley, henceforth called the 'Province of Quebec', had British Common Law imposed upon them, and found themselves with no institutional recognition of either their French language or their Catholic religion.

Despite the initial measures taken by British authorities to assimilate the French-speaking inhabitants and convert them to Protestantism, this colonial strategy was revised a few years later: in 1774, the Quebec Act reinstated French civil laws as well as certain fundamental rights. The Catholic religion was

recognised and the territory was enlarged, stretching to the Great Lakes region.

The change of regime and the upheavals of the last quarter of the 18th century, which included the American War of Independence (1775–83), deeply affected Canadian society. These disrupting events also had a strong impact on the colonial painting market. The change in regime from French to British marked the end of an art trade which had been carried out for decades between the colony and France.³ The direct circulation of pictorial art from France – as well as networks and relations with French merchants and painters – were either broken or complicated. Because French-flagged vessels no longer had the right to sail on the St. Lawrence river, trade now necessarily involved intermediaries established in England.

In this period of adaptation and reconstruction, the new dynamics reconfigured the painting market.⁴ Of course, new commercial connections were created with the British,⁵ but the reluctance of Catholic authorities to order religious works from Protestant merchants affected the overseas circuit. Based on mistrust or cost issues, this reluctance nonetheless



Fig. 1 François Baillairgé, *Study of a Reclining Male Nude*, 1778–1781, red chalk and graphite on paper, 44.7 × 58.2 cm, Québec, Musée national des beaux-arts du Québec, inv. no. 1975.239. (Photo: MNBAQ, Jean-Guy Kérucac.)

had the beneficial effect of fostering the development of local production which, carried out on the spot, could consequently be overseen and controlled by its commissioners. The Canadian Church's support for resident painters – which had been almost non-existent during the French regime – enabled some artists to establish their practice.

This growth in local pictorial production during the last two decades of the 18th century also had the side effect of stimulating the market for painting materials in the British colony. In this regard, the *Journal* (diary) or 'livres des dépenses et affaires'⁶ of Canadian artist François Baillairgé (1759–1830), which records his workshop's activities methodically between 1784 and 1800, is highly relevant as it identifies the different intermediaries, networks and means of obtaining artists' materials that were available to the painter. In fact, in a colony that had no enterprise solely dedicated to producing, distributing or selling art materials, by studying this manuscript it can be seen that Baillairgé fitted into an eclectic market.⁷ He had to rely on a combination of ingenuity and traditional networks of retail sales – from Quebec's non-specialist merchants who imported canvases, pigments and brushes, as well as other goods, from London. Moreover, far from being merely passive regarding the

colonial situation, this research proposes that through his many activities, experiments and interrelations with merchants and artists of the time, Baillairgé actively participated in the local market's diversification.

François Baillairgé

François Baillairgé was born in Quebec City in 1759,⁸ the son of Jean Baillairgé (1726–1805), a craftsman who was promoted to the rank of architect after the British Conquest. Undoubtedly pressured by his father, so that he could assist him and even succeed him, François began his artistic training at the age of 14. As there were no art schools in the colony he served his apprenticeship at his father's workshop, where he was taught the rudiments of carpentry, sculpture and architecture.⁹ The sculptor Antoine Jacson (c.1725–1803) also imparted his knowledge to the young François. At the age of 17, he studied drawing 'at the hands of Mr. Nicol Swiss engineer, his father's companion.'¹⁰ Having exhausted the artistic education opportunities in the colony, aged 19 Baillairgé left Quebec to continue his training in Paris. His father paid for

his studies and living costs,¹¹ and the Quebec Séminaire des Missions Étrangères (Foreign Missions Seminary) provided supervision and support on site in the French metropolis through its mother house and its director, Abbot François Sorbier de Villars (1720–1788).

Shortly after his arrival in Paris in September 1778, Baillairgé was accepted as a pupil at the private studio of the sculptor Jean-Baptiste Stouf (1742–1826) and in February 1779, he became the first French Canadian to study at the famous Royal Academy of Painting and Sculpture of Paris. Over the next two years, he perfected the art of drawing according to the academic method: a set and gradual sequence of learning, moving from two-dimensional models to copying and live model drawing (Fig. 1).¹² He also attended theoretical perspective and anatomy classes. At the end of 1780, just three months before his departure from Paris, the young François was introduced to the art of painting in the workshop of Simon Julien (1735–1800), recipient of the Prix de Rome in 1760. Finally, after having been 'rendu capable' according to the sculptor Jean-Baptiste Stouf, and with Abbot François Sorbier de Villars fearing that a long stay in Paris could 'become dangerous ... And dissuade him from returning to his Country',¹³ Baillairgé was sent back to the colony in 1781.

On his return to Quebec City, Baillairgé joined a market with limited competition among artists – there were only a few painters in the colony, none of whom could boast such specialist training. Invited by all parties, Baillairgé received very diverse commissions, which highlight his reputation as a versatile artist. In addition to carving wood and decorating churches, he demonstrated his ability to draw architectural plans. He also met the many demands that encouraged him to handle the brush. François Baillairgé thus began a fruitful career that made him not only one of the most eminent members of a famous family of architects, painters and sculptors, but also one of the most prominent Canadian artists of his time.

While Baillairgé's sculpted, drawn and architectural work has attracted the attention of art historians, little research has been carried out into the artist's paintings. François Baillairgé wished to be recognised as a painter on his return from Europe, and he devoted a great deal of time and energy to painting religious subjects.¹⁴

This lack of interest can be explained in part by the low pictorial quality of his paintings and is inexorably linked to the artist's lack of education in painting (Fig. 2). Aware of his own struggle with this medium, in 1785, he even sought the assistance of Quebec connoisseurs through a newspaper advertisement in the hope of receiving favourable criticism and advice that would enable him to attain perfection:

The subscriber desires such Gentlemen as have a taste for Painting and are Connoisseurs in that art, may be pleas'd to call at his shop in St. Ann's street, adjoining Dr. Montmollin's yard, where they may see and examine a picture of St. Peter and Paul, executed by him for the Grand Altar of the church at the Bay of that name. – Tho' incapable of procuring in this country necessary insight to direct him, he flatters himself that the criticism and advice of those skill'd in the art



Fig. 2 François Baillairgé, *Saint Francis Xavier Preaching in India*, 1805, oil on canvas, 243 × 168 cm, Québec, Musée national des beaux-arts du Québec, inv. no. 1986.28. (Photo: MNBAQ, Patrick Altman.)

may be a means of his attaining that perfection in it he aspires to. Québec, September 26, 1785. FRANCIS BAILLAIRGÉ.¹⁵

He also tried to remedy his incomplete education by studying art technical and theoretical books.¹⁶ Although he could never compete in virtuosity with the great European Masters, within the Canadian context, his abilities would prove sufficient to satisfy art lovers and be awarded several pictorial commissions throughout his career. Therefore, these works, once excluded from questions relating to 'great painting' or subject to unfavourable comparison with exceptional works, are grounds for further discussion. In this paper, the focus is not on aesthetics and taste (which would have been fascinating as well) but the specific materials used by the painter. The results of analyses of Baillairgé's paintings conducted by the Canadian Conservation Institute (CCI) are then related to the contents of the artist's diary.

Baillairgé's diary

Baillairgé's diary, an exceptional source for the study of Canadian art history, is held by the Bibliothèque et Archives nationales du Québec.¹⁷ In this diary, which covers the period from September 1784 to December 1800, Baillairgé logged his

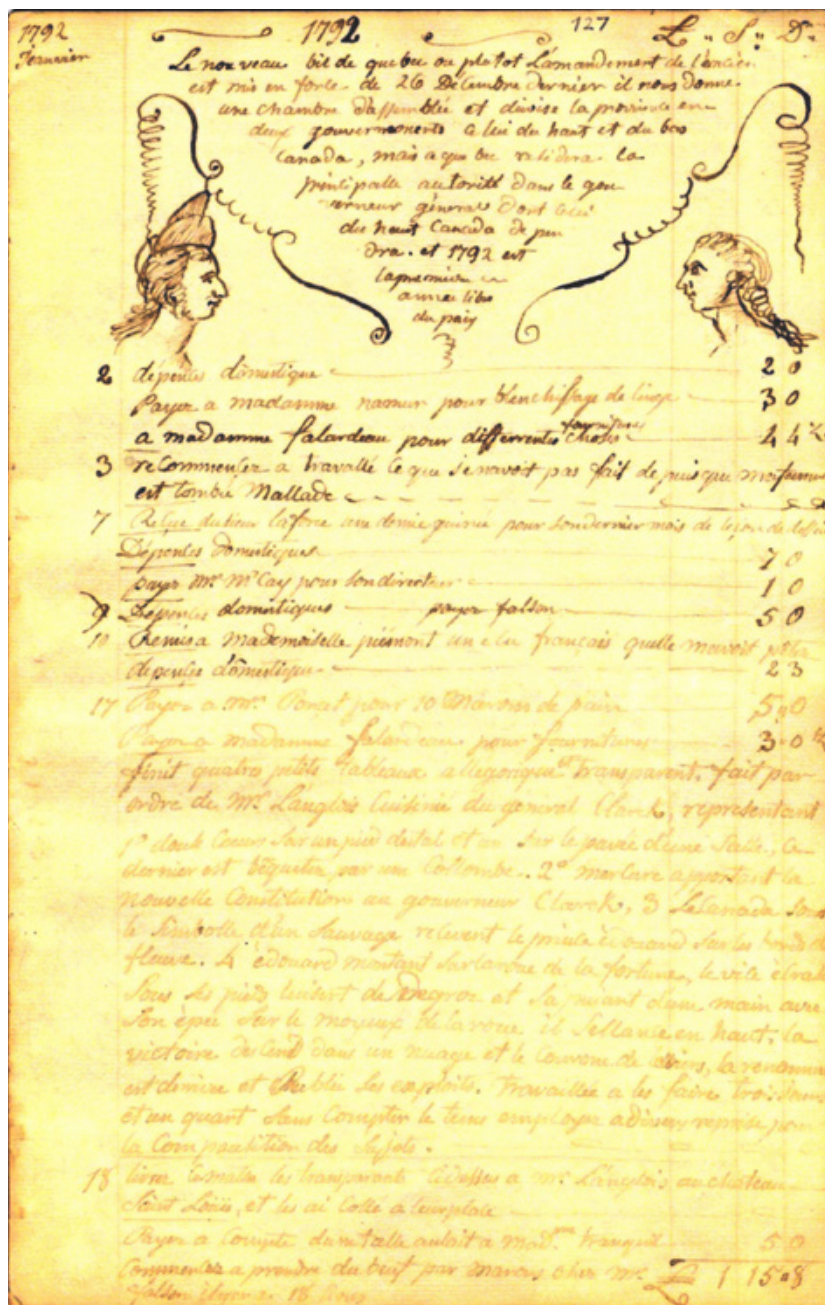


Fig. 3 Folio 127 of Baillairgé's diary, including the drawing of two characters made in 1792. (Photo: Québec, Bibliothèque et Archives nationales du Québec, 'Livre de compte incluant le journal personnel de François Baillairgé, Fonds François-Baillairgé, inv. no. P398,P1.)

daily expenses, both personal and professional. Not only is the diary full of small details, such as the purchase of pigments, Malaga wine and 'maple sugar', Baillairgé also recorded his artistic activities and time spent on some of his productions. To all this is added some personal information, a poem and drawings (Fig. 3). Acting as a commonplace book, Baillairgé kept track of his accounts in this diary and, probably referred to it as a summary record of his orders and achievements. Conscious of his versatility and confident in his abilities, he presents himself in the frontispiece of his diary in these terms: 'Painter, and Sculptor & Architect, and Drawing Master' (Fig. 4).

Furthermore, this diary reveals a story less devoted to the analysis of the object, its forms or its iconography and more to the study of the artist's activities. In short, it helps to

decentralise attention from the finished and surviving object towards questions relating to the creation process and the artist's interactions and negotiations with his environment and its many mediators (merchants, commissioners, students, etc.). Therefore, far from giving a static image of Baillairgé's workshop at any fixed moment, his diary permits us to partially trace the genesis of his work over time, from order, purchase of materials, to execution and delivery.

In order to give a more accurate overview of the painter's production and the documentary potential of his diary, from 1784 to 1800, François Baillairgé recorded information on 24 commissions of religious paintings. He also executed 49 portraits, drawn or painted, of which 12 are described as miniatures. Finally, he painted ten other works representing

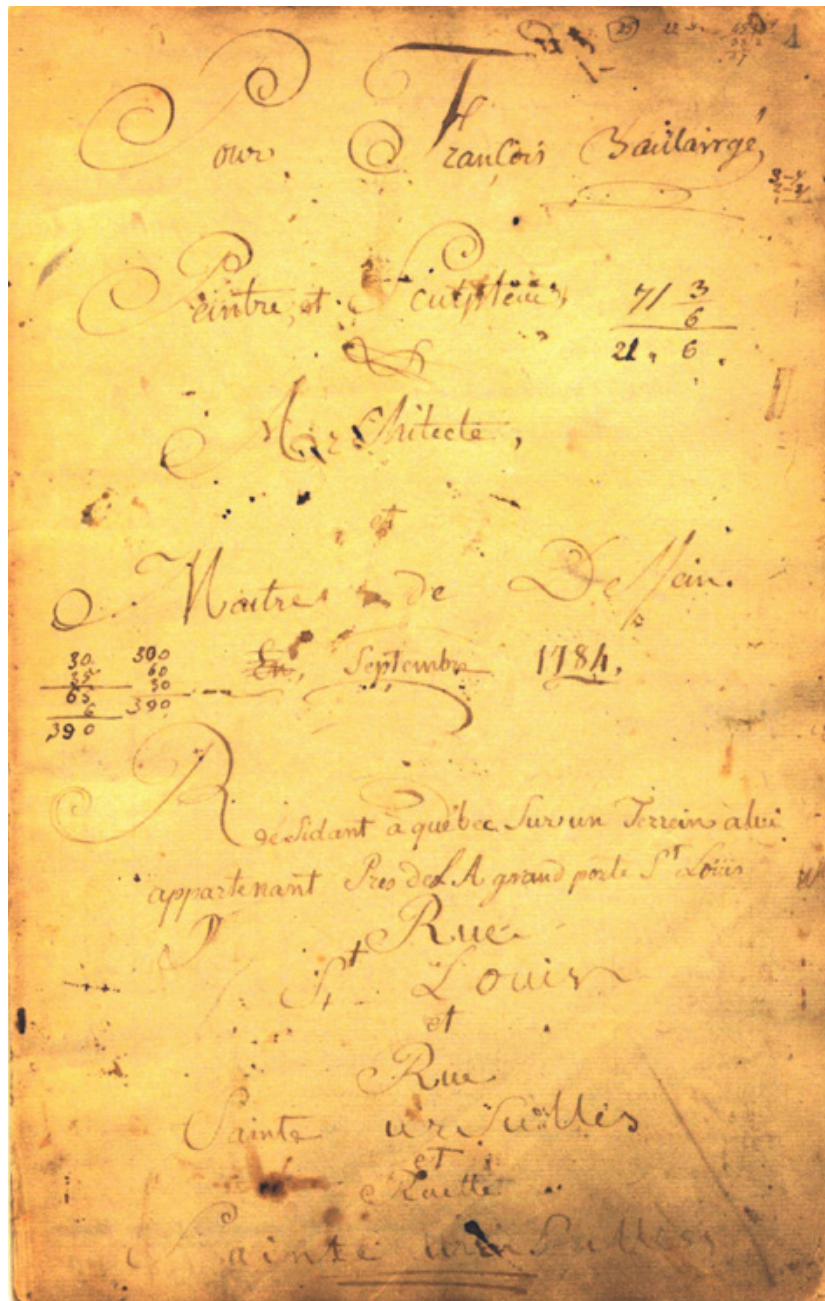


Fig. 4 Title page of Baillairgé's diary. (Photo: Québec, Bibliothèque et Archives nationales du Québec, 'Livre de compte incluant le journal personnel de François Baillairgé, Fonds François-Baillairgé, inv. no. P398,P1.)

allegorical scenes and landscapes. Through this pictorial corpus, we understand the artist's need to obtain materials and tools suitable for his painted work.

The art materials market in Quebec City

François Baillairgé was thrust into a market which received much of its supply from England, British ships benefiting from a colonial exclusivity until the beginning of the 19th century.¹⁸ This market seemed to flourish in the last two decades of the 18th century as the colony enjoyed its new status as the last bastion of importance of British North America at the end of

the American War of Independence in 1783. Welcoming loyalists, settlers of New England who stayed loyal to the English crown, the colony experienced expansive development, both demographically and economically.¹⁹ Quebec City, in particular, once again became the administrative, merchant and religious capital that it had been at the time of New France. Thus, at the end of the 18th century, the city was the most heavily populated among British North American colonies, and formed an increasingly significant internal market. Several important merchants resided there,²⁰ taking advantage of Quebec's ideal location, the St. Lawrence river being the preferred seaway for the transportation of products, both receiving British manufactured goods arriving by boat, and distributing goods to the local market.

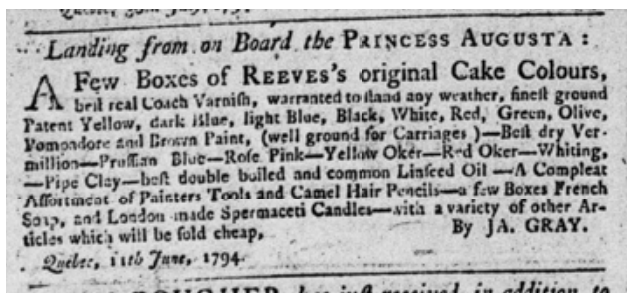


Fig. 5 Advertisement by James Gray published in the *Gazette de Québec*, 7 August 1794.



Fig. 6 Dated between 1788 and 1839 and associated with the London merchant John Scott, this bottle of pigments (or ink) was found during archaeological excavations at Place-Royale in Quebec City. (Photo © Ministère de la Culture et des Communications du Québec, Joanie April-Gauthier.)



Fig. 7 François Baillairgé, *Pascal-Jacques Taché*, c.1805, oil on canvas, 69 × 56 cm, Québec, Musée national des beaux-arts du Québec, inv. no. 1982.19. (Photo: MNBAQ, Patrick Altman.)

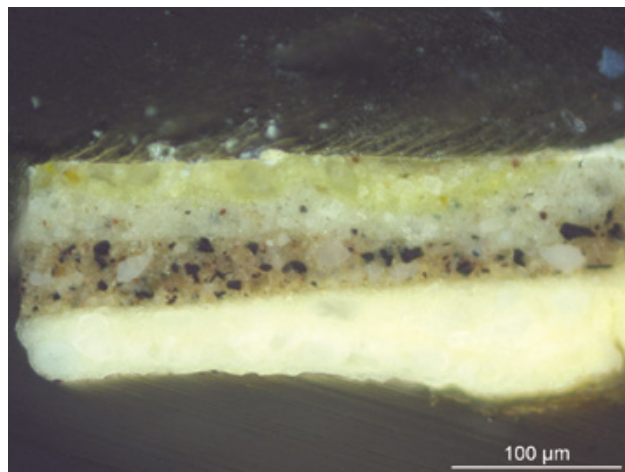


Fig. 8 François Baillairgé, *Pascal-Jacques Taché*: cross-section taken from trees in the background in incident light. It consists of a green layer applied on top of two brown layers. The white preparation layer comprises calcium carbonate and lead white. (Photo © Government of Canada, Canadian Conservation Institute.)

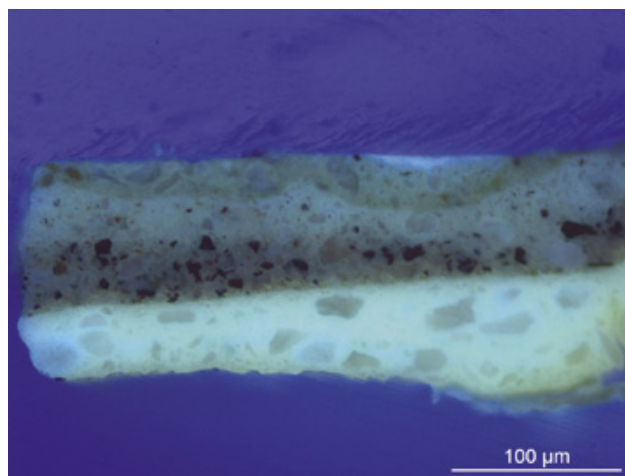


Fig. 9 François Baillairgé, *Pascal-Jacques Taché*: the same sample as shown in Fig. 8 in UV light. SEM-EDS results reveal the following elements in large quantity (in bold), in average quantity (normal) and as a trace (in parentheses): green: **Si, O, Pb**, C, Al (Ca, Fe, Na, K, Mg); pale brown: **Pb, C**, O (Ca, Fe, Al); brown: Pb, C, O, Si, Ca (Al, Fe, Mg). (Photo: © Government of Canada, Canadian Conservation Institute.)

Within the various advertisements published in the newspapers of the time is evidence of specialist artist material shipments from England.²¹ For example, in 1794, the cargo of *HMS Princess Augusta*, which arrived from London, contained boxes of Reeves original cake colours,²² fine quality pigments produced by one of the most important English colourmakers (Fig. 5). Similarly, among the indications supporting this trade route from England to North America must be added the discovery of a bottle of pigments (or ink) during archaeological excavations at Place-Royale in Quebec City (Fig. 6). This bottle, dated between 1788 and 1839, bears the inscription 'Scott' on the shoulder and '417 Strand' on the body, indicating the London merchant John Scott (1752–1839).²³

Although supply was partly regulated by the seasons, depending on which boats docked at Quebec's port, on local demand and the willingness of exporters, Baillairgé was able

Table 1 List of colours found in Baillairgé's diary.

Colour	Colour as listed in Baillairgé's diary	Date and folio no.
White	Chalk white (blanc d'Espagne)	1 October 1785, f. 27
	Chalk white (whitening)	14 December 1792, f. 136; 19 December 1792, f. 136
	Lead white (blanc de plomb)	11 October 1784, f. 3; 21 February 1786, f. 34; 31 March 1787, f. 60
	Lead white (blanc de Cerrusse)	4 July 1789, f. 96
	Unknown white (blanc/peinture blanche)	22 October 1784, f. 4; 4 August 1795, f. 159; 3 March 1797, f. 168; 19 April 1798, f. 173; 18 September 1798, f. 176; 22 May 1800, f. 183; 24 July 1800, f. 184
Black	Ivory black (noir d'ivoire)	19 December 1792, f. 136
	Lamp black (noir fumée)	14 May 1787, f. 64; 28 November 1787, f. 74; 21 December 1790, f. 116
	Unknown black (noir)	14 December 1790, f. 116
Yellow	Dutch pink (rose Pinck/Dutch Pink)	8 June 1791, f. 122; 14 December 1792, f. 136; 24 December 1792, f. 136; 22 June 1793, f. 143; 15 May 1795, f. 157
	Lead oxochloride, Patent yellow (Patente yellow)	22 May 1792, f. 131; 11 October 1792, f. 134; 18 October 1792, f. 134; 25 April 1793, f. 142; 22 June 1793, f. 143; 28 April 1794, f. 149
	Litharge (litharge)	30 November 1787, f. 74; 2 December 1790, f. 115; 22 May 1792, f. 131
	Massicot (massicot)	4 July 1789, f. 96
	Orpiment (orpin)	2 December 1790, f. 115; 23 May 1792, f. 132
	Yellow iron oxide, yellow ochre (ocre jaune)	1 February 1787, f. 54; 25 May 1789, f. 94; 20 November 1790, f. 115; 2 December 1790, f. 115; 6 December 1790, f. 115; 7 December 1790, f. 115; 14 December 1790, f. 116; 21 December 1790, f. 116; 14 December 1792, f. 136; 19 December 1792, f. 136; 24 September 1800, f. 184
Red	Cinnabar, vermilion (vermillon)	30 June 1786, f. 41; 18 September 1790, f. 110; 2 July 1793, f. 143; 27 July 1793, f. 143; 2 August 1793, f. 143; 16 August 1796, f. 165; 28 April 1794, f. 149; 29 August 1795, f. 160
	Iron oxide red, red ochre (ocre rouge)	31 March 1787, f. 60; 14 December 1792, f. 136; 19 December 1792, f. 136; 24 December 1792, f. 136
	Red lead (rouge de plomb)	25 May 1789, f. 94
	Brasil (laque-Colombine)	2 July 1799, f. 179
	Unknown red (rouge)	31 January 1787, f. 54
Blue	Prussian blue (bleu de prusse)	4 July 1789, f. 96; 4 July 1794, f. 150
	Indigo (pierre bleu)	14 December 1792, f. 136
	Unknown blue (azure en poudre)	15 December 1792, f. 136
Green	Copper green, verdigris (vert de gris)	28 November 1787, f. 74; 18 August 1789, f. 97; 21 October 1792, f. 135
Brown	Brown iron oxide, brown ochre (ocre brune)	25 May 1789, f. 94
	Brown ochre (brun rouge ou ôcre despagne)	21 November 1787, f. 74
Unknown	Unknown lake colour (laque)	18 June 1789, f. 95; 4 July 1789, f. 96; 19 April 1798, f. 173; 18 September 1798, f. 176

to obtain a variety of painting materials from merchants. Indeed, on different occasions he purchased all the necessities for his practice, often one product at a time, between 1784 and 1800.

The material composition of Baillairgé's works

François Baillairgé's diary entries reveal the purchases of painters' materials.²⁴ For his supports, he usually obtained canvas, which was common in this period.²⁵ Once on the stretcher, Baillairgé then applied glue on the canvas to reduce its porosity and protect its fibres, followed by the application of a red or a white preparation layer. In the case of the painting of *Saint Francis Xavier Preaching in India* (Fig. 2) and the portrait of *Pascal-Jacques Taché* (Figs 7–9), the preparation was composed of calcium carbonate and lead white.²⁶ Paint layers were then applied on top of the ground in order to create the

work. Dry pigments were ground by the artist and mixed with a binder to obtain a smooth paste. The binder, as reported in different expenses in the diary, was linseed²⁷ or walnut oil²⁸ with essence of turpentine used as diluent.²⁹

Finally, the diary mentions more than 15 pigments purchased by the artist (see Table 1) including lead white, charcoal black, vermilion, Prussian blue and red and orange iron oxides, all of which were identified in the analysis of six samples taken from the portrait of Taché.³⁰ To complete this overview of the material composition of his paintings, Baillairgé bought mastic gum³¹ to create the varnish that he applied on his finished artworks.³²

Quebec's artistic equipment suppliers

In addition to providing information on the materials used, Baillairgé's diary allows us to identify different individuals who were active in the trade of colonial art materials. During

McNIDER & MITCHELL,

Best leave to inform their Friends and the Public, they have imported in the Ships LONDON and CAROLINA from LONDON, a General Assortment of Mercanables, which they will dispose of, on very moderate Terms for Cash, or Best Credit, — Consisting of the following Articles, viz.

BEST Hyson, Souchong, Green and Bohea Tea, Loaf and Muscovado sugar, barley sugar, brown candy and Spanish juice, pepper mint drops, candied citron and orange pill, bloom and sun raisins, currants and figs, sweet and bitter almonds, Jordan ditto, walnuts, Spanish ditto, Vermicelli, macaroon and best pick'd linglais, mace, cinnamon, nutmegs and cloves, pepper, allspice, ginger, and best Durham mustard, best patent chocolate, and common ditto, best green coffee and sugar in grain, capers, olives, ketchup anchovies, and best Florence oil in quart and pint bottles, vinegar and lime juice, double and single Glosier cheese, best English mould candles, candle and turpentine soap, best Poland and common starch, azure, fig blue, and indigo, paints of all colours, and best bott'd linseed oil, red lead, spruce oaker, Venetian red, verdigrease, Dutch pink, rose pink, Prussian blue, black lead, sugar of lead, nitre, coppers and allam, best and common glue, Spanish whiting and pipe clay, black rosin, Ivory black, and lamp ditto, cloth brushes, shoe ditto, painting ditto, scrubbing ditto, hair brooms and mops, heart's brushes and combs ditto, Ladies and Gentlemen's gloves of all kinds, stockings ditto, black Morocco slippers, lace shoes, channel'd pumps, military shoes, youths fine and strong ditto, girls low heel'd Morocco, seal and dog-skin slippers, white and colour'd threads, edgings, laces, ribbons, gauze, black silk mode, and sewing silks, tassels, figured and plain ditto, shawls and handkerchiefs, all wide British calicoes, and best India nankens, cambricks and Irish linens, white and brown Russia sheetings, common and fine duck dowlas, silk and cotton flay laces, white calicoes and common ditto cottons, fashionable sash ribbons, narrow black velvet ribbon, fine Holland tapes, common ditto, fine and common table cloth, diaper, and huckabuk, 5-4 and 6-4 strip'd cottons, cotton and linen checks, best ticks, small handkerchiefs, and blue cottons, white and yellow bees wax, quarto paper gilt and plain, foolscap and port paper, sealing wax and wafers, black and red ink powder, pen knives, black and red lead pencils, a neat assortment of glass ware, cropt leather by the hide or in squares, wax'd and grain'd calf skins, cordevan and shoulder boot legs with straps, yellow and green Morocco skins, Ruffet ditto fit for boot tops, shoe thread, closing ditto, spinnell and magpye galloon, fine worsted in small balls, Russia hairs, Howard's blacking balls heel ditto, bank and jack lines, oval and square toilet glasses with mahogany and gilt frames, essence of lavender, bergamot, jasmine, rosemary, thyme and lemon, hair powder, hard pomatum, best English hoguard, dresting combs, rack ditto, ivory ditto, violins of different qualities, ditto strings, black ebony bows and common ditto, with ivory nuts, black, blue, green, yellow and straw colour'd durants, calimancoes and satinetts, prime old scotch port by the pipe or cask or dozen, L. P. Madeira, N. Y. ditto, Frontinac and claret wine, best old Coniac brandy, Jamaica spirits and Leeward Island rum. — A variety of other articles too tedious to enumerate, which they assure their Friends and the Public will be sold low — Those who may please to favour them with their Orders may rely on every attention being paid. — *Quebec, 30th June, 1794.*

Fig. 10 Advertisement by McNider & Mitchell published in the *Gazette de Québec*, 14 August 1794.

Just imported by JAMES HANNA from LONDON:

<p>HOUSE and Chamber Clocks, Alarms and time-pieces, Gold, Pinchbeck and Silver Watches, A variety of the newest fashion Watch Chains, Ditto Watch Trinkets—and Seals, Ditto Watch Keys, Table and Tereen Spoons, de- sert, Tea and Tong, Pots, Caddys, and Cream Urns, Table Coffers, Salt and Mustard Spoons, Funch Spoons, Spurs, Fire-machin Molins, Boatwain calls, Nutmeg graters, Lady's mirrors & pinces, Fourteen pins, combs & bells, Bookbind & ear-picks, Nerve buttons, Newest fashion shoe-buckles, Salts with glasses, ditto plated Children's clasps & thumb, Pinchbeck ditto, Clasps for Stock.</p>	<p>PLATED WORK. Mugs, candlesticks, spoons, Spurs, newest fashion Ladies & Gentlemen's plated buckles, Best buckles, Table crosses, Signs for the hair Great variety of the newest fashion Jewellery, Silk purses, Tortoise-shell combs & sliders Spectacles, concave glasses, Gold's reading glasses, Glasses diamond pencils, Bottle labels, Morocco pocket books, Sword belts, hooks & knots, Reeve's best colours, Crayon's & Indian ink, Hair pencils, Ivory for portraits, Hat-buckles & pins, Best Hunter's compasses.</p> <p>CUTLERY. Forks & blades, Ditto French & dart, Gentlemen's dress swords, Regimental hangers, Navy ditto, Highland dirks complete,</p>	<p>Scissors, pen-knives, & bun- ters cork-screws, Steel & plated spurs, Dog collars & locks, Ditto chains, ditto for wolf and bear, foxes, &c. Cucumber slicers, Rings for keys, Tambour cases & needles, Knitting needles & marks, Embroidering & open stitch ditto, Surgeons lancets & instru- ments, Mathematical instruments, A variety of fishing tackle, Buckle chaps of all sorts to replace broken web-band and steel knee-buckles, Black shoe and knee-buckles, Stock buttons & pins, Boot garters, Steel portecrayons, Shot belts, ditto powder long horns, & fowling-pieces, Wiker dram-bottles, The history of Chas. boards and men complete, Bagammon tables, ditto, Spring fly-books,</p>
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A variety of other Articles too tedious to insert, all to be sold at a small advance for Cash only.—All sorts of Clocks, Watches, &c. repaired.—Silver Work and Jewellery made and repaired.—Engraving and Hair Work done in the neatest manner.—The highest Price given for old Gold and Silver.

QUEBEC: PRINTED BY SAMUEL NEILSON, N°3 MOUNTAIN-STREET.

Fig. 11 Advertisement by James Hanna published in the *Gazette de Québec*, 2 June 1791.

a period of 16 years, the artist dealt with nearly 20 individuals from different linguistic and religious backgrounds, consisting of Francophone, Anglophone, Catholic and Protestant members of Quebec City, including for example, the merchants James McCord and James Gray, who sold several painting materials to Baillairgé between 1792 and 1795. On a regular basis from 1795, the painter also purchased canvas from the shop of the brothers Nicolas and Paul Dorion and in 1799, he bought 'various colours'³³ from merchant John McNider who, a few years earlier, had published an advertisement (Fig. 10) offering this type of goods under McNider & Mitchell's banner: 'Paints of all colours, And best boiled linseed oil, red lead, Spruce Oaker, Venetian red, verdigrease, Dutch pink, rose pink, Prussian Blue, black lead.'³⁴ The variety of goods advertised in the extensive list, which appeared in the most important newspaper of the time, the *Gazette de Québec*, emphasises the non-specialised nature of such suppliers.

While most of Baillairgé's Quebec suppliers were merchants, some were engaged in other professions such as apothecaries, the historical predecessors of colour sellers. For example, on a few occasions, he mentions purchases from an apothecary,³⁵ without specifically naming him precisely. The artist also dealt with a watchmaker and jeweller, James Hanna, who, in addition to repairing his watch, sold him a 'box of colors, fine lacquer, Prussian blue'³⁶ and ivory supports for miniatures, a material announced by this trader in the newspapers in 1791 (Fig. 11).³⁷ These last two examples attest to the eclectic materials market in which Baillairgé moved.

Baillairgé's networks: multiple and heterogeneous connections

It would appear that Baillairgé's primary role was as a buyer of painting materials in the colonial market: as Quebec's principal artist, he not only maintained commercial relationships with his suppliers, he also developed personal connections with them. These diversified connections were all the more interesting because of the relationship that existed between the artist and his suppliers. All his suppliers lived in Quebec City and carried out their commercial activities within a few steps of Baillairgé's workshop (Fig. 12). Within this restricted area, limited to a few square metres and streets of Quebec City, the artist was able to obtain the materials and tools needed for his professional endeavours and form personal relationships. The connections between Baillairgé and his suppliers proved to be significant on a variety of levels and, in some respects, might have impacted his artistic work and his negotiations within the milieu.

For example, some of Baillairgé's suppliers, such as the brothers Montmollin, sons of Anglican Reverend David François de Montmollin (d.1803), may have qualified not only as neighbours (between 1784 and 1790), but also as friends and theatre companions. In 1785, they were involved in the representation of Molière's play, *Les Fourberies de Scapin*³⁸ — Baillairgé even loaned them books. In addition, the Montmollins not only sold goods to Baillairgé, they were



Fig. 12 Map of Quebec City showing the locations of 15 art material suppliers cited in Baillairgé's diary between 1792 and 1798.

also his customers. In 1786, one of the brothers began taking drawing classes with the artist³⁹ and in 1787, the Montmollins commissioned a portrait from Baillairgé.⁴⁰

Baillairgé also maintained a personal relationship with Joseph-Marie Cherrier, a merchant from whom he purchased paint materials as early as May 1787. Later, in October of that same year, the artist became the godfather of Olivier Félix Cherrier, the merchant's newborn son.⁴¹ With these close and familial ties, Baillairgé managed to develop a special relationship with Cherrier, who agreed to place specific orders for materials and artistic tools for the painter. On 28 May 1789, Baillairgé logged the payment of a large order of brushes: 'At Mr. Cherrier's 6 dozen painting brushes that I asked him to bring me from London, such as two dozen of badger hair ... Two dozen of weasel hair ... two dozen of camel's fur.'⁴² Baillairgé was able to request particular items from this merchant who he knew well and trusted, and obtain artistic materials which apparently were unavailable in Quebec City. This type of exchange shows that François Baillairgé was not necessarily limited by a colonial artistic market already decided in advance – he could occasionally ask for and obtain desired products from a few intermediaries and, hence, take an active part in the development of this market.⁴³

This same type of exchange and involvement in the construction of the market can be illustrated by the relation between Baillairgé and the merchants Germain, the owners of one of the most important businesses in Quebec City. From 1785, Baillairgé regularly obtained some of his painting supplies (e.g. canvas, oil and pigments) from the establishment of Louis Langlois dit Germain (d.1798) and his son, Louis-Augustin Langlois dit Germain (1770–1852). In 1799, the artist was asked to paint canvases to decorate Germain's store located in the upper city of Quebec. In addition to this task, on 15 May 1795, Louis Langlois dit Germain employed Baillairgé for unexpected work, specifically to grind '4 pounds of Dutch Pink',⁴⁴ offering him the opportunity to participate in the art materials market.

Occasionally Baillairgé also played the role of seller. Some information in the artist's diary makes it possible to account for the sale of colours to the Ursuline nuns and to an unidentified 'Mr. Dixon'.⁴⁵ He frequently sold 'supplies' to students enrolled in the courses he gave at his workshop, including brushes and colours.⁴⁶ Moreover, in the context of the small artistic milieu of his time, Baillairgé even provided oil to the French painter Louis Dulongpré (1759–1843), whom he described as a 'Rival in painting'.⁴⁷ Dulongpré, mostly active in the Montreal area, was Baillairgé's biggest competitor, and is credited with the most important pictorial production in

the colony between 1795 and 1820.⁴⁸ In summary, this market was punctuated by diverse interactions which, at various times, exceeded the artistic field. It should also be noted that these mutual transactions benefited both parties.

From purchase to local production: Baillairgé's experimentation

From the above, it can be seen that Baillairgé adopted a flexible position in an entangled environment of interrelations. In addition to his role as an artist and a consumer of art materials, he participated in the constitution and diversification of the artistic market. Different attempts were made by the artist to prepare specific materials in order to partly break free from the market and bypass the existing network of imports. For example, as he recorded in his diary, Baillairgé experimented with different animal hair to make his own brushes:

try different hair; The tail of the Russian squirrel is very soft and is used for brushes. The tail of the mink is very short, but it is better for small brushes. The dog hair, from the coil at the back of the neck, is good for medium brushes.⁴⁹

By trying to capitalise on local animal resources (even dogs!), Baillairgé was seeking out opportunities to exploit natural resources. He even attempted to create his own colours:

I find in Quebec, in the foundations of the door from the Mountain Street, yellow earth, the most beautiful, attached immediately to the walls; It's a true Sienna earth, which becomes very beautiful by calcining ... there are some of lower quality ... outside the walls of the city; such as red, reddish and Brown.⁵⁰

Although Baillairgé did not offer more details regarding the use (or not) of these materials and tools, he continued buying the products offered on the market such as 'boar Brushes';⁵¹ which were acquired from a vendor named 'Mr. Black' in 1798. Perhaps his experiments were not always entirely successful!

In addition to a quest for local raw materials, as mentioned above he also tried to create his own colours. In May 1792, he noted how to produce the colour orpiment⁵² by manipulating arsenic mixed with oil. As the mixture did not dry and resulted in a non-homogeneous colour, he added lead salt to the mix in another test but did not record the result of this experiment. Similarly, in the same month, Baillairgé chronicled in his diary the production process of another colour, patent yellow, with litharge and burned sea salt mixed in equal quantities.⁵³ In October 1792, probably unable to master the process, Baillairgé set up a meeting with chemist Henry Taylor, a Canadian student in London, in order to purchase the formula,⁵⁴ but again the results are inconclusive. After some time, it would seem that he abandoned the idea of producing the pigment and resigned himself to buying the desired colour from Quebec's merchants.⁵⁵

Conclusions

In a British colony in North America in the late 18th century, the case of François Baillairgé sheds light on the various contingencies which the artist had to negotiate. After studying in France, Baillairgé longed to embrace a career in which he would not only sculpt but also paint. This confronted him with several technical and supply challenges. Even though the artist possessed the supports, pigments and binders necessary for painting at his Quebec City studio, the fact remains that for the acquisition of these materials, he relied on a colonial market yet to be defined. In this respect, the analysis of Baillairgé's diary highlights precious details pertaining to his interactions with various colonial suppliers who acquired their materials chiefly from British ships. By identifying these merchants and their civic addresses, this research offers a territorial understanding of the supply networks in Quebec City at the end of the 18th century, exposing the geographical proximity between the artist and his art suppliers. In addition, this study has shown that there were other motives for establishing commercial relationships which complicated the artist's network. For example, Baillairgé developed a professional relationship with the Montmollin brothers, not only because they lived nearby, but also because of a friendship and a mutual involvement in the Quebec theatre which predated their commercial dealings. They even developed a reverse or co-dependent customer relationship: initially, Baillairgé purchased materials from Montmollin; later, the merchant ordered a portrait from him. Baillairgé's relationship with a merchant could exceed the elementary commercial relationship, as evidenced by the nomination of Baillairgé as the godfather of Joseph-Marie Cherrier's son. The networks he developed for artistic reasons were rooted in these social relationships. This reveals information both on the individual and the art materials' market, which Baillairgé sometimes tried to overcome by producing the necessary pigments and brushes himself, and provides a broader understanding of the artist's sociability, which accounts for the somewhat eclectic relationships between Baillairgé and different merchants in this North American and British colonial market.

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Notes

1. P.-A. Linteau, *Histoire du Canada*, Paris, Presses universitaires de France, 2010; J. Lacoursière, J. Provencher and D. Vaugeois, *Canada Québec 1534–2015*, Quebec, Septentrion, 2015; J.-M. Lacroix, *Histoire du Canada: des origines à nos jours*, Paris, Taillandier, 2016.
2. Linteau 2010 (cited in note 1), p. 27. The author estimates the Canadian population as little more than 60,000 inhabitants in 1760. That population was far less important, compared to the 1,593,625 people who settled in the American colonies in 1760: see W. Lerner (ed.), *Historical Statistics of the United States: Colonial Times to 1970*, Washington DC, United States Census Bureau, 1975, part 2, p. 1168.
3. P.-O. Ouellet, 'La constitution du marché de l'art et le goût au XVIII^e siècle en Nouvelle-France', in P.-O. Ouellet and N. Miglioli (eds), *Mélanges sur l'art au Québec historique (XVII^e–XIX^e siècles)*, Quebec, CRILCQ, 2009, pp. 117–144; L. Lacroix (ed.), *Les arts en Nouvelle-France*, Quebec, Publications du Québec and Musée national des beaux-arts du Québec, 2012.
4. J.R. Porter, 'L'abbé Jean-Antoine Aide-Créquy (1749–1780) et l'essor de la peinture religieuse après la Conquête', *Annales d'histoire de l'art canadien* 7(1), 1983, pp. 55–72; P.-O. Ouellet, 'L'art religieux au Bas-Canada, 1800–1820', in D. Drouin and G. Kazerouni (eds), *Le fabuleux destin des tableaux des abbés Desjardins: peintures des XVII^e et XVIII^e siècles des musées et églises du Québec*, Paris, Snoeck, 2017, pp. 54–61.
5. For example, in Montreal, in a letter dated 31 September 1771, Mother Marguerite d'Youville (1701–1771) asked for the price of a French painting. She specified that the transport of the painting from France required a new intermediary and mentioned: 'A gentleman from London who is here now makes me hope to pass it for 3 or 4 louis': A. Ferland-Angers, *Mère d'Youville, vénérable Marie-Marguerite Du Frost De Lajemmerais, veuve d'Youville: 1701–1771*, Montréal, Beauchemin, 1945, p. 262.
6. Quebec, Bibliothèque et Archives nationales du Québec (BANQ), 'Livre de compte incluant le journal personnel de François Baillairgé', Fonds François-Baillairgé, P398,P1. The diary is also accessible online: <http://numerique.banq.qc.ca/patrimoine/details/52327/3268370?docsearchtext=livre%20de%20comptes%20baillairgé> (accessed 10 September 2018). *Journal*, or diary, was the name given to this document by Jean Bruchési in 1954, when he conducted the first study on the topic: see J. Bruchési, 'Le journal de François Baillairgé', *Cahier des dix* 19, 1954, pp. 111–127. Recently, the document's name has been reconsidered. In October 2018, at a conference held in Montreal, Didier Prioul, Université Laval, suggested 'livres des dépenses et affaires'. The name refers to the inscription at the beginning of the document, folio 2, written by Baillairgé himself.
7. We would like to highlight Rustin Steele Levenson's 1983 pioneering study that inspired our research: see R.S. Levenson, 'Materials and techniques of painters in Québec city (1760–1850)', *Annales d'histoire de l'art canadien* 7(1), 1983, pp. 1–54. Similarly, the excellent article by Forest *et al.* on the materials and practice of Jean-Antoine Aide-Créquy (1749–1780), a contemporary of Baillairgé: see É. Forest, M.-C. Corbeil and E. Moffatt, 'Jean-Antoine Aide-Créquy (1749–1780): matériaux et technique picturale', *Annales d'histoire de l'art canadien* 36(2), 2015, pp. 11–47.
8. See: G.-F. Baillairgé, *François Baillairgé et Pierre-Florent Baillairgé*, Joliette, Bureaux de l'étudiant, du couvent et de la famille, 1891; G. Morisset, 'François Baillairgé (1759–1830)', *Technique* 23(1), 1948, pp. 27–32; G. Morisset, 'François Baillairgé (1759–1830): l'architecte', *Technique* 23(3), 1948, pp. 159–163; G. Morisset, 'François Baillairgé (1759–1830): le peintre', *Technique* 23(4), 1948, pp. 227–231; G. Morisset, 'François Baillairgé (1759–1830): le sculpteur', *Technique* 24(2), 1949, pp. 89–94; G. Morisset, 'François Baillairgé (1759–1830): le sculpteur (suite)', *Technique* 24(3), 1949, pp. 187–191; G. Morisset, 'François Baillairgé (1759–1830): le sculpteur (suite)', *Technique* 24(4), 1949, pp. 233–238; G. Morisset, *La peinture traditionnelle au Canada français*, Ottawa, Le Cercle du livre de France, 1960; D. Karel, L. Noppen and C. Thibault, *François Baillairgé et son œuvre (1759–1830)*, Quebec, Groupe de recherche en art du Québec de l'Université Laval and Musée du Québec, 1975; M. Paradis, *Étude stylistique de l'œuvre sculpté de François Baillairgé (1759–1830)*, PhD dissertation, Department of Art History, University of Toulouse-Le Mirail, 1976; L. Lacroix (ed.), *François Baillairgé (1759–1830): un portefeuille de dessins académiques*, Montréal, Galerie d'art Concordia, 1985; J.R. Porter and J. Belisle, *La sculpture ancienne au Québec: trois siècles d'art religieux et profane*, Montréal, Éditions de l'Homme, 1986; D. Karel, L. Noppen and M. Paradis, 'Baillairgé, François', *Dictionnaire biographique du Canada* 6, 1987, pp. 26–31; M. Béland (ed.), *La peinture au Québec, 1820–1850: nouveaux regards, nouvelles perspectives*, Quebec, Musée du Québec, 1991; M. Béland (ed.), *Restauration en sculpture ancienne*, Quebec, Musée du Québec and Centre de conservation du Québec, 1994; R. Villeneuve, *Du baroque au néo-classicisme: la sculpture au Québec*, Ottawa, Musée des beaux-arts du Canada, 1997; M.-C. Rioux, *Étude des matériaux et des techniques de l'œuvre dessiné et peint de François Baillairgé (1759–1830)*, MA dissertation, Department of History, Laval University, 1998; M. Bressani and M. Grignon, 'Une protection spéciale du ciel: le décor de l'église de Saint-Joachim et les tribulations de l'Église catholique québécoise au début du XIX^e siècle', *Annales d'histoire de l'art canadien* 29, 2008, pp. 8–49; P.-O. Ouellet, 'François Baillairgé: le détail académique', in Y. Lacasse and D. Castonguay (eds), *Québec, une ville et ses artistes*, Quebec, Musée national des beaux-arts du Québec, 2008, pp. 100–111.
9. Karel *et al.* 1975 (cited in note 8), p. 7.
10. Ibid.
11. As the art historian David Karel explains, it seems that the Quebec and Paris seminars provided for the transfer of funds from Jean to François Baillairgé. Similarly, soon after his return to Quebec in 1781, François was to hand over 608 pounds (*livres*) to the seminary, then 807 additional pounds the following year, 'on account of what he had received being in Paris from Mr Villars': see Karel *et al.* 1975 (cited in note 8), p. 52.
12. Ibid.; Lacroix 1985 (cited in note 8).
13. Karel *et al.* 1975 (cited in note 8), p. 58.
14. D. Karel, *Dictionnaire des artistes de langue française en Amérique du Nord, peintres, sculpteurs, dessinateurs, graveurs, photographes et orfèvres*, Quebec, Musée du Québec, Sainte-Foy, Presses de l'Université Laval, 1992, p. 33.
15. *Gazette de Québec* 29 September 1785.
16. The inventory of the property of François Baillairgé, drawn up on 30 and 31 May 1808, accounts for many art books. René Villeneuve provides an overview and mentions, among others, Roger de Piles (1635–1709) and Michel-François Dandré-Bardon (1700–1783): see Villeneuve 1997 (cited in note 8), pp. 194–197.
17. Diary (cited in note 6).
18. Levenson 1983 (cited in note 7), p. 10.
19. Linteau 2010 (cited in note 1), pp. 38–44.
20. Ibid., p. 44.
21. For instance, see the following advertisements for art materials: 'Just Imported', *Gazette de Québec* 30 May 1765, p. 3; 'Just Imported, from London', *Gazette de Québec* 11 October 1770,

- p. 3; 'Just Imported by David David', *Gazette de Québec* 7 June 1787, p. 3; 'Just Imported', *Gazette de Québec* 9 September 1790, p. 8; 'Just Imported by James Hanna from London', *Gazette de Québec* 2 June 1791, p. 4. See also the advertisement by McNider & Mitchell, *Gazette de Québec* 14 August 1794, p. 4, in which they 'inform their Friends and the Public, they have imported in the Ships *London* and *Caroline* from London, a General Assortment or Merchandises'. The same network, from England to America, is mentioned by L. Mayer and G. Myers in *American Painters on Technique: The Colonial Period to 1860*, Los Angeles, Getty Publications, 2011, pp. 1–2.
22. *Gazette de Québec* 7 August 1794, p. 6.
 23. See the website of the Patrimoine culturel du Québec: <http://www.patrimoine-culturel.gouv.qc.ca/rpcq/detail.do?methode=consulter&id=187368&type=bien#.W6F2161wvyw> (accessed 10 September 2018).
 24. See Rioux 1998 (cited in note 8) and the unpublished analysis reports produced by the Canadian Conservation Institute: M.-C. Corbeil and E. Moffatt, 'Analyse d'échantillons du tableau *Saint François Xavier*, par François Baillairgé', Canadian Conservation Institute (report LRA 3721), 1998; M.-C. Corbeil and E. Moffatt, 'Analyse d'échantillons du *Portrait de Louis Fromenteau de la Boucherie*, attribué à François Baillairgé', Canadian Conservation Institute (report LRA 4288), 2004; M.-C. Corbeil, 'Analyse d'échantillons prélevés sur le tableau *La Présentation au temple*, par François Baillairgé', Canadian Conservation Institute (report LRA 4243), 2004; M.-C. Corbeil, 'Analyse d'échantillons du portrait de Pascal-Jacques Taché, attribué à François Baillairgé', Canadian Conservation Institute (report LRA 4421), 2006.
 25. Diary (cited in note 6), 3 November 1784, f. 6; 2 June 1786, f. 39; 5 January 1788, f. 76; 28 May 1788, f. 81; 27 June 1788, f. 83; 2 July 1793, f. 143; 11 October 1793, f. 145; 9 July 1794, f. 150; 24 September 1794, f. 152; 23 March 1795, f. 156; 24 March 1795, f. 157; 6 November 1796, f. 167; 31 January 1797, f. 168; 21 February 1797, f. 168; 25 April 1797, f. 169; 7 September 1797, f. 170; 24 October 1797, f. 170; 30 October 1797, f. 171; 19 April 1798, f. 173; 13 September 1798, f. 176; 17 June 1799, f. 179; 6 September 1799, f. 180; 7 May 1800, f. 183; 1 July 1800, f. 183; 14 July 1800, f. 184; 28 July 1800, f. 184; 15 October 1800, f. 184.
 26. Corbeil and Moffatt 1998 (cited in note 24), p. 2; Corbeil 2006 (cited in note 24), p. 1.
 27. Diary (cited in note 6), 27 November 1784, f. 7; 9 June 1785, f. 21; 5 June 1789, f. 95; 2 December 1790, f. 115; 13 December 1790, f. 115; 20 December 1790, f. 116; 21 December 1790, f. 116; 28 April 1794, f. 149.
 28. Diary (cited in note 6), 20 August 1796, f. 165.
 29. Diary (cited in note 6), 31 March 1786, f. 60; 6 December 1790, f. 115; 14 December 1790, f. 116; 20 December 1790, f. 116; 21 December 1790, f. 116; 22 May 1792, f. 131; 11 October 1792, f. 134; 14 November 1792, f. 135; 8 August 1793, f. 144.
 30. Corbeil 2006 (cited in note 24).
 31. Baillairgé purchased mastic gum on a few occasions: Diary (cited in note 6), 20 November 1790, f. 114; 23 November 1790, f. 114; 2 December 1790, f. 115.
 32. In 1774, Jean-Félix Watin stated that mastic in turpentine was the only varnish appropriate for oil paintings: see J.-F. Watin, *L'art du peintre, doreur, vernisseur: ouvrage utile aux artistes & aux amateurs...*, Paris, Chez Grangé, 1774, pp. 239–240. Mayer and Myers 2011 (cited in note 21) also provides information on the ingredients used by North American painters to create varnish in the 18th century (pp. 28–30). The authors noted the use of 'Canada gum, or Canada balsam' (p. 30), but there is no record of any purchase of this local product in Baillairgé's diary.
 33. Diary (cited in note 6), 2 July 1799, f. 179.
 34. *Gazette de Québec* 14 August 1794, p. 4.
 35. Diary (cited in note 6), 15 October 1784, f. 3; 28 November 1787, f. 74. On the role of apothecaries in the art materials market, see D. Diderot and J. Le Rond d'Alembert, *Encyclopédie ou dictionnaire raisonné des sciences, des arts et des métiers, paune une société de gens des lettres*, A Neufchastel, Chez Samuel Faulche & Compagnie, 1765, vol. 16, p. 379: 'Ce sont ordinairement le marchands droguistes – épiciers qui vendent les drogues & les couleurs des peintres, qui font aussi imprimer & qui débitent ces sortes de toiles.'
 36. Ibid., 4 July 1789, f. 96.
 37. *Gazette de Québec* 2 June 1791, p. 4.
 38. Diary (cited in note 6), 19 January 1785, f. 33.
 39. Ibid., 20 December 1786, f. 51.
 40. Ibid., 18 June 1787, f. 66.
 41. Ibid., 20 October 1787, f. 74.
 42. Ibid., 28 May 1789, f. 94.
 43. Some advertisements highlight that it was indeed possible from the British colony to order goods from across the Atlantic by the intermediary of agents or merchants. For example, in the David David advertisement (*Gazette de Québec* 7 June 1787, p. 3), it is specified that 'All orders from the country will be dispatched with the utmost care and diligence, and packed in the carefulest manner.'
 44. Diary (cited in note 6), 15 May 1795, f. 157.
 45. Ibid., 20 May 1790, f. 106.
 46. Ibid., 2 December 1790, f. 115; 24 January 1791, f. 118; 17 February 1791, f. 118.
 47. Ibid., 24 August 1799, f. 180.
 48. Ouellet 2017 (cited note 4).
 49. Diary (cited in note 6), 27 January 1795, f. 155.
 50. Ibid., 10 July 1797, f. 170.
 51. Ibid., 21 May 1798, f. 175.
 52. Ibid., 23 May 1792, f. 132. See also R. D. Harley, *Artists' Pigments c. 1600–1835*, London, Butterworths Scientific, p. 93. The author explains why this colour was the most unpopular: 'because of its poisonous nature, ... orpiment was thoroughly disliked because it was always accompanied by dangerous fumes and an offensive smell'.
 53. Diary (cited in note 6), 22 May 1792, f. 131. On patent yellow, see Harley 1982 (cited note 52), p. 99.
 54. Diary (cited in note 6), 11 October 1792, f. 134.
 55. Ibid., 28 April 1794, f. 149.

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ARCHAEOLOGICAL EVIDENCE OF VENETIAN TRADE IN COLOURING MATERIALS: THE CASE OF THE GNALIĆ SHIPWRECK

Katarina Batur and Irena Radić Rossi

ABSTRACT In late October or early November 1583, the *Gagliana Grossa* sailed from Venice towards Constantinople but foundered off the coast of northern Dalmatia. The ship was loaded with cargo, a large part of which comprised colouring materials, from the most prominent European workshops. Studies of these unique archaeological finds are providing an insight into the colouring materials available in Venice, as well as its international export power capacity. Since 1967 numerous archaeometric analyses have been carried out on these colouring materials, resulting in the identification of lead carbonate, lead oxide, mercury sulphide, antimony sulphide, iron oxide- and arsenic-based colouring materials, lake pigment, elementary tin and mercury. Until now, an understanding of Venetian trade in colouring materials has been based entirely on archival sources. The aim of this research is to merge the results of the archaeological data with archival documents in order to obtain an overview of the trade in colouring materials. Precisely dated archaeological finds, combined with archival documents, have generated a list of colouring materials used in wholesale, retail and international trade. Archival and archaeological evidence presents a unique insight into the materials available in 16th-century Venice.

Introduction

It is well known that Venice was an important European and Mediterranean centre for the pigment trade in the Renaissance. By the end of the 15th century, artisans' high demand for painting materials, well-developed techniques for

mineral processing based on chemical knowledge and expertise, and strong export activity led to the emergence of the *vendecolori*, 16th-century Venetian specialist sellers of painting supplies,¹ a profession that fell into oblivion and remained unknown until recently. Until now, knowledge on the *vendecolori* has been based entirely on archival sources.² During past decades, a vast range of colouring materials has been recovered from the cargo of the large merchantman *Gagliana Grossa*, which sank in late October/early November 1583 close to the islet of Gnalić near Biograd na Moru in northern Dalmatia (Fig. 1). The main goal of this paper is to present the available archaeological evidence and to compare this with information obtained through archival research.



Fig. 1 *Gagliana Grossa* is resting on the seabed at a depth of 26–30 m, south of the rocky islet of Gnalić at the entrance to the Pašman Channel. (Photo: S. Govorčin.)

The Gnalić shipwreck: history of research

After years of illegal activities, the shipwreck was officially discovered in 1967. The prompt action by Ivo Petricioli, an art historian from the Faculty of Humanities and Social Sciences in

Table 1 The colouring materials and related raw materials identified from the Gnalić shipwreck.

Gnalić shipwreck raw (colouring) materials	Form	Transport container	Amounts
Lead carbonate	Conical ingot	Casks (height c.43–50 cm; diameter: 30 cm)	Full casks still <i>in situ</i> ; over 1500 kg recovered
Lead oxide	Irregular lump	Unknown	c.1.6 kg
Mercury sulphide	Bell-shaped, possibly vermilion (type A)	Chests (80 × 110 cm)	14 bell-shaped ingots; over 1000 kg total
	Lump (type B)	Unknown	26 kg
Iron oxide-based colouring materials	Powder	Barrels (height c.85–125 cm)	63 kg iron oxide* per barrel (based on calculations on barrel no. 3); about 10 barrels
Arsenic-based colouring material	Powder	Two barrels with yellow powder (?) mentioned in the 1972 fieldwork report	Not possible to calculate; visible staining with some material preserved on the ship's hull and in the sediment
Mercury	Liquid pond	Unknown	Over 50 kg
Tin	Rod	Chests (30 × 30 × 75 cm)	c.1773 tin rods, 70 cm each; over 1000 kg
Antimony sulphide	Lump	Unknown	2 pieces; 0.288 kg
Lake	Ball	Unknown	Average weight of one ball: 0.00175 kg; total amount (c.30 balls of lake pigment): 0.00555 kg

* The weight of wet material

Zadar, and his enthusiastic team, led to the immediate recovery of an incredible repertoire of finds which fascinated the general as well as the professional public.³ Between 1967 and 1973 five rescue campaigns were carried out under the direction of Ksenija Radulić from the Zadar Department of the Directorate for the Protection of Cultural Heritage (Republički zavod za zaštitu spomenika kulture u Zadru). Although fully aware of the importance and potential of the site, and the essential need for systematic research, Radulić finally stopped the excavation due to the lack of adequate logistical and financial support. Fortunately, she managed to preserve the integrity of the collection through the establishment of the Local Heritage Museum of Biograd na Moru, with Sofija Petricoli and Božidar Vilhar performing complex conservation treatments of the finds related to the ship's armament, equipment and cargo.⁴

Research recommenced after 45 years in the form of a short-term test campaign performed in 2012, which soon evolved into a systematic interdisciplinary research project, directed by the University of Zadar. Underwater excavations revealed the remains of a round-hulled merchantman loaded with cargo originating from the most prominent European workshops. Glass vessels and beads, windowpanes, chandelier and scone elements, precious textiles, spectacles with leather frames, small objects used in everyday life and various other items were shipped to the markets of Constantinople, some of which were perhaps destined to be transported even further by land caravans to eastern Europe or the eastern Mediterranean.⁵

Besides numerous glass objects, the largest proportion of the cargo consisted of colouring materials (Table 1). Inorganic colouring materials, including lead carbonate, lead oxide, antimony sulphide, mercury sulphide, elementary tin and mercury, were identified on the wreck site by means of various chemical analyses. Iron oxide- and arsenic-based colouring materials were also found, however further analyses are required for a more detailed identification as they may have been altered by the underwater environment or disturbed during initial excavation campaigns. Lake was the

only preserved organic pigment discovered in the cargo. Lead carbonate, tin and iron oxide-based colouring materials were packed in barrels, casks and boxes, and stowed directly into the ship's hold; however, the method of packaging the remainder of the materials is unknown.

The recovery of two decorated bronze guns in 1967, cast in Venice in 1582 by Zuane Alberghetti, provided a *terminus post quem* for the shipwreck site.⁶ In 1973, based on the documents from the State Archive of Venice, Astone Gasparetto suggested the possible identification of the sunken ship as the *Gagliana* (*Gagliana* or *Gaiana*), lost in 1583 'in the waters of Murter' or 'near Zaravecchia' (today's Biograd na Moru).⁷ In 2012, Gasparetto's presumption was finally confirmed: systematic research in the State Archive of Venice revealed hundreds of documents, directly or indirectly linked to the ship's story.⁸

Conceived in 1567 and named after the first owners *Lezza, Moceniga e Basadonna*, the ship was built in Venice and launched in 1569. Two years later it was captured by the Ottomans off Valona, Albania, and in 1581 it was sold to the da Gagliano family in Pera, Constantinople. Named *Gagliana Grossa* after the new owner, Odoardo da Gagliano, with a capacity of 1200 Venetian barrels, the ship sailed the common trading route between Venice and Constantinople before sinking in autumn 1583 in the waters of the islet of Gnalić.⁹ After eight years of archival research, the rich story of the ship was unveiled, providing an abundance of information in regard to its cultural, historical, political and economic context.

Colouring materials from the ship's cargo: research and current results

Due to limitation in time, experience and resources, the first excavation campaign focused on the recovery of the most endangered objects rather than the possible content of the

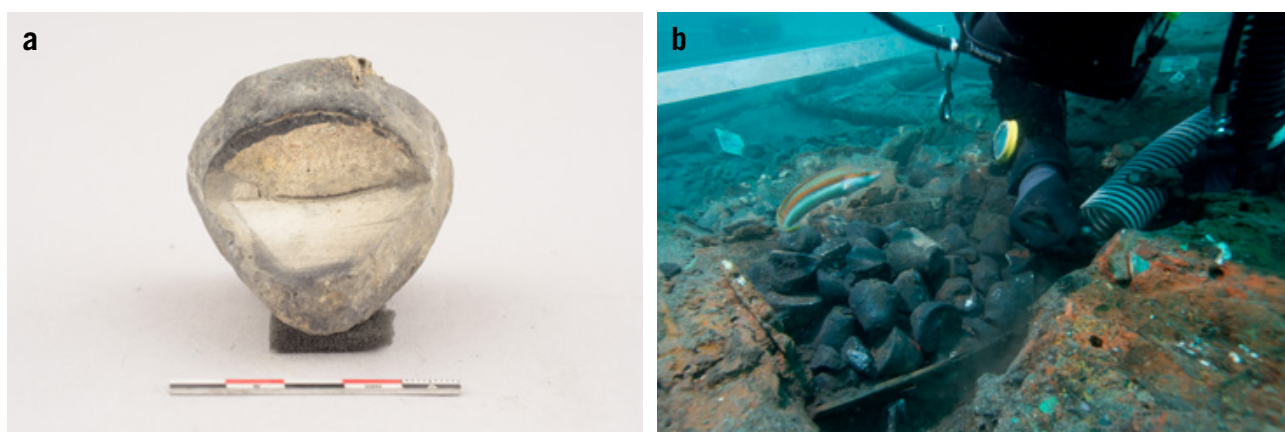


Fig. 2 (a) A lead white conical ingot. (Photo: K. Batur.). (b) The ingots were packed in casks. (Photo: S. Govorčin.)



Fig. 3 A lump of minium. (Photo: K. Batur.)



Fig. 4 Iron oxide-based colouring materials were packed in large barrels. (Photo: R. Torres.)



Fig. 5 The ship is lying on its starboard side with the barrels of iron-based colouring material and lead white stowed in the hold. (Photo and model: K. Yamafune, R. Torres and S. Govorčin.)

transport containers.¹⁰ The recovered artefacts were first published in *Vrulje – Journal of the National Museum in Zadar* in 1970, and until the end of the 20th century this remained the only scientific reference on the inventory of the Gnalić finds.¹¹ Almost 30 years after the initial excavation campaigns, the cargo from the shipwreck was partially examined within the framework of ‘The Heritage of the Serenissima’ project. Although indicated as components of the ship’s cargo,

colouring materials were never discussed.¹² Systematic sampling and analyses of raw materials and semi-products began in 2012, with a special focus on the barrels and casks stowed in the bottom part of the ship’s hold. This resulted in a number of samples of colouring materials, which are currently undergoing detailed examination.¹³

When characterising colouring materials from underwater sites, it is important to take into consideration all the

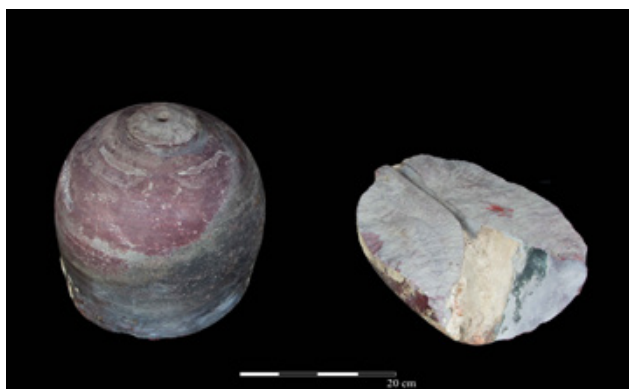


Fig. 6 Bell-shaped mercury sulphide, possibly vermillion. (Photo: I. Asić.)



Fig. 7 Mercury sulphide in the shape of lumps. (Photo: S. Govorčin.)

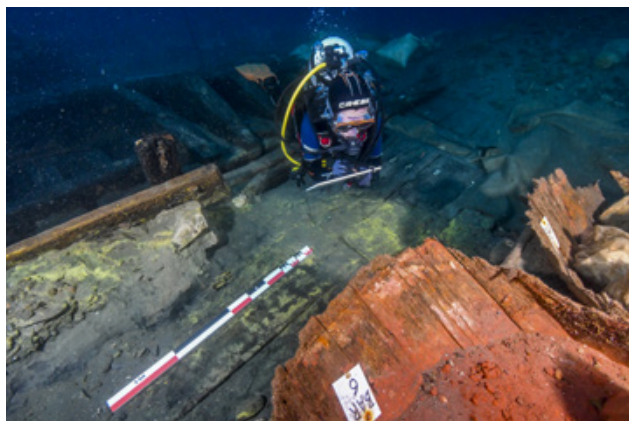


Fig. 8 An accumulation of yellow colour south of the bilge pump. (Photo: K. Yamafune.)

alterations potentially caused by the surrounding environment. Since these colouring materials rested on the seabed for over four centuries, many surface changes may have occurred such as chemical alterations due to the alkaline conditions in the underwater environment, degradation caused by the presence of incompatible metals, or improper storage conditions after recovery. Although beyond the scope of this article, chemical alterations and environmental conditions are important for understanding the studied material.

In this research project the term 'colouring material' is used rather than 'pigment' or 'colorant'. The term 'pigment' is

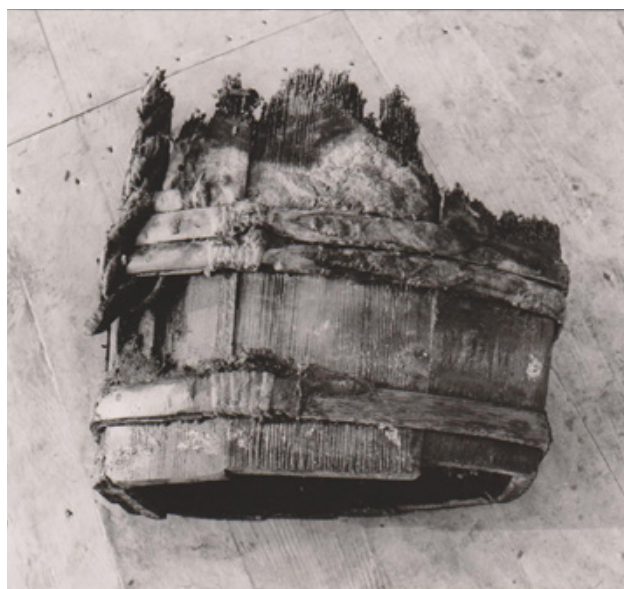


Fig. 9 A barrel filled with yellow colour from the 1967 excavations. (Photo: Ministry of Culture, Conservation Department in Zadar.)

reserved for lake, as this material would only have been used in painting.¹⁴ Furthermore, merchants and trading agents would seldom have used the term 'pigment' as they did not consider the various colouring materials to refer only to painting materials. In archival documents such as valuations or bills of lading, colouring materials are often categorised as spices. When the profession of *vendecolori* appeared in Venice, the pigments and dyes in their inventories were listed as colours.¹⁵

Lead carbonate or lead white forms the greater part of the colouring material found in the preserved cargo,¹⁶ traded in the form of conical ingots, relating to descriptions of the ceramic moulds used by Venetian manufacturers.¹⁷ The ingots weigh approximately 250 g each and some pieces have a black outer layer, identified as galena (lead sulphide).¹⁸ The ingots were packed in wooden casks with straw used as dunnage (Fig. 2). The heads of at least three several barrels bear a monogram comprising the initials S and Z, and a Christian cross.

To date, only two pieces of lead oxide (Fig. 3) have been identified, probably due to its irregular form, which is easily confused with the ballast gravel.¹⁹ The second most represented material in the ship's cargo is the iron oxide-based colouring material (Fig. 4), which was packed in at least 10 large barrels stowed in the aft and central part of the ship's hold (Fig. 5), next to and under the casks containing the lead white ingots. Mercury sulphide is present in two forms: bell-shaped (Fig. 6) weighing approximately 100 kg each and lumps of needle-like structure (Fig. 7).²⁰

A material of intense yellow colour was also identified in the ship's hold, particularly in the midship section around the bilge pump and in the nearby sediment (Fig. 8). Its colour attracted the divers' attention as it is attached to the wooden elements of the ship's hull. The 1972 fieldwork diaries mention two barrels filled with 'yellow sulphur' (Fig. 9). Chemical analysis performed on samples collected in 2017 in the form of powder and without any container, revealed complex arsenic sulphide.²¹ These samples require further study.

Table 2 A comparison between the materials available in colour seller shops and those identified from the Gnalić shipwreck.

Available evidence of trade with colouring materials in the 16th century	Mattheus q. Joannis a coloribus (1504)	Hieronimo dai Sulimadi (c.1520)	Domenico de Gardignano (1534)	Partnership between Zuan di Nicolo dai colori and Marco da Corphu (1550)	Giovanni Griffalconi (1551)	Matteo dai colori (1556)	Gnalić shipwreck raw (colouring) materials (1583)	Jacopo de' Benedetti (1594)
LEVEL OF TRADE	RETAIL	WHOLESALE	RETAIL	INTERNATIONAL EXPORT	WHOLESALE	WHOLESALE	INTERNATIONAL EXPORT	RETAIL
COLOURING MATERIALS	Lead white	Lead white	<i>Biacha</i>	–	Lead white	–	Lead carbonate*	<i>Biacha</i>
	–	–	<i>Minio</i>	Minium	–	–	Lead oxide	<i>Minio</i>
	–	–	<i>Cinabro</i> (vermilion)	Vermilion	–	<i>Cenaprio</i> (vermilion)	Mercury sulphide*	<i>Cenaprio</i>
	–	–	<i>Tera rossa</i>	–	–	–	Iron oxide-based colouring materials	<i>Lapis ros[s]o; Terra ros[s]a; Bolo gros[s]o; Terra sigilada</i>
	–	–	<i>Rexegal oropimento</i>	–	–	–	Arsenic-based colouring material	<i>Oropimento comun [sic]m[asena]do; Oropimento intt cernido; Oropimento c[h]iaro; Oropimento mezan</i>
	–	Mercury	–	–	–	Mercury	Mercury*	Mercury
	Tin	–	–	–	–	–	Tin*	–
	–	–	–	–	–	–	Antimony sulphide*	<i>Antimonio</i>
	–	–	<i>Cremexe</i> (crimson of Old World cochineal)	<i>Laca di grana</i> (kermes lake)	–	–	Lake	<i>Lacha di grana; Lacha de crimese; Lacha; Lacha de verzin</i>
	Matthew 2002, p. 681	Matthew and Berrie 2010, p. 246	Matthew 2002, p. 681; Matthew and Berrie 2010, p. 247	Matthew and Berrie 2010, p. 247	Matthew 2002, p. 681	Matthew and Berrie 2010, p. 246	Kelez 1970, pp. 40–45*; fieldwork documentation 2013–2018	Krischel 2002, pp. 93–158

* The material identified in the late 1960s (Kelez 1970, cited in note 11)

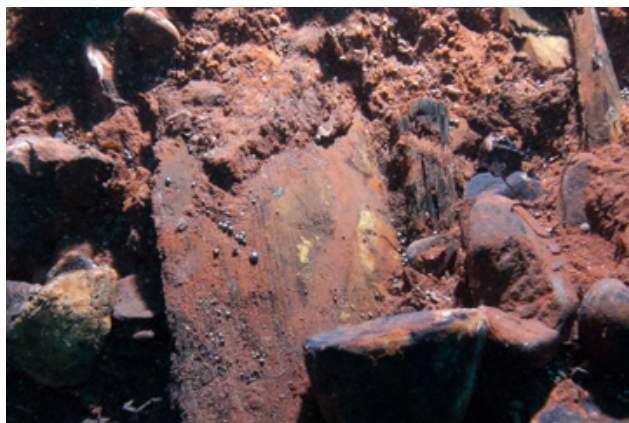


Fig. 10 Drops of mercury on a barrel stave. (Photo: S. Govorčin.)



Fig. 11 Lake pigment. (Photo: K. Batur.)

The results of the chemical analyses pointed to the presence of irregular lumps of antimony sulphide. Elementary tin was transported in the form of cast rods, bearing the stamp 'ceto de stagni', the Venetian lion and the letters 'MC' underneath. The rods, 63 cm long and weighing around 0.5 kg each, were packed in rectangular wooden boxes. Rescue research campaigns performed in the 1960s and 70s yielded over 1000 pieces.²² Antimony sulphide in the lump form and tin in rods were certainly destined for metal production and were included in the research as both appear in documents related to the *vendecolori* (Table 2). Both materials were also the main components used to create yellow colours in pottery glaze, as discussed in the 16th-century manuscript by Cipriano Piccolpasso.²³

Small beads of elementary mercury are present in the sediment, occasionally forming small pools (Fig. 10).²⁴ Mercury was probably transported in its elementary form, but some may have drained from the tin-mercury alloy of the amalgam mirrors found in the ship's cargo.²⁵ The elemental mercury could have been kept in sheepskin containers, as was the custom in nearby Idria in Slovenia.²⁶

The lake pigment was found in the area of the ship's hold interpreted as the first deck²⁷ and constitutes the first archaeological evidence of the transport of lake in the form of small balls. In the 1594 inventory of *vendecolore* Jacopo de' Benedetti, several types of lake are listed with 'balls' as the unit of measurement: *lacha di grana*, *lacha de crimese*, *lacha* and *lacha de verzin*. The unit term probably refers to the ball-shaped lake pigment individually packed into linen.²⁸ The lake pigments discovered in the cargo of *Gagliana Grossa* consist of aluminium substrate with precipitated madder, cochineal and redwood (Fig. 11). The heterogeneous composition of the Gnalić balls suggests that lake pigments were originally traded by mixing several types of pigments.

Half of the site is still intact below the surface layer, and we may expect new discoveries of colouring materials in the near future. As most of the colouring materials included yellow, white and black colours, it is likely that the ship also transported blue and green colouring materials. Although over 200 documents containing information on the ship and its context have been found in the State Archive of Venice, the bill of lading is still missing for the ship's last voyage.²⁹ The owner of the ship, merchant Odoardo da Gagliano, ran a family business with his uncle Domenico da Gagliano, based in Venice. They were successfully trading between Venice and Constantinople, and their network of relationships included Venetian patricians and citizens, as well as merchants and ambassadors from other European states. Some of these merchants probably loaded the colouring materials onto the ship. Unfortunately, the currently known deeds of assignment do not mention any insured cargo of raw materials.³⁰

Venetian colour sellers: *vendecolori*

Unlike other cities in Italy, where the colours were sold in apothecaries, in the high Renaissance a different type of shop offered painting materials in Venice. It is known that shops stocking confections, candles and soaps, so called *spezieri da grosso*, co-existed with shops that specialised in colour selling, owned by merchants called *vendecolori*. Although this profession never gained guild status, it clearly had an identity as it was recognised as being involved in the refining of the materials and colour selling.³¹ Almost two decades of research conducted on the archival documents of the *vendecolori* has yielded an impressive amount of data on their profession, including locations and contents of their shops and storages. Wills, dowries, partnership contracts, testaments and inventories have allowed both general and art historians to reconstruct the profession of *vendecolori*. Inventories are particularly interesting as they list the colouring materials and painters' tools available in the shops and storages in certain periods. Four published inventories dating to 1534, 1556, 1586 and 1594 provide an overview of materials stocked in shops.³²

Vendecolori owned shops and their associated storages in the busy area of Rialto. It could be argued that due to their position in the city centre, those shops operated only on a retail level. On the contrary, however, many documents prove



Fig. 12 A diver shown during sediment sampling: the lack of light results in a poor perception of the colour. (Photo: M. Martinčák.)

that some were very active not only in wholesale business, but also in international trade. Manufacturers of the raw materials were supplying the necessary substances to the *vendecolori*, thus involving them in regional wholesale trade. The existence of their storages, which were either an integral part of the shops or situated nearby, is a strong argument for their participation in wholesale trade.³³

The main evidence for their involvement in international trade is the appearance of materials in their inventories which were not available locally. Minerals were obtained from merchants arriving in Venice by land routes from Bohemia, Germany and Hungary, or by sea routes from the eastern Mediterranean.³⁴ Some of the materials may have been imported to Venice where they were processed by specialists before being shipped to their final destination. One example is *laca di grana*, which was imported into Venice from the Spanish colonies in South America. Local refining techniques converted this dye into lake, which was then exported to Spain. Some *vendecolori* even formed a partnership capable of exporting raw materials and ready-to-use pigments to Constantinople.³⁵

During the 15th and 16th centuries, the area of the Rialto market was transformed into a port zone, enabling the transport of merchandise from the shores of the Grand Canal. Goods were probably loaded on the Riva del Vin (bank of wine) or the Riva del Ferro (bank of iron), where many of the colour seller shops were located, onto riverine boats and then transferred to the port outside the city where the cargo ships were moored.³⁶

Combining archaeological and historical data

Although the archival documents offer significant information on the status of the *vendecolori* profession, the position of their shops and particularly important inventories of the traded colouring materials, there are some limitations. Firstly, the documents and inventories only list the materials available at a specific time: it is possible that some materials were already out of stock when the inventory items were listed.³⁷ In addition, descriptive information on the forms in which the colouring materials were traded, the means of packaging or the shape of transport containers for wholesale and international trade is usually missing. The terminology is often unclear as similar materials bear various names, as in the case of the arsenic- and iron oxide-based items in Jacopo de' Benedetti's shop.³⁸ This lack of information creates knowledge gaps which can be filled from studies in other fields. Therefore, the archival research should be complemented by the study of the artefacts and raw materials used in Renaissance painting in order to expand our understanding of the pigments available in that period.³⁹

Archaeological finds preserved *in situ*, as in the case of the Gnalić shipwreck, offer a unique opportunity to confirm the existence of, and directly examine, the colouring materials mentioned in the documents. On the one hand, the inventories listing colouring materials available in the shops, coupled with the same materials recovered from the archaeological site, demonstrate the export capacity of the Venetian colour selling industry and the demands of the Ottoman markets.

On the other hand, despite meticulous analysis of these well-preserved artefacts, which lay underwater mostly undisturbed for four centuries, it is still not possible to obtain a complete overview of the transported goods. As the wreck site lies at a depth of 26–30 m, most of the visible colours appear to be blue and green (Fig. 12), therefore some blue and green colouring materials may not have attracted the attention of the divers during previous excavations. Due to the underwater conditions, some materials and their containers have degraded, organic dyes have dissolved, and the material composition has sometimes been affected by chemical alterations.

In order to relate contemporary terminology to the colouring materials identified from the Gnalić shipwreck, comparisons were made with published data from shop inventories (Table 2). All the published data was considered, regardless of whether the shops operated on a wholesale or retail level, or were involved in local, regional or international trade. In this phase of the research it has not been possible to link the origin of the colouring materials to colour sellers' shops due to the lack of documents related to loading and insurance of such cargo.

Material identification was carried out on elementary chemical components.⁴⁰ In this article the use of historical material terms was avoided due to the uncertain chemical composition and mineral structure of items listed in the historical inventories. For example, we equated lead carbonate with the terms *biacha* and lead white, although it is not certain if *biacha* in the historical sources referred to basic lead carbonate or lead carbonate. Additionally, mercury sulphide (type B) was not classified as cinnabar or vermilion because that distinction requires knowledge of its synthetic or natural origin. In order to attribute the proper terminology in the case of historical names for mercury sulphide, the determination of its synthetic or natural origin must be supported by the results of future studies involving archaeometric analyses. The identification of three different lake pigments – cochineal, madder and redwood documented for the first time in the shape of balls – is particularly interesting.

Conclusions

To date, the cargo of the *Gagliana Grossa*, a large Venetian merchantman which sank in 1583 near the islet of Gnalić, is the only archaeological evidence of maritime trade in colouring materials between Venice and Constantinople. Until recently, knowledge on the Venetian colour selling industry was based exclusively on archival documents. Examination of historical and archaeological sources provides a unique opportunity to verify the presence of historical colouring materials in the ship's cargo. Although there is ample evidence that the Venetian colour sellers (*vendecolori*) were involved in wholesale and international trade, the current state of research does not allow us to confirm the provenance of the colouring materials recovered from the Gnalić shipwreck: they could originate from various sources and colour seller shops.

Detailed examination of the colouring materials obtained from the Gnalić shipwreck is still in progress, but the promising results, combined with historical sources, will hopefully increase our knowledge on the Late Renaissance colour-related industry in Venice, and contribute to our understanding of international maritime trade in the 16th century.

Acknowledgements

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Notes

1. For the factors that led to the appearance of *vendecolori* see L.C. Matthew, 'Vendecolori a Venezia: the reconstruction of a profession', *The Burlington Magazine* 144, 2002, pp. 680–686.
2. The study of *vendecolori* was significantly improved by the work of Barbara Berrie, Julia DeLancey, Louisa Matthew and Roland Krischel. For more information on *vendecolori* and the questions of their appearance, business and performance, see Matthew 2002 (cited in note 1); R. Krischel, 'Zur geschichte des Venezianischen pigmenthandels – das sortiment des *Jacobus de Benedictis à coloribus*', *Wallraf-Richartz-Jahrbuch* 63, 2002, pp. 93–158; L.C. Matthew and B.H. Berrie, "'Memoria de colori che bisognino torre a vinetia': Venice as a centre for the purchase of painters' colours", in J. Kirby, S. Nash and J. Cannon (eds), *Trade in Artists' Materials: Markets and Commerce in Europe to 1700*, London, Archetype Publications, 2010, pp. 245–252; J.A. DeLancey, "'In the streets where they sell colors": placing *vendecolori* in the urban fabric of early modern Venice', *Wallraf-Richartz-Jahrbuch* 72, 2011, pp. 193–232; R. Krischel, 'The Venetian pigment trade in the sixteenth century', in L. Waldman (ed.), *Colors Between Two Worlds: The Florentine Codex of Bernardino de Sahagún*, Kunsthistorisches Institut in Florenz, Max-Planck Institut, 2011, pp. 316–332.
3. I. Petricoli and V. Uranić (eds), *Vrulje – Glasilo Narodnog muzeja u Zadru* 1, Zadar, Narodni muzej Zadar, 1970.
4. For the history of the research see I. Radić Rossi, M. Bondioli, M. Nicolardi, Z. Brusić, L. Čoralić and F.V. de Castro, 'The shipwreck of Gnalić: mirror of Renaissance Europe', in A. Filep, E. Jurdana and A. Pandžić (eds), *Gnalić: Treasure of the 16th Century Sunken Ship*, exh. cat., Zagreb, Croatian

- History Museum, 2013, pp. 66–95; pp. 66–75; I. Radić Rossi, M. Nicolardi and K. Batur, 'The Gnalić shipwreck: microcosm of the Late Renaissance world', in D. Davison, V. Gaffney, P. Miracle and J. Sofaer (eds), *Croatia at the Crossroads: A Consideration of Archaeological and Historical Connectivity*, Oxford, Archaeopress, 2016, pp. 223–248; pp. 223–229.
5. For a more comprehensive list of the artefacts see Filep *et al.* 2013 (cited in note 4). For the glass typology, see I. Lazar and H. Willmott, *The Glass from the Gnalić Wreck*, Koper, Annales Mediterranea, 2006.
6. Petricioli and Uranija 1970 (cited in note 3), pp. 9–10.
7. A. Gasparetto, 'The Gnalić wreck: identification of the ship', *Journal of Glass Studies* 15, 1973, pp. 80–81.
8. See Radić Rossi *et al.* 2013 and 2016 (cited in note 4). Since 2015 the systematic interdisciplinary study of the ship has been included in the Archaeology of Adriatic Shipbuilding and Seafaring Project (AdriaS), supported by the Croatian Science Foundation (HRZZ IP-09-2014-8211). The ongoing fieldwork activities continue to yield precious information on various aspects of the Late Renaissance world.
9. Radić Rossi *et al.* 2016 (cited in note 4), pp. 243–246.
10. Based on photographic documentation stored in the Croatian Conservation Department and the diary from 1972 written by the director of the excavation Ksenija Radulić.
11. The initial chemical analyses were carried out by chemist Ivo Kelez, who was the first to propose that the raw materials were used for a decorative purpose. For more information see I. Kelez, 'O sirovinama', in Petricioli and Uranija 1970 (cited in note 3), pp. 40–45.
12. The project was conducted in collaboration with Mitja Guštin (University Primorska, Koper), Sauro Gelichi (University Ca'Foscari, Venice) and Konrad Spindler (University of Innsbruck). The research groups from each institution spent some time in the Homeland Museum of Biograd na Moru to study the artefacts. See M. Guštin, S. Gelichi and K. Spindler (eds), *The Heritage of the Serenissima: The Presentation of the Architectural and Archaeological Remains of the Venetian Republic*, Koper, Annales Mediterranea, 2006.
13. Preliminary analyses were carried out in collaboration with Vladimir Bermanec from the Faculty of Science, Department of Geology, University of Zagreb. The results showed the presence of some materials not identified in the 1970 study by Ivo Kelez. The challenging work of interpreting the results has not been completed due to the necessity of supplementing recent test results with those obtained using additional appropriate and available scientific techniques. Research continued in 2018 in collaboration with the Interdisciplinary Centre for Conservation and Restoration of Heritage (CICRP) in Marseille. The analyses included X-ray fluorescence spectroscopy (XRF), X-ray diffraction (XRD), scanning electron microscopy–energy dispersive X-ray (SEM-EDX) spectroscopy, Fourier transform infrared (FTIR) spectroscopy and Raman spectroscopy. All the samples were documented by multispectral imaging.
14. While choosing proper terms, the term 'pigment' was deliberately avoided as it would have restricted the potential use of the material to painting. These materials could also be employed in cosmetics and medicinal supplies, as well as glass production, pottery painting, the manufacture of musical instruments, books and terrazzo floors. For the various artisans and industries using colouring materials, see Matthew and Berrie 2010 (cited in note 2), p. 245. We consider the term 'colouring material' appropriate, based on the terminology used for prehistoric raw materials finds. With thanks to Adeline Bonneau for pointing out the terminology issue. For an example, see H. Salomon, C. Vignaud, Y. Coquinot, L. Beck, C. Stringer, D. Strivay and F. D'Errico, 'Selection and heating of colouring materials in the Mousterian level of Es-Skhul (c.100 000 years BP, Mount Carmel, Israel)', *Archaeometry* 54(4), 2012, pp. 698–722.
15. For the trade in colouring materials under the category of spices, see J.A. DeLancey, 'Shipping colour: *valute*, pigments, trade and Francesco di Marco Datini', in Kirby *et al.* 2010 (cited in note 2), p. 78.
16. The results of XRD and Raman spectroscopy from 2018 were interpreted as lead carbonate. The samples analysed by I. Kelez in 1970 contained 82% basic lead carbonate and 18% chalk. For a detailed description, see Kelez 1970 (cited in note 11), p. 44.
17. See B.H. Berrie and L.C. Matthew, 'Lead white from Venice: a whiter shade of pale', in M. Spring (ed.) *Studying Old Master Paintings: Technology and Practice*, London, Archetype Publications, 2011, pp. 295–301; pp. 296–297.
18. XRD was used for the identification of galena. The layer was created due to the high concentration of hydrogen sulphide on the site: Kelez 1970 (cited in note 11), p. 44.
19. The red core is surrounded by a black surface layer. As in the case of lead carbonate, it is probably the reaction of lead with the hydrosulphuric environment which created the layer of galena (see note 18). XRD for verification of the composition of the surface layer has not yet been performed.
20. We categorised bell-shaped mercury sulphide as type A, and the lumps of mercury sulphide as type B. Type A can be considered a synthetic form of mercury sulphide (vermillion); its smooth, rounded shape coupled with visible layering show it was manufactured. The regular shape and the layering resulted from a sublimation process; mercury and sulphur were heated together, and the mercury sulphide gas condensed on the inner surface of a bell-shaped mould, producing layers as the ingot formed.
21. XRF and SEM-EDX were used for chemical analyses and XRD for the crystallographic structure. The sampling was carried out at several positions in the central midship area. The samples included: fine sand sediment containing yellow material, recovered south of the bilge pump; a yellow colour from a ballast stone taken from the amorphous accumulation southwest of the bilge pump; yellow and orange powder found on a wooden stick. Potentially interesting are the samples of yellow material on the ballast stone and wooden stick due to the considerable presence of arsenic and sulphur. However, the results of diffraction revealed a pattern composed of several overlapping phases. We assume that these samples might indicate the degradation of arsenic sulphides. It was not possible to determine the final identification of the material without applying complementary techniques, planned in the next phase of the research. The chemical analyses performed by Kelez 1970 (cited in note 11) resulted in the identification of flowers of sulphur, without indicating the presence of the arsenic-based colouring materials. Kelez stated that the cargo caused the degradation of the other merchandise during the past four centuries. However, it remains unclear which instruments he used and which materials from the wreck he analysed.
22. Filep *et al.* 2013 (cited in note 4), p. 112.
23. According to Cipriano Piccolpasso, the glaze *marzacotto* was made of frit of glass to which lead, tin or antimony could be added later to obtain a yellow colour: see C. Piccolpasso, *The Three Books of the Potter's Art*, facsimile of the manuscript in the manuscript in the Victoria and Albert Museum, London, translated by Ronald Lightbown and Alan Caiger-Smith, vol. 2, 1980, pp. 51, 63.
24. In 2014 the divers and archaeologists recovered three litres of liquid mercury, equivalent to almost 40 kilos, puddled in low spots on the site. In the 16th century mercury was employed in the process of colouring material production. Historical sources

- record its use in the production of vermilion, blue pigment and mosaic gold, as well as in processes involving gilding and silvering. See Matthew and Berrie 2010 (cited in note 2), p. 246. Mercury was very important to the glass industry; in mirror production, with the addition of tin, it created an amalgam used as a reflective surface. For examples of rectangular and rounded mirrors that were also a part of the ship's cargo see Filep *et al.* 2013 (cited in note 4), pp. 155–156.
25. For the production of tin-mercury amalgam mirrors, see P. Hadsund, 'The tin-mercury mirror: its manufacturing technique and deterioration processes', *Studies in Conservation* 38(1), 1993, pp. 3–16.
 26. See S. Petricioli, 'Deset godina rada na hidroarheološkom nalazu kod Gnalića', *Godišnjak Zaštite Spomenika Kulture Hrvatske* 6, 1981, pp. 37–45.
 27. In the first phase, the samples were analysed in CICRP, Marseille, using XRF, SEM-EDX, XRD and FTIR with the help of Fanny Bauchau. It was assumed that the dark purple balls recovered from the site could be lake, as the FTIR analyses detected the existence of organic components, and chemical analyses showed a high presence of aluminium. The suggestion was finally confirmed using high performance liquid chromatography (HPLC) in December 2018 by Maarten van Bommel from the University of Amsterdam. However, questions still remain as to whether this is Old World or New World cochineal, or if any binding media was used to keep all the components together. The results will be published in 2019.
 28. See Krischel 2002 (cited in note 2), pp. 107–111.
 29. Research of the documents related to the shipwreck will be published in its entirety in I. Radić Rossi and M. Nicolardi, *Brodolom kod Gnalića – Ogledalo renesansnog svijeta*, Zadar, University of Zadar, Institute for Maritime Heritage, in press. According to correspondence from Mauro Bondioli, the goods from *Gagliana Grossa* could have been insured in other cities, not just Venice. In 40 years of archival research, no Renaissance insurance document has been found that mentions raw materials: perhaps they were not considered valuable enough to insure?
 30. See Radić Rossi *et al.* 2013 (cited in note 4), p. 83. For the identities and nationalities of merchants, see E. Dursteler, *Venetians in Constantinople: Nation, Identity, and Coexistence in the Early Modern Mediterranean*, Baltimore MD, JHU Press, 2006, p. 133.
 31. The authors are addressing the issue of the lack of clarity with regard to the status of *vendecolori*, which requires further detailed study: see Matthew 2002 (cited in note 1), p. 681; DeLancey 2011 (cited in note 2), p. 197.
 32. For inventories belonging to Sebastianus de montibus (1534), Matteo dai colori (1556), Franciscus Bartholamei (1586) and Jacopo de' Benedetti (1594), see Matthew 2002 (cited in note 1), Matthew and Berrie 2010 (cited in note 2) and Krischel 2002 (cited in note 2). Research of these documents contributes to the knowledge of 16th-century colouring materials terminology. Comparing inventories from 1534 and 1594, it can be observed that as the century progressed, a wider range of colouring materials became available from the colour seller. In the inventory of Jacopo de' Benedetti dating to 1594 the same pigments are mentioned in several locations, suggesting the existence of different grades and hues: see Berrie and Matthew 2010 (cited in note 2), p. 248.
 33. Involvement in the wholesale trade is clear in the inventories of Giovanni Griffalconi from 1551, who specialised in refining and selling lead white, and Hieronymo da i sulimadi, who lived around 1520 and sold several substances including lead white and vermilion. Since both colour sellers were also manufacturers, their businesses were highly profitable: see Matthew 2002 (cited in note 1), p. 681; Matthew and Berrie 2010 (cited in note 2), pp. 246–247; DeLancey 2011 (cited in note 2), p. 198.
 34. For maritime and land trading routes passing through the Venetian state, see M. O'Connell, 'Venice: city of merchants or city for merchandise?', in W. Blockmans, M. Krom and J. Wubs-Mrozewicz (eds), *The Routledge Handbook of Maritime Trade around Europe 1300–1600*, Oxford, Routledge, 2017, pp. 103–120.
 35. For the import and export of *laca di grana* see Krischel 2002 (cited in note 2), p. 107. Berrie and Matthew 2010 (cited in note 2), p. 247 mention a partnership established between Zuan di Nicolo dai collori and Marco da Corphu.
 36. For the development of the colour seller shops in the area of the Rialto port see DeLancey 2011 (cited in note 2), pp. 203–204.
 37. See Berrie and Matthew 2010 (cited in note 2), p. 248.
 38. The example comes from the inventory of Jacopo de' Benedetti that lists different types of iron oxide (*lapis ros[s]o*, *terra ros[s]a*, *bolo gros[s]o* and *terra sigilada*) and arsenic sulphide – orpiment (*oropimento comum [sic] m[asena]do*, *oropimento intt cernido*, *oropimento c[hiaro]*, *oropimento mezan*): see Krischel 2002 (cited in note 2), pp. 112–113.
 39. For one way to expand this study through complementary techniques, see B. Berrie, 'Rethinking the history of artists' pigments through chemical analysis', *Annual Review of Analytical Chemistry* 5, 2012, pp. 441–459.
 40. The main reference used was N. Eastaugh, V. Walsh, T. Chaplin and R. Siddall, *Pigment Compendium: A Dictionary and Optical Microscopy of Historical Pigments*, Oxford, Routledge, 2008.

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EFFICIENZA E UNIONE: PRACTICAL CONSIDERATIONS FOR USING COLOURED GROUNDS IN 16TH-CENTURY ITALY

Moorea Hall-Aquitania

ABSTRACT This paper explores the practical and material aspects of the proposed Italian origin of coloured grounds – aside from style, why might artists have chosen to adopt this technique? Sixteenth-century Italian technical treatises, including those by Giorgio Vasari, Raffaello Borghini and Giovanni Battista Armenini, were studied to gain information on how coloured grounds were applied and what issues (namely transportation and efficiency) could be solved with this technique. This knowledge was supplemented by 16th-century records that demonstrated the increasing sizes of canvas as well as evidence of growing market demands for paintings and the efficient painting techniques required to meet them. In addition, receipts listing the relative costs of materials that may also have influenced the artist's choices are considered. Over the course of the 16th century, the market for painting widened and trade in paintings and materials expanded. Within this environment, considerations such as lowering the costs of time and materials began to influence artistic decisions, and those hoping for an efficient and cost-effective method would have been drawn to painting on canvas with a coloured ground.

Introduction

In 1979, Hessel Miedema and Bert Meijer were among the first to investigate the introduction of coloured grounds and preparatory layers in paintings.¹ Miedema and Meijer proposed that coloured grounds originated in Italy, when painters transitioned from panel to canvas supports. This technique subsequently spread to the Netherlands, affecting the stylistic development of Netherlandish art. In her study of various grounds, no doubt informed by the Italian treatises she translated, Mary P. Merrifield concluded that the 'great requisites' for grounds on canvas were thinness, whiteness, flexibility and smoothness.² So why did artists begin to use coloured grounds so extensively in the 16th and 17th centuries?³ A full exploration of the connections between stylistic development and technical innovation concerning the introduction of coloured grounds in the Netherlands and other countries remains to be carried out. This paper begins that exploration by expanding on one of the premises of Miedema and Meijer's question, suggesting some practical considerations relating to the introduction of coloured grounds in Italy which may give insight into why

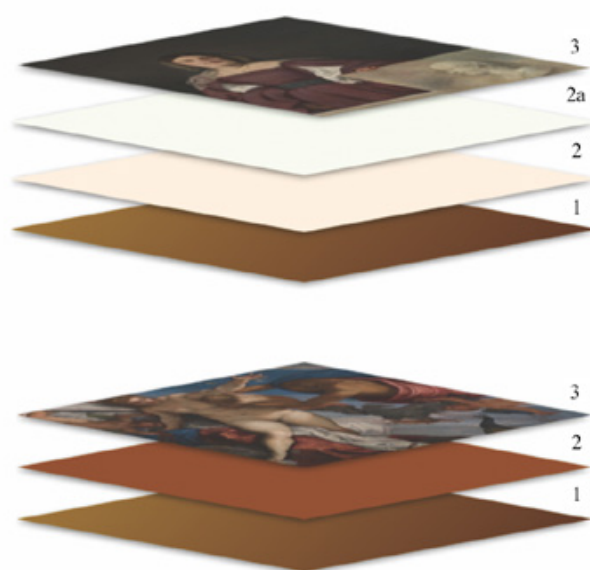


Fig. 1 Diagrams of layer structures: (1) canvas primed with animal skin glue; (2) ground layer (oil or chalk and glue); (2a) *imprimatura*; (3) paint layers.



Fig. 2 Reconstruction of a 16th-century painting with a dark brown ground. (Reconstruction: Abbie Vandivere, 2001.)



Fig. 3 Giorgio Vasari, *The Feast in the House of Simon*, 1544, pen in brown and brush in brown and white, underdrawing in black charcoal, on blue paper, 55.6 × 41.4 cm, Amsterdam, Rijksmuseum, RP-T-1951-1.

this technique was so quickly adopted and disseminated across Europe.

The term 'ground' is somewhat misleading since it has been used in so many ways in historic and contemporary literature, at times meaning one preparatory layer and at others referring to the entire preparatory system. For the sake of simplification, this paper refers to three preparatory layers: the size layer (animal skin glue to tighten and seal the canvas fibres), the ground(s) (the layers after the size layer, which act to fill in remaining texture and create a smooth surface on which to paint), and the *imprimatura* (the layer that may follow after the ground to prevent oil absorption or a base colour to work on, or both).⁴ The use of the term 'coloured ground' may tempt one into thinking that it only refers to the pigmented layer replacing the traditional gesso ground (Fig. 1) however, in this paper and other similar research, 'coloured

ground' is used to discuss both oil and pigment grounds and coloured *imprimatura* on gesso grounds providing the surface on which the painter begins working is coloured.

The primary sources used for this research span from the 15th to the 17th century. This timespan includes the earlier theory and practice that may have led to the 16th-century proliferation of coloured grounds, and the reflection on and continued use of this technique in the 17th century. Cennino Cennini (c.1370–c.1440), Leon Battista Alberti (1404–1472), and Leonardo da Vinci (1452–1519) are considered earlier sources. Primary 16th-century sources include Giorgio Vasari (1511–1574), Raffaello Borghini (1537–1588) and Giovanni Battista Armenini (1530–1609), all of whom discuss the preparation of coloured grounds. Also important are Gian Paolo Lomazzo (1538–1592), who wrote on art theory and colour, and Filippo Baldinucci (1624–1697), whose 1681 *Vocabolario* gives insight into contemporary artistic terminology. One of the main texts on the preparation of coloured grounds, by Giovanni Volpato (1633–1706), dates from the 17th century, as does a key source on colour perspective from the little-known Matteo Zaccolini (1574–1630). This paper explores information on coloured grounds in Italian sources, including technical treatises, art and colour theories, inventories, records of materials and commissions, and the paintings themselves.

Transportation

Vasari and Borghini both cite transportability as the main reason for painting on canvas. Vasari introduces his section on oil painting on canvas as follows:

In order to be able to convey pictures from one place to another, men have invented the convenient method of painting on canvas, which is of little weight, and when rolled up is easy to transport. Unless these canvases intended for oil painting are to remain stationary, they are not covered with gesso, which would interfere with their flexibility, seeing that the gesso would crack if they were rolled up.⁵

Therefore, in Vasari's view, canvas was specifically employed for its lightweight qualities for transport with oil grounds as secondary, tailored to the needs of this flexible support.



Fig. 4 Giovanni Battista Moroni, *Portrait of a Man*, 1565, oil on canvas, 87 × 66 cm, Rijksmuseum, Amsterdam, SK-A-3410.

Miedema and Meijer propose the same idea, questioning whether it was the shift from panel to canvas that necessitated a flexible ground. However, while there is a correlation between coloured grounds and canvas, a tinted preparatory layer has also been used on many panels, so this argument is not fully persuasive. One example in Vasari's chapters on coloured grounds was actually proposed for both panel and canvas.⁶

Borghini only discussed coloured grounds for canvas. In his recipe for a thin ground of glue and 'colour' to fill the holes,⁷ he adds that 'Flemish canvases, which can be easily rolled up and carried everywhere, are done in this way.'⁸ He also urges that compared to a later recipe using chalk and paste, this recipe is 'better if the canvas has to be transported to other countries, noting that canvases done in the second way, with the chalk, would crack in many places in being rolled up.'⁹ Borghini must have incorporated these notes in part from Vasari, although he adds the specification of Flemish origin and also mentions international transport. While several secondary sources have repeated the story that canvas was adopted in Venice particularly for its ease of transportation, it is not wholly convincing that this would be the reason to change the painting support, since Venetians had easily moved everything from large artworks to furniture around the city for centuries.¹⁰ While transport was indeed an important feature, especially with patrons commissioning works from artists in other cities and the growth of international art trade, it does not seem likely that this would be the main reason for switching from panel to canvas.¹¹ The ability

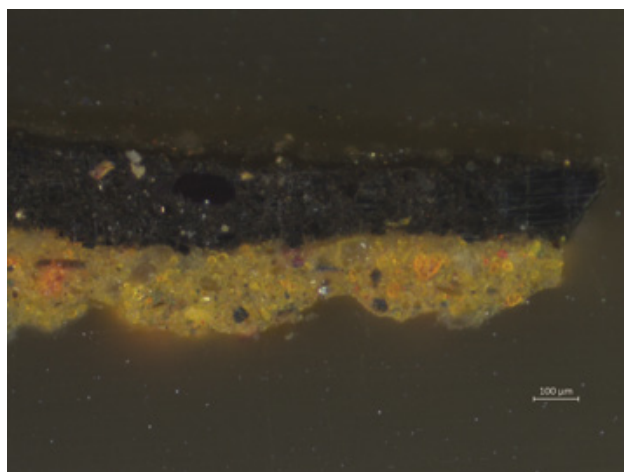


Fig. 5 Giovanni Battista Moroni, *Portrait of a Man*: cross-section from a black garment in darkfield at ×500 magnification using a Zeiss AXIO Imager.A2m with AxioCam MRc5 and VIS-LED and LED 365 nm filter set EX G 365, BS FT 395, EM LP 420, Rijksmuseum, 2017, SK-A-3410_02. (Cross-section: Guilia de Vivo; photo: Moorea Hall-Aquitania.)



Fig. 6 Giovanni Battista Moroni, *Portrait of a Man*: detail around the stomach. (Photo: Moorea Hall-Aquitania.)

to roll primed canvases properly could thus be viewed as an impetus to the rising art trade, especially for larger works travelling over longer distances.

Efficiency

Perhaps a more persuasive argument for using coloured grounds on these large canvases was efficiency. While transportation and rolling do make a good case for the choice of support, in that line of reasoning the ground is secondary and colour does not play a large role. However, for completing



Fig. 7 Giovanni Battista Moroni, *Portrait of a Young Lady*, 1560–1578, oil on canvas, 73.5 × 65 cm, Amsterdam, Rijksmuseum, 1998, SK-A-3036.

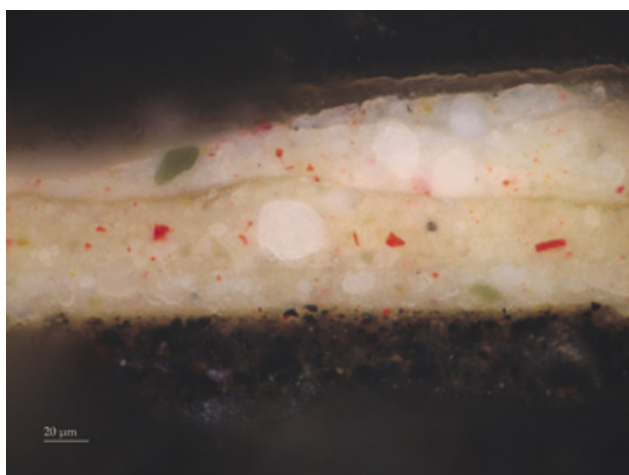


Fig. 8 Giovanni Battista Moroni, *Portrait of a Young Lady*: cross-section from the hand in darkfield at ×500 magnification, Amsterdam, Rijksmuseum, SK-A-3036_R26-2. (Cross-section/photo: Arie Wallert.)

commissions on time, quick and efficient painting was key, and coloured grounds helped to achieve this (Fig. 2). In Borghini and Vasari's instructions for *chiaroscuro*, the painter should first create a field or mid-tone of *terretta*, then work in the shadows and modelling with darker colours such as umber and black, and finally add the highlights with white. To what exactly the authors' term *terretta* is referring remains unclear. Generally recognised as a white earth, also called *terra da boccali* or *terra di cava*,¹² Vasari's mention of a *terretta* of green earth, yellow and white, or a black earth, suggests that the term was synonymous with *mestica*, another term for a mixture for ground layers.¹³ Both Borghini and Vasari are probably referring to the latter, since their discussion of

chiaroscuro methods suggests that a neutral ground would be necessary as a starting mid-tone on which to add shadows and highlights. It is revealing that in Vasari's chapter on oil for canvas or panel, he discusses the traditional process of transferring a charcoal underdrawing using a cartoon, but then comments that those not wishing to follow this method should draw with *gesso da sarti bianco* (white tailor's chalk) or willow charcoal because it is easy to erase.¹⁴ The suggestion of white tailor's chalk could also indicate the colour of the *imprimatura*, which would have to be dark enough for the white chalk to be visible.

If one proceeds with the idea that the field would be a neutral colour, grey or beige, the instructions to add shadows and highlights make more sense. Armenini writes briefly of *chiaroscuro* as well, describing a field or *campo* of indeterminate colour over which charcoal and lead white are played off one another to model light and shade.¹⁵ Vasari also discusses modelling on tinted paper, instructing the reader to create *chiaroscuro* by sketching the outlines of a drawing with pen, and then using a dark wash for shadows and lead white for highlights, or, for the very skilled, leaving the paper as the highlight (Fig. 3).¹⁶ Cennini proposed a similar way of modelling drapery in fresco and tempera, starting with a mid-tone of the pure colour and white, and then applying white for highlights and pure colour for shadows. Perhaps emerging from traditions of modelling in fresco, drawing and tempera painting, the use of a coloured ground over the whole support to act as a starting undertone or mid-tone represented a continuation of these approaches to the construction of a picture. The initial tone of a coloured ground thus sped up the modelling process; in the early phases of building up the painting as well as in the final appearance, with certain areas of the ground left to show through. It can also be used in this way to soften and smooth the transition between adjacent areas of colour: in Giovanni Battista Moroni's *Portrait of a Man* (Fig. 4), the reddish-brown ground (Fig. 5) is visible around the outlines of the figure. This outline of ground colour is especially apparent around his stomach (Fig. 6) as well as around his skin and hair, but due to abrasion of the painting it is unclear to what extent its visibility was originally intended. However, it was not uncommon to allow the ground to show through around outlines and in some mid-tones and shadows, thereby speeding up the painting process and helping to harmonise the whole picture with a subtle continuity of colour.

Yet even though it became a popular technique, pictorial use of the ground colour was not always utilised, even within one artist's oeuvre. For instance, *Portrait of a Young Lady* (Fig. 7), another painting by Moroni, has an almost black ground, and while the only place the ground shows through is in her fan, it is present throughout the entire painting. Not only is the grey-black ground constrained to the fan on the surface, it had to be actively worked against in areas such as the hands, for which Moroni needed two layers of paint – first lead white and then a lighter flesh colour – to cancel out the blackness before adding final flesh colours (Fig. 8). It remains unclear as to why he chose to begin with such a dark colour over the whole support but it confirms that coloured grounds were not

always related to the final appearance of a work and that there must have been other reasons for using them, connected to the painting process itself.

Unione

Within the painting process, coloured grounds could be employed to aid with colour matching, optical mixing and colour harmony (*Unione*). In his undated, but probably 16th-century *Trattato della pittura*, Leonardo da Vinci stated that the blue of air comes from the body of illuminated atmosphere between earth and the darkness that lay beyond. He emphasised: 'the blue will be the more beautiful, the greater the darkness behind it'.¹⁷ Of course, his experiments with painting thin layers of lead white over a black background did not produce the bright azure of a blue sky (see the Moroni woman's sleeve for an example of what this actually looks like). Yet the approach to layering colours to produce effects that mimic nature and appear natural to the human eye would be echoed by coloured grounds, albeit more subtly. Despite his insight into the layering of atmosphere in nature, for painting Leonardo recommended a bright white ground (*campo candidissimo*), so that colours laid over it would appear luminous, like stained glass. However, he does specify a white ground only for transparent colours, since it gives no advantage to opaque pigments.¹⁸ Indeed many paintings on coloured grounds rely on the tone of the ground to smooth and harmonise colours rather than illuminate them.

While Leonardo recommended white as the best ground, his further treatment of optical colour mixing shows an understanding of how colours interact when placed over one another. In his note on the mutation of transparent colours over other colours he observed:

When a transparent colour is placed on another colour, it becomes changed by it, there is composed a mixed colour, different from both the simple ones that compose it. This is seen in smoke coming out of chimneys which, when it is in contrast to the black of the chimney, appears blue; and when it rises, in contrast with the blue of the air, it appears grey or reddish. So also scarlet laid upon blue makes violet, and when blue is put on yellow it makes green, saffron on white makes yellow. Bright colour upon dark makes a blue the more excellent as the bright and the dark colour are themselves the more excellent.¹⁹

This idea that scumbling a bright colour over a dark one could create a more beautiful effect than an admixture of those same pigments was repeated by Charles Lock Eastlake in his chapter on glazes.²⁰ It is tempting to use this example as an analogy for coloured grounds, but the practical reality of scumbling with opaque pigments does not produce the same mixing effects as glazing with transparent colours. However, Leonardo's experiments and thoughts concerning optical mixing and layering of colour do indicate a step

towards coloured grounds or at least a paving of the way for a more nuanced treatment of colours and colour mixing. In contrast to Alberti and Cennini, whose system of modelling the whole is merely a collection of modelled parts, Leonardo treats light as the unifying element in a painting, giving it precedence over body and bright colours. As John Shearman explains, with Leonardo, light and colour reach a relationship more similar to their scientific and naturalistic behaviour.²¹ In late Quattrocento painting, light remained a function of colour. Now, colour is considered a function of light: colour appears, changes, and disappears according to the lighting conditions, and its qualities are governed by the fall of light upon it and not by the properties of the pigments composing it. Leonardo's *chiaroscuro*, rather than focusing on monochrome relief as Cennini and Alberti did, concentrates on unifying neutral areas and shadows. Over the following century this unity of tone would be achieved through the more straightforward use of coloured grounds, but Leonardo can be seen as an early experimenter.

Perhaps the next evolution beyond Leonardo's spatial *chiaroscuro* was the early 17th-century work of Matteo Zaccoloni (1574–1630) on colour perspective. Zaccoloni was a lay brother of the Theatine Order of San Silvestro in Rome, who believed that his treatise on colour perspective would give the practice of *colore* a scientific foundation equivalent to that which had been formulated for *disegno* with the science of linear perspective.²² His work relies so heavily on Leonardo that it is believed he had access to an unpublished manuscript of the *Trattato della pittura* between 1605 and 1617 in Rome.²³ Treatment of his work must be limited here to its relation to coloured grounds, but Zaccoloni's *Trattato* (completed around 1618) is a masterful work, clarifying and expanding Leonardo's ideas with practical examples in four volumes concerning Colours, Colour Perspective, Linear Perspective and Cast Shadows. The manuscript was never published and the original was lost, but fortunately the scholar Cassiano del Pozzo (1588–1657) made and edited a copy.²⁴ Cassiano also gave a copy to his great friend Nicolas Poussin, who brought fame to Zaccoloni's ideas and regularly employed brownish grounds or double grounds with grey upper layers.²⁵ Zaccoloni did not favour *tenebroso* painting, the darkly dramatic variety of *chiaroscuro* that Caravaggio would make famous. This placed him in opposition to dark, contrasting grounds in general. Zaccoloni did, however, advocate for a neutral background colour to allow light and shadow to take effect without excessive distortions of contrast.²⁶ A medium value, lighter than the shadows but darker than the highlights, would be less disruptive to the balance between the two extremes. Furthermore, in paintings with Zaccoloni's correct colour perspective, illumination increases towards the horizon. With a median-toned ground, one can be sure that regardless of the diminishing saturation of hues as objects fade into the distance, the lights will remain above median value and the darks below it, maintaining the illusion of unified illumination from foreground to background.²⁷ Zaccoloni does not specifically mention a coloured ground in the technical sense of the term, but he does instruct painters to select their background colour before

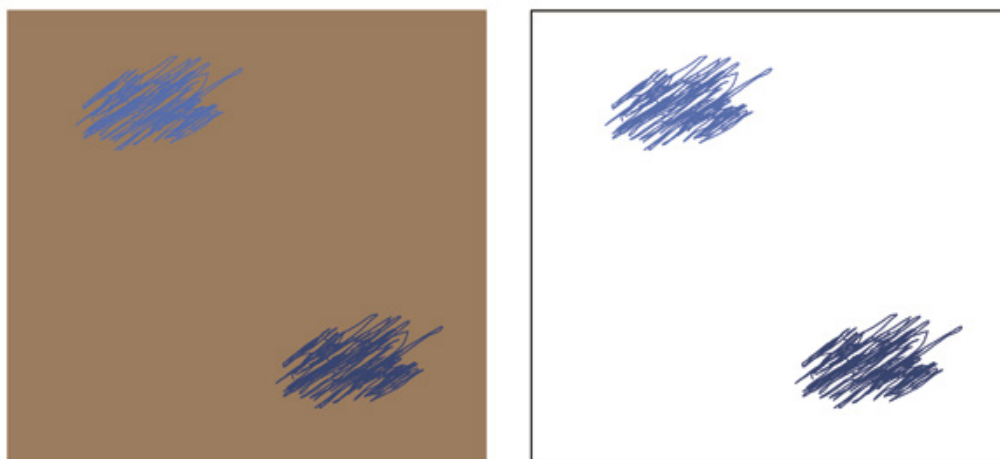


Fig. 9 Diagram of colour matching on a neutral versus a white ground.

modelling forms, so that they have a standard of measurement against which to immediately measure the strength and brightness of each area of colour. He describes the frustration of an artist who has carefully selected a weak black for one figure, only to discover that it appears true black beside a bright white area.²⁸ Figure 9 shows an example of colour matching on a median-toned ground versus a white ground, wherein the brightness of white causes surrounding colours to appear darker, making it harder to perceive differences in colour. This gives some insight into how a painter could use the ground colour as a measuring device during painting.

Vasari writes that *unione* in a painting is 'a discordance of colours accorded together'.²⁹ If a painter does not practise *unione*, he will be left with a design marred by figures that appear as though painted by patches of colour rather than by a brush concerned with natural light and shade. Vasari suggests placing the most central or important figures in the brightest light and clothing them in the most brilliant colours so that the eye will be drawn to them, and conversely using darker and more neutral tones for surroundings or for less important figures.³⁰ This is a practical approach to the colour theory discussed by Cennini, Alberti and Leonardo, although it does not attempt to solve issues of contrasting value and tone, merely finding an application that employs these disparities for heightened drama. Yet, like Zaccolini, Vasari stresses that dark and light should not be overly contrasted and artists should be wary of which colours are placed beside one another. Vasari compares this ideal *unione* to musical harmony: 'As the too fiery mars the design, so the dim, sallow, flat and overdiluted makes a thing appear quenched, old and smoke-dried; but the concord that is established between the fiery and the flat tone is perfect and delights the eye just as harmonious and subtle music delights the ear'.³¹ Indeed, it could be said that a coloured ground acts as the bass or drums in a composition, steadying the colours and keeping them all at the same tempo. All the colours are pulled towards the tone of the underlying ground, unified and muted, and thereby given continuity.

Size and demand

The ability to ease transitions and create a consistent base or mid-tone would become extremely beneficial as canvas sizes increased. In Venice especially, where coloured grounds flourished, paintings in the 16th and 17th centuries were most often priced by surface area.³² This tendency to price by size rather than the number of figures could indicate a Venetian approach to painting as a matter of surface and colour rather than figure and composition – *colore* versus *disegno* in terms of market value. Venetian painters did not receive the same high prices for their works as their Roman counterparts, so this craft pricing did not necessarily translate into financial reward.³³ In a study of over 300 letters, records and contracts from Venice in the 16th and early 17th century, only three showed pricing by figure. Size remained standard, as the maximum width of a hand-woven canvas was limited by the size of the loom, which was around or just over a metre.³⁴ However, painters or preparers stitched together pieces of canvas for larger works. Tintoretto, especially, was known for sewing together various strips of canvas from 110 to 120 cm wide, sometimes using different types of canvas or joining pieces together haphazardly instead of the standard vertical or horizontal construction.³⁵ His painting of *Christ Washing the Disciples' Feet* in the National Gallery, London, is composed of five strips of canvas: one long piece across the bottom half, bisecting Christ's face, and then four smaller pieces above that.³⁶ Therefore, even within the limitations of loom size, canvas paintings could be incredibly large – Tintoretto's famous *Paradise* in the Doge's Palace is 205.66 m². Many artists in 16th-century Venice, including Jacopo Bassano, Paolo Veronese, Titian, Paolo Farinati and Palma Giovane, painted on canvases over 100 m².³⁷ The low cost, lightness and potential large size of canvas made it a natural choice over panel for big commissions.³⁸ The implications of pricing by size can be seen in two paintings by Tintoretto, executed two years apart for the Scuola di San Rocco. The *Crucifixion* in the Sala dell'Albergo is a monumental work of 65.6 m², covering an entire wall, that cost 250 ducats. The painting of *St Roch in Prison Comforted*

by an Angel, part of the decorative series in the church, is 20.1 m² and cost 68 ducats. This is the same artist, painting for the same client. However, despite the number of figures and composition, both paintings have the same price per square metre of 4 ducats.³⁹

Naturally, it would make sense to paint larger canvases at a quick pace in order to maximise profit, especially as demand for paintings rose throughout the second half of the 16th century.⁴⁰ A survey of over 1000 inventories revealed that the number of paintings owned by people from various social classes increased almost fourfold between 1560–1562 and 1610–1615.⁴¹ This could partially be attributed to the accumulation of paintings over generations, but the size of the increase suggests a higher demand. With the following growth in output, efficiency and style became significant. An overly detailed style could have detrimental economic effects due to the time it required. Pragmatically, the larger and more efficiently painted a canvas, the more profit it would yield.

Cost of materials

While using coloured grounds to paint efficiently and harmoniously could help to offset the cost of time, the implications of larger canvas sizes lead to consideration of material costs. This may be the primary reason why lead white and oil alone did not replace gesso grounds, although a lead white *imprimatura* remained common. This hypothesis is supported by analysing a Venetian inventory from 1572 which lists pigments (all prices are translated to Roman *baiocchi* for consistency⁴²) including various yellow, black and red earths for 0.05–0.07 *baiocchi* per ounce, umber for 0.13 *baiocchi* per ounce and lead white for 0.23 *baiocchi* per ounce. The lead white is still inexpensive compared to other pigments but double to triple the cost of any of the earth pigments.⁴³ In one inventory from Rome dated 1614–1617, pigment costs are tallied: earth pigments remain the cheapest at 0.3 *baiocchi* per ounce while lead white costs 0.75–0.8. For reference, the highest grade ultramarine was priced at 800 *baiocchi* per ounce and good red lake was 30.⁴⁴ Another later document of payment from 1633–1635 to Roman artist Andrea Camassei (1602–1649) from his patron lists pigment costs for red earth and umber as 0.47 *baiocchi* per ounce versus 0.78 for lead white (in the inventory the quantities are measured in pounds).⁴⁵

From these sources, it is clear that lead white often cost twice as much as earth pigments, but with such low prices for both, would this actually affect an artist's decision to use the cheaper alternative, perhaps despite its colour? This is difficult to answer without knowing in what quantities these pigments were bought and used. It should also be noted that some pigments absorb more oil than others, and some are also heavier, which complicates the pricing and calculation of how much pigment would be needed for one painting. Depending on the painting style of the artist, a coloured ground could also mean less pigment being used overall, since many areas of

the ground were left to show through in the final appearance of the work and areas of shadow do not need to be built up as much.

A more extensive cost analysis is difficult, since the most ubiquitous and thus inexpensive pigments such as yellow, red, green and brown earths were locally available and required little processing. This meant that they were often omitted from receipts and inventories that focused on more costly pigments and materials such as ultramarine or gold leaf.⁴⁶ Lead white, while relatively inexpensive, was also a manufactured pigment requiring some time to process and was more expensive if imported. Perhaps its toxic and work-intensive manufacturing process explains its appearance in many inventories despite the low cost.⁴⁷ What is evident from the examples above is that earth pigments were indeed cheaper than lead white, and that their absence from many records is evidence in itself for their widespread availability as raw materials – a factor which is perhaps just as important as price.

Conclusions

While ease of transportation is the main reason for coloured grounds on canvas cited by Vasari and Borghini in their chapters on oil painting, by analysing sources beyond artistic treatises it is clear that factors affecting the trade and production of these canvases would have played an even greater role in the rise of coloured grounds. Efficiency needed to keep up with growing size and demand, as well as the cost of materials to cover these larger canvases, undoubtedly influenced the practice of many artists. With centuries between current studies and the production of the works themselves, it can be all too easy to divorce style from practical considerations. For the Renaissance painter, time, logistics, demand and money all played an important role in the creation of an artwork, and coloured grounds were positioned at a significant intersection of these concerns.

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Notes

1. H. Miedema and B. Meijer, 'The introduction of coloured ground in painting and its influence on stylistic development, with particular respect to sixteenth-century Netherlandish art', *Storia dell'arte* 35, 1979, pp. 79–80.
2. According to Mary Merrifield, Antonio Palomino, Francisco Pacheco, Borghini, Giovanni Volpato and Charles Le Brun did not recommend white lead for grounds because it was blamed for cracking, although Vasari and Armenini were in favour of it. See M.P. Merrifield, *Original Treatises on the Arts of Painting*, New York, Dover, 1967, pp. ccxc–ccxciii.
3. See J. Dunkerton and M. Spring, 'The development of painting on coloured surfaces in sixteenth-century Italy', in A. Roy and P. Smith (eds), *Painting Techniques: History, Materials and Studio Practice*, London, International Institute for the Conservation of Historic and Artistic Works, 1998, pp. 120–130; N. Van Hout, 'Meaning and development of the ground-layer in seventeenth century painting', in E. Hermens (ed.), *Looking through Paintings: The Study of Painting Techniques and Materials in Support of Art Historical Research*, London, Archetype Publications, 1998, pp. 199–226.
4. For further discussion of terminology related to ground layers and preparatory systems, see M. Stols-Witlox, *A Perfect Ground: Preparatory Layers for Oil Paintings 1550–1900*, London, Archetype Publications, 2017, pp. xi–xiv.
5. 'Gli uomini, per potere portare le pitture di paese in paese, hanno trovato la comodità delle tele dipinte, come quelle che pesano poco, ed avvolte sono agevoli a trasportarsi. Queste a olio, perch'elie siano arrendevoli, se non hanno a stare ferme, non s'ingessano, attesoche il gesso vi crepa su arrotolandole.' See G. Vasari, *Le vite de' più eccellenti pittori scultori e architettori, nelle redazioni del 1550 e 1568*, R. Bettarini and P. Barocchi (eds), Florence, Sansoni, 1966, pp. 217–218.
6. *Ibid.*, pp. 133–134.
7. See R. Borghini, *Il Riposo*, Florence, Marescotti, 1584, p. 173.
8. *Ibid.*
9. *Ibid.*, pp. 175–176.
10. See M.B. Hall, *Color and Meaning: Practice and Theory in Renaissance Painting*, Cambridge, Cambridge University Press, 1992, p. 209.
11. Bruce Cole writes that canvas is in some ways a sturdier, longer-lasting support than panel, since it is less affected by changes in temperature and humidity, and the 'tooth' of canvas may be desirable as a surface texture for oils. The texture argument may be true, but canvases are indeed affected by temperature and humidity, albeit in different ways than panel, so this reasoning is flawed; see B. Cole, *The Renaissance Artist at Work: From Pisano to Titian*, New York, Harper & Row, 1983, pp. 72–75.
12. Merrifield 1967 (cited in note 2), pp. 730–731; N. Eastaugh, V. Walsh, T. Chaplin and R. Siddall, *Pigment Compendium: A Dictionary and Optical Microscopy of Historical Pigments*, Amsterdam, Butterworth-Heinemann, 2008, pp. 365–366, 401.
13. See G. Vasari, *Le vite de' più eccellenti pittori scultori e architettori*, Florence, Giunti, 1568, p. 55. Baldinucci defines *mestica* in his 1681 *Vocabolario* as a composition of various earths and pigments ground in walnut or linseed oil and used to prepare supports for painting, synonymous with *imprimatura*. See F. Baldinucci, *Vocabolario toscano dell'arte del disegno nel quale si esplicano i propri termini e voci non solo della pittura, scultura e architettura; ma ancora di altre arti a quelle subordinate*, Florence, Santi Franchi, 1681, p. 97.
14. *Ibid.*, pp. 133–134.
15. G.B. Armenini, *De' veri precetti della pittura*, Ravenna, Apresso Francesco Tebaldini, 1586, p. 168.
16. See Vasari 1568 (cited in note 13), p. 46.
17. See Da Vinci, *Treatise on Painting: Codex Urbinas Latinus 1270*, A.P. McMahon (trans.), Princeton, Princeton University Press, 1956, p. 95.
18. *Ibid.*, p. 83. Also Da Vinci and R. Du Fresne (ed.), *Trattato della pittura*, Paris, Giacomo Langlois, 1651, p. 95.
19. 'Quando un colore trasparente è sopra un'altro colore variato da lui, si compone un color misto diverso da ciascun de' semplici che lo compongono. Questo si vede nel fumo che esce dal cammino, il quale quando è rincontro al nero d'esso camino si fa azzurro, e quando s'inalza al riscontro dell'azzurro dell'aria, pare berretino, o rofleggiante. E così il pauonasso dato sopra l'azzurro si sa di color di viola: e quando l'azzurro sarà dato sopra il giallo, egli si sa verde: & il croco sopra il bianco si sa giallo: & il chiaro sopra l'oscurità si sa azzurro, tanto più bello, quanto il chiaro e l'oscuro saranno eccellenti.' See Da Vinci and Du Fresne 1651 (cited in note 18), p. 31.
20. C.L. Eastlake, *Materials for a History of Oil Painting*, London, 1869, pp. 262–263.
21. See J. Shearman, 'On Leonardo's colour and chiaroscuro', *Zeitschrift für Kunstgeschichte* 25, 1962, p. 18.
22. See J.C. Bell, *Color and Theory in Seicento Art: Zaccolini's Prospettiva del Colore and the Heritage of Leonardo*, PhD dissertation, Providence RI, Department of Art at Brown University, 1983, p. 122.
23. See J.C. Bell, 'Zaccolini and the *Trattato della pittura* of Leonardo da Vinci', in C. Farago (ed.), *Re-Reading Leonardo: The Treatise on Painting across Europe, 1550–1900*, Farnham, Ashgate, 2009, pp. 127–128.
24. *Ibid.*, p. 135.
25. M. Stols-Witlox, "By no means a trivial matter." The influence of the colour of ground layers on artists' working methods and on the appearance of oil paintings, according to historical recipes from North West Europe, c. 1550–1900', *Oud Holland* 128(4), 2013, p. 179.
26. Bell 1983 (cited in note 22), p. 179.
27. *Ibid.*, pp. 234–235.
28. *Ibid.*, pp. 428–432.
29. See Vasari 1568 (cited in note 13), p. 48.
30. *Ibid.*, p. 48.
31. *Ibid.*, p. 49.
32. Venice is used as an example due to the high number of coloured grounds used there in the early 16th century and because of the strong correlation between the size and price of oil paintings. However, it was not the only city to use size as a factor for pricing, although in cities such as Florence and Rome size is used more in fresco and mosaic work than oil paintings; R.E. Spear and P. Sohm, *Painting for Profit: The Economic Lives of Seventeenth-Century Italian Painters*, New Haven, Yale University Press, 2010, table 29, appendix 1, pp. 27, 240.
33. *Ibid.*, p. 242.
34. J. Dunkerton, 'Titian's painting technique to c.1540', *National Gallery Technical Bulletin* 34, 2013, p. 10.
35. J. Plesters and L. Lazzarini, 'Preliminary observations on the technique and materials of Tintoretto', in N. Brommelle and P. Smith (eds), *Conservation and Restoration of Pictorial Art*, London, Butterworths, 1976, p. 12.
36. J. Plesters, 'Tintoretto's paintings in the National Gallery, Part 1', *National Gallery Technical Bulletin* 3, 1979, p. 18.
37. Spear and Sohm 2010 (cited in note 32), pp. 245–251.
38. For further discussion on the development of painting on canvas, and the various sizes and constructions of canvas for large works, which may have been tied to the making of sails, see J. Dunkerton, S. Foister and P. Nicholas, *Dürer to Veronese: Sixteenth-Century Painting in the National Gallery*, London, National Gallery Publications, 1999, pp. 268–271.

39. See Spear and Sohm 2010 (cited in note 32), pp. 245–251 for more price and size comparisons.
40. Pierre Gérin-Jean concludes, based on multiple linear regression analysis of painting prices, that the ‘price of a painting increases together with its surface area, the number of figures painted, or with the social status of the buyer’; see P. Gérin-Jean, ‘Prices of works of art and hierarchy of artistic value on the Italian market (1400–1700)’, in M. Fantoni (ed.), *The Art Market in Italy: 15th–17th Centuries*, Modena, Franco Cosimo Panini, 2003.
41. Patricians had owned an average of 3.4 paintings but by the second decade this had increased to an average of 13.1. Citizens owned the same number of paintings as the nobility in the 1560s, but by 1610–1615 they had an average of 10.9. Ownership by artisans and shopkeepers rose from 2.3 to 4.7. See Spear and Sohm 2010 (cited in note 32), p. 211.
42. Roman paintings in the 16th century are most often priced in *scudi* (1 *scudo* = 100 *baiocchi*). In the 16th century, an average wage was between 20 and 150 *scudi* per year, but some artists were capable of earning much more. Mancini wrote that a good painter could earn 3–6 *scudi* per day, which translates to over 1000 *scudi* per year. However, the cost of living in Rome was also high, as well as the overheads involved in running a studio. An estimated expenditure of 5–10 *scudi* for materials per painting is negligible, but it is notable that artists would often be paid separately for ultramarine and a canvas and stretcher but would cover the rest of the material costs themselves. See R.E. Spear, ‘Scrambling for scudi: notes on painters’ earnings in early baroque Rome’, *The Art Bulletin* 85(2), 2003, pp. 310–320.
43. The inventory lists ‘*Terra gialla Massana*’, ‘*Terra negra Messena*’, and ‘*Terra rossa de ponente*’ for 0.05 to 0.07 *baiocchi* per ounce. ‘*Terra de hombra Massena*’ is 0.13 *baiocchi* per ounce and ‘*Abbayal biancha*’ is 0.23 *baiocchi* per ounce. See R.E. Spear, ‘A century of pigment prices: seventeenth-century Italy’, in J. Kirby, S. Nash and J. Cannon (eds), *Trade in Artists’ Materials: Markets and Commerce in Europe to 1700*, London, Archetype Publications, 2010, p. 288.
44. Taken from an inventory of the pigments bought from a colour merchant by the Borghese from 1614 to 1617 to decorate their palace in Rome. *Terra d’Ambra di Venetia*, *Terra Rossa*, *Terra Gialda scura fina* and *Terra Gialla* all cost 0.3 *baiocchi* per ounce. Lead white, ‘*Biacca fina di Venetia*’, costs 0.75–0.8. Spear and Sohm 2010 (cited in note 32), p. 66.
45. M.A. Lavin, ‘A seventeenth-century painter’s supplies: document of payment to Andrea Camassei’, *The Art Bulletin* 52(2), 1970, pp. 192–194.
46. S. Kubersky-Piredda, ‘The market for painters’ materials in Renaissance Florence’, in Kirby *et al.* 2010 (cited in note 43), pp. 232–242.
47. *Ibid.*, p. 224.

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‘CHE ALTRI CHE LUI NON LO FA’: MAKING ULTRAMARINE BLUE IN GRAND DUCAL FLORENCE

Sheila Barker

ABSTRACT This article considers the local Florentine history of artisanal knowledge regarding the preparation of ultramarine blue from the lapis lazuli stone. In the late 16th century, the prepared stone could be obtained in small quantities through apothecaries, but there were growing debates as to the best way of making it, depending on whether it was to be used as a medicine or a pigment. At this time, according to new documentation, a Vallombrosan monk emerged as the city’s foremost maker of ultramarine blue for painting. The cost effectiveness of his method may have rivalled or even surpassed those in use by the Venetian *vendicolori*.

Introduction: a pigment requiring expertise

Ultramarine blue held sway at the court of the Medici grand dukes in early modern Florence for several reasons. The pigment’s extraordinary expense meant that whenever it was present in the material objects used by the Medici, like gold leaf it served as a visible index of the family’s wealth and princely taste. Because it is made from lapis lazuli, a stone whose only known source at that time was in Badakhshan (Afghanistan), ultramarine blue also evoked the vitality of the Medici court’s commercial and diplomatic ties with the merchants of the Levant.¹ Moreover, the pigment functioned as manifest proof of the sophisticated skill and knowledge of the craftsmen and artists at the Medici court. As Cennino Cennini (c.1360–before 1427) commented of ultramarine blue in *Il libro dell’arte*, ‘It is an unusual skill to know how to make it well.’²

Making ultramarine blue pigment from lapis lazuli stones in the early modern period presented formidable challenges. To begin with, in the Renaissance marketplace, other stones were sometimes sold as lapis lazuli, either by accident or by fraudulent design. Cennini cautioned his readership that inferior blue stones known as *azzurro della magna* (azurite) were sometimes passed off as lapis lazuli, a substitution that rewarded unscrupulous vendors with enormous profits.³ Indeed, echoes of Cennini’s warning on the risk of the deceptive sale of false lapis lazuli continue to resound throughout the Florentine recipe books for several centuries. An unpublished Florentine recipe book from 1531

asserts that the genuine stone is sold in Damascus, but fails to mention its origin (the location of the mines was apparently a mystery even among Italy’s pigment experts).⁴ This declaration is followed by a well-known method of testing for authenticity that involves heating the stone.⁵ The process described is in fact quite accurate, as lapis lazuli exhibits a remarkable resistance to heat in comparison to azurite, a basic copper carbonate stone that, when heated, will glow and then change in colour to black (due to its conversion into cupric oxide):

Take the stone called lapis lazuli that is brought here from Damascus and that has a few veins of gold and which is coloured blue, but note that a [specimen] that has large veins is not the best; rather, the best is one that has a few subtle and tiny [veins]. You will test it in the following way: put a little of it atop the glowing-hot iron blade of a knife and then go back and add some more and see if [the first batch] has kept its original colour.⁶

Once a Florentine artisan had acquired the authentic stone, making the brilliant ultramarine blue pigment required a lengthy and complex preparation because lapis lazuli’s blue mineral component, lazurite, has to be separated from all the other mineral constituents.⁷ Although there is no risk of diminishing the intensity of the colour by pulverising the pigment too finely (as happens with azurite), the process may nonetheless have required a delicate touch. This is suggested



Fig. 1 Agnolo Bronzino, *Portrait of Eleonora de Toledo and her Son*, 1544–1545, oil on panel, 115 × 96 cm, Galleria degli Uffizi, Florence, inv. no. 748.

by Cennini's intriguing comment that follows immediately after his recipe for ultramarine blue, which references the prominent role of young women in the making of the precious pigment:

And know also that it is more the business of lovely young girls rather than men to make it, because they stay put in the house all the time, and have more delicate hands.⁸

Taking into account the difficulty, expense and time involved in the making of ultramarine blue pigment, it is easy to understand why painters in Renaissance Florence rarely made it themselves.⁹ Painters either acquired the pigment ready-made at the price specified by the patron or it was purchased and provided to them by the patron.¹⁰

Suppliers of ultramarine blue in Renaissance Florence

It is unclear whether there were always sufficient quantities available for sale in Florence. On the one hand, as an ingredient for medicines, lapis lazuli had been part of the standard stock trade of Florentine apothecaries since at least the 15th century.¹¹ On the other hand, when charged with commissions for Florentine patrons some artists, including Domenico Veneziano (c.1410–1461) and Benozzo Gozzoli (c.1421–1497), acquired ultramarine blue elsewhere – particularly Venice, Europe's most important emporium for this substance.¹² In one notable exception to this trend, Michelangelo obtained some of his ultramarine blue for the frescoes of the Sistine Chapel ceiling in Rome from the Gesuata fathers in Florence.¹³ For the most part, however, the pigment was not

purchased locally, probably because it was available at lower prices in markets with a direct connection to the Levant.

The pharmaceutical context in which artists acquired their lapis lazuli and ultramarine blue should not be completely discounted in studies of the artistic uses of these substances. Medicines made from lapis lazuli, such as the *Pillole di Lapis Lazuli di Mesue* found in the 1498 and 1550 editions of the *Ricettario fiorentino*, were indicated for the treatment of melancholy, the disease that was attributed to an excess accumulation of cold and wet humours in the body.¹⁴ This medical use of lapis lazuli had been endorsed in ancient times by Galen and Hippocrates, and in the 9th century by Mesue (Yuhanna ibn Masawaih, 777–857), who classified the stone as hot to the second degree and drying to the third degree.¹⁵

Initially the Italian apothecaries prepared lapis lazuli for internal remedies and painters' palettes with one and the same method. Eventually, though, distinctions arose between the way the stone was refined depending on whether it was required for medical uses or for artists' ultramarine blue. This discrepancy seems to have arisen shortly before 1617, when a medical debate broke out over the various lapis lazuli preparations then used by Italian apothecaries. At this time, two doctors in Lucca each published opposing arguments to explain what Mesue meant when he called for 'prepared' lapis to be used in the cordial called Alchermes.¹⁶ Their debate over its preparation involved conflicts regarding the best way to translate the Arabic manuscripts, disagreements as to whether empirical experience had more authority than venerable tradition or vice versa, and comparisons between the various methods for preparing lapis lazuli as a pigment and as a medicine (especially since recipes for the latter often involved extra steps such as baking the pulverised stone in an oven).

The divulgation of recipes for refining the pigment

When Italians first acquired knowledge of how to refine lapis lazuli is a more speculative problem. Presumably this technical knowledge first reached Italy from Arabic sources in the mid-13th century, when the presence of the Crusaders at several port cities in the Middle East facilitated the trade in the Mediterranean.¹⁷ Beginning in the 14th century, ultramarine blue recipes in Latin were circulated in Italy, first by alchemists and then by merchants.¹⁸ By the 15th century, Florentines tended to copy down ultramarine blue recipes in Italian rather than Latin. This vernacularisation was accompanied by a growth in both the length and level of detail in the recipes. Since many of these same recipes in Italian are for producing the pigment on large scale, we can deduce that they were meant for commercial use at the city's major apothecaries, a conclusion which is further supported by the frequent notation of pigment prices on the same page.¹⁹

In 16th-century Florence, the copying down of handwritten recipes for ultramarine slowed somewhat, perhaps

due to the proliferation of published books of secrets.²⁰ Compared to the more studied 15th century, less is known about the makers of ultramarine blue in the 16th century. Julia DeLancey has argued recently that apothecaries continued to be heavily involved in the supply of artists' materials in Florence through to the end of the 16th century.²¹ The Medici court painter Agnolo Bronzino obtained prepared ultramarine pigment from the Medici court while working on the portrait of Eleonora de Toledo and her son in 1545 (Fig. 1).²² Since there was no one on the court payroll at that time with such a specialisation, it is reasonable to presume that the pigment was sold to the Medici court by an apothecary. In the case of the ultramarine blue used on the maps of Cosimo de' Medici's Sala delle Carte Geografiche in Palazzo Vecchio, we know that the Dominican mathematician and astronomer Ignazio Danti obtained the ultramarine from apothecaries, not from the court.²³

Basilio Latini's pre-eminence as a maker of ultramarine blue

Adding a remarkable new wrinkle to this picture is the case of Basilio Latini, a monk who singlehandedly gained a monopoly on the Florentine production of ultramarine blue in the late 16th century. His emergence as an expert in the refinement of this pigment is outlined below.

Latini, who belonged to the Vallombrosans, an Order under the Benedictine Rule, spent much of the 1580s in Florence, moving between the city's two Vallombrosan monasteries of San Pancrazio and Santa Trinita. By 1589 he had moved to the Vallombrosan House in Passignano, serving as their *provveditore*. His name appears in archival documents for the first time in 1584 as the provider of the pigment with which Alessandro Allori tinted Mary's blue cloak in the altarpiece for the Salviati chapel in San Marco, the church of a reformed Dominican friary.²⁴ Since the friars of San Marco operated a large and important pharmacy at their convent, it is striking that they nevertheless went through Latini to obtain the ultramarine blue needed for the completion of their altarpiece. Given the wide diffusion of recipes for the pigment and the friars' access to the necessary equipment, they should have been able to make it themselves: perhaps the ultramarine blue he produced was superior in purity and beauty, or it may have been cheaper to purchase the pigment from Latini rather than produce it themselves.

Two years later, in 1586, Latini supplied his blue to another Dominican community in Florence: the nuns of San Domenico al Maglio.²⁵ Very possibly, Latini was recommended to the nuns by the Dominican friars of San Marco. In any case, the nuns purchased his ultramarine blue in conjunction with their commission for a new altarpiece for their church that was painted by Girolamo Macchietti (c.1535–1592), one of the Mannerist painters who worked in Grand Duke Francesco de' Medici's *studiolo* in Palazzo Vecchio.²⁶ Unfortunately Macchietti's altarpiece for the Dominican nuns is now lost or unidentified.

Latini's reputation in Florence reached a peak when he was called upon to supply ultramarine blue to the Medici court even though there were already several individuals in Florence with advanced knowledge of stones of various kinds: the Medici employed a number of artisans specialised in stone working, many of whom were foreigners who had been lured to the city because of the rarity of their technical know-how.²⁷ In 1572, Grand Duke Francesco de' Medici had set up a stonecutting workshop in the Casino di San Marco, which his successor, Grand Duke Ferdinando I, transferred to the so-called *Officina della Galleria* on the upper floor of the Uffizi in 1586. By 1588, the Delft-born jeweller Jacques Bylivert had become the overseer of the *Officina della Galleria*.²⁸ The bigger stones used in the Medici's art commissions were worked on in the *Cappella dei Principi*, where the larger water saws were also kept. The valuable scrap material left over from carving lapis lazuli was routinely collected in the troughs under the saw blades and retained for *pietre commesse* inlay work, *scagliola* gessoes, and perhaps also for the ultramarine pigment.

It was in this context, in 1588, that Basilio Latini began supplying artistic materials to the Medici court – in this case not blue, but milled gold for decorating Ludovico Butti's depiction of the Buonsignori Map in oil on the walls of the Camera delle Matematiche in the Uffizi, carried out under the guidance of a cosmographer, a Benedictine monk from Monteoliveto named Stefano.²⁹ In the same year Latini began supplying the milled gold and ultramarine blue for painting the terrestrial globe at the centre of Ferdinando de' Medici's great armillary sphere, designed by cosmographer Antonio Santucci and completed between 1588 and 1593 (Fig. 2).³⁰

Latini and the broader Italian market for ultramarine blue

Around the time that Santucci's armillary sphere was being constructed, Latini befriended Jacopo Ligozzi (1547–1627), a Medici court painter. Ligozzi was doubly involved with Medici court usage of lapis lazuli – not only did the paintings he made for the Medici make liberal use of ultramarine blue, but also his designs for their inlaid stone tabletops ingeniously exploited the particular characteristics of lapis lazuli.³¹ Thanks to Ligozzi's connections with the Florentine court, in 1594 a Medici secretary sent a letter on Latini's behalf to Duke Vincenzo I Gonzaga in Mantua in which he declared Latini to be a 'maestro perfetto' (supreme master) in the art of making ultramarine blue, and suggested that the duke should hire Latini to make pigments from his deposits of lapis lazuli fragments.³²

Valuable data on the Italian market for lapis lazuli stones in the first years of the 17th century can be gleaned from the correspondence regarding Latini that circulated between Florence and Mantua. In 1602, the Gonzaga agent Giuliano Dieciaiuti wrote from Florence to the duke of Mantua concerning a commission to Jacopo Ligozzi for 12 paintings.³³ For the ultramarine blue to be used in these paintings, Ligozzi referred the Mantuan agent to 'un monaco di Valenbrosa don Basilio, che altri che lui non lo fa, che ne fa per Sua Altezza



Fig. 2 Antonio Santucci, *Armillary Sphere*, 1588–1593, polychrome wood and metal, height 370 cm, Museo Galileo, Florence, inv. no. 714. (Photo courtesy of Museo Galileo, Istituto e Museo di Storia della Scienza.)

Serenissima' (Don Basilio, a monk from Vallombrosa who does what no one else does, who does this work for His Serene Highness), a description which suggests that Latini was the exclusive supplier to Ferdinando I de' Medici and that his specialist knowledge on the preparation of lapis lazuli was very hard to come by.

The price Latini requested for his ultramarine pigment was 20 gold *scudi* per Florentine ounce (Cennino Cennini two centuries earlier had quoted a much lower price of 8 *florins* an ounce). For the *cenere d'azzurro*, the ashes (i.e. the final, less saturated, extraction of the pigment), Latini requested 2 *scudi* per Florentine ounce. He was also willing to make fresh supplies from the duke's own supply of lapis lazuli rubble, scrap material 'which had no other use anyway' according to the letters. If the duke wished to send 10 or 20 pounds of lapis lazuli scrap to Florence, Ligozzi would arrange for Latini make it into a pigment for the 12 paintings. As for the unused pigment, Ligozzi could either send it back to the duke or pay him for its value.³⁴ The Mantuan agent advised the duke to opt for the latter option, stating that the ultramarine commanded much higher prices in Florence than in Venice or Germany. This letter and others confirm the profitability of this operation.³⁵ In the Venetian market, an Italian pound of lapis rubble cost about 8 *lire* (slightly more than one gold Florentine *scudo*) and rendered about half a Florentine ounce

of ultramarine pigment; this half-ounce in turn could be sold for 10 gold *scudi* in Florence. Using this formula, the duke's 10 pounds of rubble could be made into fine pigment worth 100 *scudi* plus the ultramarine ashes. In other words, Latini's operation could produce somewhere around a nine-fold profit in Florence with respect to the cost of the raw material.

The Medici court's appropriation of Latini's secret

It is remarkable that with all the apothecaries and jewellers in Florence, time and again the best artists at the Medici court made recourse to Latini; indeed, even individuals as far away as Mantua knew of his fame. By 1613, when the painter Artemisia Gentileschi arrived in Florence, Latini's secret must have somehow been divulged to the Medici because the Officina della Galleria now supplied her and other painters directly with the ultramarine blue needed for their artistic commissions;³⁶ the role of the expert preparer of ultramarine had now become institutionalised in Florence, having been taken over by the Officina.

It can be no mere coincidence that the bureaucratic division of the Medici government responsible for overseeing the Officina della Galleria – known as the Guardaroba – was directed until 1626 by Cosimo Latini, a relative of the monk from Vallombrosa. Indeed, the distribution of staff positions at the Medici court was frequently subject to nepotism. Perhaps Cosimo Latini even shared his kinsman's lapidary secrets with the Medici grand dukes in order to secure his highly paid staff position within their court.

From the research presented here, it can be concluded that even though Medicean Florence abounded with expert stone workers and a wide array of manuscript recipes for making ultramarine blue, a true working knowledge of the process along with access to the proper equipment was confined to a very small number of individuals between the late 16th and early 17th century.³⁷ Among the few artisans in Florence with the capacity to make ultramarine in the late 16th century, a Vallombrosan monk stood out, garnering the respect of patrons and artists alike. His cost-efficient method for making ultramarine blue was the decisive factor in his success in the late Renaissance Florentine marketplace for artists' colours. Following the appropriation of his secret by the Medici court's Officina della Galleria, the knowledge of refining lapis lazuli became an institutional procedure, finally putting an end to the lineage of individual expert suppliers of the most precious of all blue pigments.

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I wish to thank my two peer reviewers as well as Matthew Hayes for kindly reading drafts of this chapter and offering their invaluable suggestions for improvement.

Notes

1. On the Medici court's exchanges with the peoples of the Levant, see M. Arfaioi and M. Caroscio, *The Grand Ducal Medici and the Levant: Material Culture, Diplomacy, and Imagery in the Early Modern Mediterranean*, Turnhout, Harvey Miller, 2016.
2. L. Broecke (ed. and tr.), *Cennino Cennini's Il libro dell'arte: A New English Translation and Commentary with Italian Transcription*, London, Archetype Publications, 2015, p. 90.
3. Broecke 2015 (cited in note 2), p. 89.
4. Ms Biblioteca Nazionale Centrale di Firenze, Magliabechiana classe xv, vol. 136, ff. 75r–76v.
5. This test, as well as another involving hot coals, was already known to Florentine merchants such as Francesco Balducci Pegolotti by the early 14th century: see F. Balducci Pegolotti, *La pratica della mercatura*, A. Evans (ed.), Cambridge MA, Medieval Academy Books, 1936, p. 372.
6. Ms Magl. xv, 136 (cited in note 4), ff. 75r–76v: 'Recipe la pietra che si chiama lapis lazuli che si porta di damascho et tien' alcune vene d'oro et è colorita di azzurro, ma notha che quella che tiene quelle vene grandi non è la migliore ma quella che tiene alcune soctile et minute è la migliore. Tu ne farai experientia in questo modo: mectine un pocho in sur una lamina di ferro acciesa et di nuovo torna a mectici et se ella si mantiene in nel primo suo colore.'
7. See, for example, J. Plesters, 'Ultramarine blue, natural and artificial', in A. Roy (ed.), *Artists' Pigments: A Handbook of their History and Characteristics*, vol. II, Washington DC, National Gallery of Art, 1993, pp. 37–65 and S. Bucklow, 'Paradigms and pigment recipes: natural ultramarine', *Zeitschrift für Kunsttechnologie und Konservierung* 14(1), 2000, pp. 5–14.
8. Broecke 2015 (cited in note 2), p. 90.
9. One of the few artists of this age who did make his own ultramarine blue was Lorenzo Lotto: see L.C. Matthew, '“Vendicolori a Venezia”: the reconstruction of a profession', *The Burlington Magazine* 144(1196), 2002, pp. 680–686; p. 682; R. Krischel, 'Zur Geschichte des venezianischen Pigmenthandels. Das Sortiment des “Jacobus de Benedictus à coloribus”', *Wallraf-Richartz-Jahrbuch* 63, 2002, pp. 93–158; p. 120.
10. Specific cases are discussed in M. Baxandall, *Painting and Experience in Fifteenth-Century Italy*, 2nd edn, Oxford, Oxford University Press, 1988, p. 14; D. Bomford, J. Dunkerton, D. Gordon, A. Roy and J. Kirby (eds), *Art in the Making: Italian Painting Before 1400*, London, National Gallery Publications, 1989, p. 8; E. Borsook, 'Fra Filippo Lippi and the murals for Prato Cathedral', *Mitteilungen des Kunsthistorischen Institutes in Florenz* 19(1), 1975, pp. 1–48; pp. 40, 44; E. Borsook, 'Cults and imagery at Sant' Ambrogio in Florence', *Mitteilungen des Kunsthistorischen Institutes in Florenz* 25(2), 1981, pp. 147–202; p. 164.
11. J. DeLancey, 'Dragonsblood & ultramarine: the dealer in artists' pigments in Florence, 1450–1600', in F. Matthews-Grieco, L. Matthew and M. Fantoni (eds), *The Art Market in Italy 15th–17th Centuries*, Modena, F.C. Panini, 2003, pp. 141–150.
12. Matthew 2002 (cited in note 9), p. 682; Krischel 2002 (cited in note 9), pp. 94, 120.
13. See the letter from Michelangelo to Frate Jacopo of the Gesuates in Florence regarding a 'cierta quantità d'azzuri begli' in G. Milanesi, *Le lettere di Michelangelo Buonarroti*, Florence, Successori Le Monnier, 1875, p. 379. On the Order of the Gesuates (*Gesuati*) in Florence, who also manufactured other pigments and liquors, see P. Bensi, 'Gli arnesi dell'arte. I Gesuati di San Giusto alle Mura e la pittura del Rinascimento a Firenze', *Studi di Storia dell'Arte* 3, 1980, pp. 33–47.

14. S. Pissinio, *De Cyanei lapidis viribus, ac de eius in confectione Alchermes vocata, legitimo uso*, Lucca, Ottaviano Guidobono et Baldassarre de' Giudici, 1617, p. 10.
15. These arguments are summarised in Pissinio 1617 (cited in note 14), p. 12.
16. Pissinio 1617 (cited in note 14), p. 38, argued that pharmacists ought to prepare lapis for medicine the same way as painters. The opposing view is expressed in V. Bendinelli, *Parere della pietra lazuli per la confettione Alchermes di Gio. Mesue*, Lucca, Ottaviano Guidobono et Baldassarre de' Giudici, 1618.
17. M. Mander, 'Pastellus fit isto modo': una trattazione legata all'azzurro oltramare', *Studi di Memofonte* 16, 2016, pp. 332–340.
18. S. Baroni and G. Pizzigoni, 'Capitulum ad faciendum lazarium ultramarinum', *Studi di Memofonte* 16, 2016, pp. 328–331. These alchemical recipes were based on texts by Paolo of Taranto and Michael Scot. According to Mander 2016 (cited in note 17), the merchants brought to their texts a new concern for the markets in which the stone was sold, the stone's geographic origins and its condition.
19. Mander 2016 (cited in note 17). Even Cennini noted the price of the pigment in his text, so this evidence could be subject to different interpretations.
20. M. Minciullo, '"A fare azzurro oltramarino": una trattazione sull'oltremare nei "Segreti diversi", Firenze, Biblioteca Nazionale Centrale, ms. Palatino 857', *Studi di Memofonte* 16, 2016, pp. 384–390.
21. According to DeLancey 2003 (cited in note 11), p. 144, the Pinadori pharmacy supplied brushes and lead white, whereas the pharmacist Stefano Rosselli seems to have made pigments.
22. Letter from Bronzino to Pier Francesco Riccio, 9 August 1545, Archivio di Stato di Firenze, Mediceo del Principato 1170a, f. 38r, digitised in the database of the Medici Archive Project (henceforth MAP), doc ID# 5567: <http://bia.medici.org/DocSources/LoginUser.do>.
23. V. Borghini, *Carteggio artistico inedito*, A. Lorenzoni (ed.), vol. I, Florence, B. Seeber, 1912, pp. 175, 177.
24. S. Cornelison, *Art and the Relic Cult of St. Antoninus in Renaissance Florence*, Farnham, Ashgate, 2012, p. 134.
25. Archivio di Stato di Firenze, Conventi Religiosi Soppressi dal Governo Francese, serie 108, busta 46, f. 62v: 'Alla Sagrestia adi 15 detto [settembre] lire cinquantasei pagati tanti spesi in oncia dua d'Azzurro trasmarino compero da Don Basilio monacho di Sancto Brancatio porto detto contanti_lire 56'.
26. S. Barker, 'Painting and Humanism in early modern Florentine convents', in S. Barker and L. Cinelli (eds), *Artiste nel chiostro: produzione artistica nei conventi femminili*, Florence, Nerbini, 2016, p. 117.
27. See S.B. Butters, *The Triumph of Vulcan: Sculptors Tools, Porphyry, and the Prince in Ducal Florence*, 2 vols, Florence, Leo S. Olschki, 1996 and W.C. Fock, 'Les orfèvres-joailliers étrangers à la cour des Médicis', in F. Diaz (ed.), *Firenze e la Toscana dei Medici nell'Europa del '500*, vol. 3, Florence, Olschki, 1983, pp. 831–845.
28. See W.C. Fock, 'The Medici crown: work of the Delft goldsmith Jacques Bylivert', *Oud Holland* 85, 1970, pp. 197–209. In 1597 Bylivert was sent to England to the court of Elizabeth I on a diplomatic mission (Archivio di Stato di Firenze, Mediceo del Principato 877, f. 173r) and in 1600 he accompanied Maria de' Medici to France (Archivio di Stato di Firenze, Guardaroba Medicea 210, f. 172r).
29. A. Mori, 'Le carte della Toscana di Stefano Buonsignori nella Galleria degli Uffizi', *La Bibliofilia* 9, 1907, pp. 281–289; L. Genovici, 'Le due carte della Toscana dipinte nel 1589 da Don Stefano Buonsignori nella Galleria degli Uffizi', *L'Universo* 8, 1927, pp. 595–632.
30. Archivio di Stato di Firenze, Guardaroba Medicea 337, ff. 40; see also Guardaroba Medicea 337, ff. 18rv and 29rv.
31. See L. Conigliello, 'L'officina decorative: il ruolo di Jacopo Ligozzi', in A. Natali, A. Nova and M. Rossi (eds), *La tribuna del principe*, Florence, Giunti, 2014, pp. 87–95.
32. 'Un padre, don Basilio Latini dello ordine di Vallombrosa, conosciuto dal Ligozzi, et del quale intendo che ne sia stato parlato costà altre volte, vorrebbe venire a trovare sua altezza, et sapendo che ella ha molti fragmenti di lapislazzuli, vorrebbe venire a farle l'azzurro oltremarino, affermando di essere maestro perfetto et haverebbe voluto che io l'havesse accompagnato con mia lettera, ma io non ho voluto farlo senza toccarne prima anticipatamente questo motto alla signoria vostra.' Letter from Belisario Vinta in Florence to Duke Vincenzo I Gonzaga in Mantua, 29 November 1594, Archivio di Stato di Mantova, AG, busta 1120, filza 4, f. 218, published in R. Piccinelli, *Il collezionismo dei Gonzaga: il carteggio tra Firenze e Mantova, 1554–1626*, Milan, Silvana, 2000, doc. 278.
33. Letter from Giuliano Dieciaiuti in Florence to Duke Vincenzo I Gonzaga in Mantua, 3 March 1602, Archivio di Stato di Mantova, AG busta 1122, filza 10, f. 487, published in Piccinelli 2000 (cited in note 32), doc. 319.
34. On Ligozzi's negotiations regarding this commission see L. Conigliello, *Jacopo Ligozzi: le vedute del Sacro Monte della Verna; I dipinti di Poppi e Bibbiena*, exh. cat., Poppi, Castello dei Conti Guidi, 1992, p. 207 and A. Luzio, *La Galleria dei Gonzaga venduta all'Inghilterra nel 1627–28: documenti degli archivi di Mantova e Londra*, Milan, L.F. Cogliati, 1913, p. 257, no. 1.
35. See the letter from Giuliano Dieciaiuti in Florence to Duke Vincenzo I Gonzaga in Mantua, 3 June 1602, Archivio di Stato di Mantova, AG busta 1122, filza 10, f. 487, published in Piccinelli 2000 (cited in note 32), doc. 319 and the letter from Antonio Forestani in Florence to the Mantuan court, 10 June 1608, Archivio di Stato di Mantova, AG, busta 1126, filza 5, f. 175 transcribed in Piccinelli 2000, *op. cit.*, doc. 492.
36. See, for instance, the documentation of ultramarine blue given to her with her first grand ducal commission, dated 24–28 October 1614, Archivio di Stato di Firenze, Guardaroba Medicea 332, ins. 1, f. 71r, first published in S. Barker, 'Artemisia's money: the entrepreneurship of a woman artist in seventeenth-century Florence', in S. Barker (ed.), *Artemisia Gentileschi in a Changing Light*, Turnhout and Brepols, Harvey Miller, 2017, pp. 59–88, appendix doc. 22, p. 77.
37. One such individual was mentioned in the transcription of testimonies given at Artemisia Gentileschi's rape trial in Rome in 1612. He was a Florentine man named Marcantonio Coppini, whose expertise was in 'making the colour ultramarine blue' and who worked at the pigment shop owned by Antinoro Bertucci: see P. Cavazzini, 'Documents relating to the trial of Agostino Tassi', in K. Christiansen and J. Mann (eds), *Orazio and Artemisia Gentileschi*, New York, Metropolitan Museum of Art, 2001, pp. 432–444, appendix 1, pp. 434–435.

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AN UNUSUAL PIGMENT IN 16TH-CENTURY FERRARA: ‘EGYPTIAN BLUE’ IN GAROFALO’S *ADORATION OF THE MAGI* AND ORTOLANO’S *ST MARGARET*

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ABSTRACT The *Adoration of the Magi* by Benvenuto Tisi (called Il Garofalo) painted in Ferrara, probably in the 1530s and now in Amsterdam, was studied in preparation for the forthcoming comprehensive catalogue of the Rijksmuseum’s Italian paintings. The then considered exceedingly rare pigment known as ‘Egyptian blue’ was identified in all the deep blue areas of the composition in mixtures with ultramarine. Analytical evidence for this was provided by the combined use of non-invasive spectroscopic imaging and spot analysis techniques, as well as microsample analyses. Two other Ferrarese paintings, by Garofalo and his close contemporary, Giovanni Battista Benvenuto (called L’Ortolano), also contain this pigment, evidence that it must have been available in Ferrara in the 1520s and/or 1530s. Samples from Garofalo’s *Adoration of the Magi* in the Rijksmuseum, Amsterdam, and Ortolano’s *St Margaret* in the National Gallery of Denmark (SMK), Copenhagen, were analysed by means of scanning electron microscopy with energy dispersive X-ray spectroscopy and compared.

Introduction

The oldest recorded synthetic blue pigment, ‘Egyptian blue’ was widely used in a large variety of applications from the early Egyptian dynasties to the end of the Roman Empire; it survived thereafter, but with rapidly increasing rarity, until the early Middle Ages in works of art produced in Italy and central Europe. Later occurrences are extremely sporadic. The recent, and unexpected, identification of this pigment in three paintings – in museums in Copenhagen, London and Amsterdam – by local artists in Ferrara in the 1520s and 30s, raises the question as to why this already obsolete pigment should have briefly been available in this North Italian town, and whether its use by these painters was a deliberate choice on their part, or the result of contamination/conscious adulteration by a local colourman.

Egyptian blue

The pigment takes its name from the fact that, as ancient Roman authors record, it was invented in ancient Egypt.¹ It is the synthetic equivalent of the mineral known as cupro-rivaite, which is found only very rarely in nature. Chemically it is a copper calcium tetrasilicate ($\text{CaCuSi}_4\text{O}_{10}$), which crystallises in the tetrahedral space.² It is chemically stable, resistant to most acids and resilient to the alkalinity of lime, making it suitable for use as a pigment in a wide variety of techniques including fresco painting. When combined with an organic binding medium it can undergo various degrees of darkening over time, either due to an exceptional accumulation of surface dirt as a result of its coarse granulometry or to darkening of the binding medium in combination with the transparency and low hiding power of the pigment.³ The method of producing it is quite complex. Silica (sand), a compound of calcium (such as powdered limestone), a compound of copper (e.g. malachite, or bronze), and a flux (alkali) have



Fig. 1 (a) Ortolano, *St Margaret*, 1524, oil on panel, 190.5 × 120.7 cm, National Gallery of Denmark, Copenhagen. (Photo © SMK.) (b) Garofalo (attr.), *Holy Family with Saints*, c.1520–35, oil on canvas transferred from panel. (Photo © The National Gallery, London.) (c) Garofalo, *Adoration of the Magi*, 1530s, oil on panel, 79 × 58 cm, Rijksmuseum, Amsterdam, inv. no. SK-A-114. Diagrams show the relative dimensions.

to be ground together. The resulting powder is shaped into spheres, which are then packed into earthenware crucibles (sometimes adhering to the sides) and baked at temperatures of between 850 and 950 °C.⁴ A more intense blue and a purer product can be obtained if a second grinding and firing is undertaken. Egyptian blue can be found in varying degrees of quality and purity, and often includes glass, silica or copper oxides depending on the stoichiometric ratios of the raw materials used during its manufacture.⁵ It can also produce different intensities of blue according to the size of the ground particles.

It is abundantly clear that Egyptian blue was produced on a large scale and was by far the most commonly used blue pigment in Egypt, Mesopotamia, Persia, Greece, Etruria and the Roman territories from the third millennium BC until the end of the Roman Empire.⁶ In Egypt and Mesopotamia it was also used in bulk in the production of small objects, including statuettes, inlays and beads. Cristina Boschetti has recently described its use in early Roman wall mosaics, also in bulk, to form tesserae before these were superseded by tesserae made of blue glass.⁷ The recipe for producing the pigment must have spread rapidly from Egypt to Mesopotamia and Persia,⁸ before its manufacture became established in the south of the Italian Peninsula, particularly at Pozzuoli, near Naples, during the Roman Empire.⁹ The first written testimony to the making of Egyptian blue is provided by Vitruvius in his treatise on architecture. Although his recipe is essentially correct, Vitruvius unfortunately failed to mention one necessary ingredient: some sort of compound of calcium. This was probably because the sand near Pozzuoli, then the principal centre of production and well known to Vitruvius, is naturally rich in calcium which would therefore not necessarily have been specified. This omission meant that later attempts, particularly during the Renaissance period, to recreate the blue of the ancients from Vitruvius's instructions were doomed to failure.

It has generally been considered that the pigment fell out of use during the Middle Ages because of a loss of technical know-how (due to its complicated production) after the fall of the Roman Empire combined with the increasing availability of other blue pigments, such as azurite and

ultramarine (lapis lazuli).¹⁰ Egyptian blue has, however, sporadically been identified in recent decades on a few works of art made in Italy and central Europe up to the 13th century and even, although very rarely, as late as the 17th century. These include the mural decorations in the church of San Saba in Rome dating from the 8th century AD,¹¹ the frescoes in Santa Maria foris portas at Castelseprio, north of Milan, dated to c.AD 1000,¹² and the 11th-century scenes from the life of Saints Alexis and Clement in the lower church of the Basilica di San Clemente, also in Rome.¹³ It is noteworthy that in the two Roman occurrences, the Egyptian blue appears to be mixed with lapis lazuli. Outside of Italy it is found, exceptionally, on a 10th-century stone altarpiece in the church of San Pere at Terrassa in Catalonia,¹⁴ and in English medieval wall paintings.¹⁵ It has also been identified on a late 12th-century panel painting in the Musei Vaticani signed 'Nicolaus Joh Pictor'.¹⁶ The latest known occurrence was found on two 17th-century sculptural models – a papier-mâché head and an unfired clay crucifix – attributed to the workshop of Alessandro Algardi.¹⁷

To these examples must now be added the three localised occurrences on paintings produced in Ferrara in the 1520s and 30s (Fig. 1). The first concerns a large (190.5 × 120.7 cm) altarpiece of *St Margaret*, dated 1524, by Giovanni Battista Beneventi (called L'Ortolano) in the National Gallery of Denmark (SMK), Copenhagen,¹⁸ and the second is a much smaller panel with a *Holy Family with Saints* by Ortolano's younger and more famous Ferrarese contemporary Benvenuto Tisi (called Il Garofalo) in the National Gallery, London.¹⁹ The third is another modestly sized panel by Garofalo, this time of the *Adoration of the Magi* in the Rijksmuseum, Amsterdam.²⁰

The Rijksmuseum's research project

Garofalo's *Adoration of the Magi* (Fig. 2) was studied as part of a programme of research into the Rijksmuseum's Italian paintings for a forthcoming catalogue of the collection.²¹ According to the research protocol developed in the Rijksmuseum for the project, each of the 214 works is



Fig. 2 Garofalo, *Adoration of the Magi*, Rijksmuseum, Amsterdam.

unframed and the recto and verso closely examined using diffuse and raking light, UV radiation and stereomicroscopy; microphotographs are also taken with the stereomicroscope. The analytic imaging includes full X-radiography, infrared reflectography (IRR) at two wavelengths, infrared false-colour (IRFC) and, for the canvases, infrared in transmitted irradiation. The technical images and analytical findings are discussed in front of the paintings by the curator and the researcher-conservator.²² Some paintings are selected for further research if deemed of sufficient art-historical and/or technical interest. While the first stage of enquiry is non-invasive, in this second stage samples are taken if required to answer specific questions.

The Rijksmuseum's *Adoration of the Magi* by Garofalo was an obvious candidate for further research – not only is it a significant work within the oeuvre of one of the leading North Italian artists of the High Renaissance, but the IRRs revealed an unexpectedly rich and complex underdrawing, which raised questions as to the genesis of the composition and possible clues regarding the activities of the painter's workshop when repeating successful compositions.

The *Adoration of the Magi* by Garofalo

Garofalo (1481–1559) was the principal painter at the Este court at Ferrara up to his death, and one of the foremost exponents of the High Renaissance style on the North Italian

mainland. He had worked with Raphael in Rome and was on close terms with Titian, Giulio Romano, Ludovico Ariosto and other leading humanists. His works were in demand throughout the Italian Peninsula, and he received commissions for both large- and small-scale works from most of the leading courts and collectors in Italy during a period in which the arts are considered to have reached a high point of excellence. His considerable output, and the fact that he repeated many of his standard compositions, often with significant variations, implies that he probably had a large workshop of assistants in which paintings for a variety of destinations were produced.²³

The modest format and the subject of the painting suggest that it was possibly intended as a small-scale altarpiece for private devotion. Garofalo repeated the composition in several paintings ranging in size from tiny panels, evidently intended for the enjoyment of connoisseurs, to large-scale gallery pictures for display in aristocratic palaces. As well as variations in structure and format, there are also differences in the number and disposition of the figures although with the poses of protagonists unaltered and with a standard repertory of *parerga*. There seems every reason to believe that he had hit on a popular compositional formula enjoyed by a wide range of viewers.

The original ownership of the Rijksmuseum's painting cannot be established with certainty. It is one of a collection of paintings purchased en bloc in Paris in 1823 by King Willem I of the Netherlands from the widow of Count Edmond de Bourke, who had served as the Danish ambassador in both Naples and Madrid during the Napoleonic period. De Bourke is reputed to have acquired many of his paintings in Spain,²⁴ and in the sale contract the Garofalo is said to have come from the collection of Don Manuel Godoy, the former Principe de el Paz and de facto prime minister of Spain until he fled together with King Carlos IV after Napoleon's conquest of Madrid. Although it is not listed in the inventory of Godoy's confiscated possessions, such a provenance cannot be excluded.²⁵ Godoy received many gifts of paintings from the collections of the Spanish king and queen (whose lover he is reputed to have been), and the fact that there is an exact, probably 17th- or 18th-century copy of the Rijksmuseum's panel among the Farnese paintings in the Museo di Capodimonte in Naples may suggest that the original was taken to Spain when the Farnese estates were inherited by King Carlos III of Spain through his mother, Elisabeth Farnese, and a copy left in Italy.

The *Adoration of the Magi* is painted on a wooden (almost certainly poplar) support composed of two vertically grained butt-joined planks and reinforced by three probably original butterfly splines. Two dovetailed grooves, carved into the thick panel, would have held batons to reinforce the construction. The preparatory layers are white, finished with a white *imprimatura* in sweeping horizontal brushstrokes, the texture of which is palpable and visible to the naked eye. The extensive and spectacular underdrawing was made in a wet medium and the different shades and thickness of the lines suggest more than one phase of work. The underdrawing served to elaborate and rework the



Fig. 3 Garofalo, *Adoration of the Magi*: detail of the Virgin and Child in (a) visible light photography, (b) infrared reflectography 0.9–1.7 μm InGaAs, (c) infrared false-colour, (d), X-radiography, (e), MA-XRF copper map (Cu-K), (f) MA-XRF mercury map (Hg-L) (relative scaling).

basic composition, with individual elements redrawn up to three times in slightly different positions. The most striking change concerns the central figure: the Virgin's head was initially drawn tilted towards the left, but was painted in a slightly raised position to the right (Fig. 3a and b). The painting's execution, in what appears to be oil-bound paint, is characterised by a rich and colourful palette with much

use of glazing and an evident wish to mask brushmarks by means of blotting, especially in the green and red draperies. The highlights on the shiny metallic objects, jewels and decorative borders of the draperies are achieved with small touches of bright yellow paint, while shell gold has been used for the haloes as well as some of the decorations on the draperies, further enriching the surface.

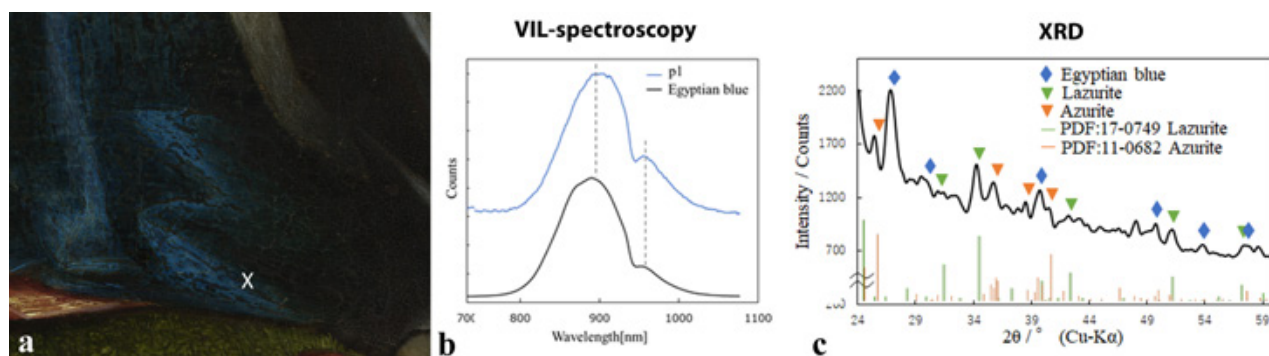


Fig. 4 Garofalo, *Adoration of the Magi*: detail of the Virgin's blue drapery showing (a) the location of measured spot at which (b) both VIL spectroscopy and (c) an XRD pattern were acquired.

Results of the analyses

Technical research began with examination and imaging analysis following the protocol outlined above. Further investigation was undertaken to identify pigments and in the hope of clarifying the changes in composition made during the drawing and painting phases. Special attention was paid to the blue pigments. IRFC suggested that different blue pigments had been used for the landscape and sky (blue response, suggesting a copper-based pigment) from that used for the Virgin's drapery (red response, indicating the possible presence of lapis lazuli). It also highlighted a possible *pentimento* in the drapery fold on the Virgin's left knee (Fig. 3c), coinciding with that in the underdrawing (Fig. 3b). The drying cracks in this area, visible to the naked eye and even clearer in X-radiography, suggested the presence of a thicker paint layer, possibly caused by reworking (Fig. 3d). Microscopic observation of the surface also revealed the presence of a blue paint layer under part of the red dress covering the Virgin's right leg, perhaps a more general reworking of the entire drapery in this area. Macro X-ray fluorescence (MA-XRF) scans were then made of the entire painting. The copper (Cu) map revealed the presence of a copper-based pigment in all the blue areas as well as in the part of the red dress covering the Virgin's right leg, confirming that this part had first been painted blue (Fig. 3e). The blue areas were also found to contain potassium, which can be used as a marker of lapis lazuli. The mercury (Hg) map, associated with the pigment vermilion (HgS), exactly follows the red dress as painted in the final composition (Fig. 3f).

In order to further explore the nature of the blue pigments, use was made of novel portable *in-situ* non-destructive analytical techniques: a portable powder diffractometer (p-XRD), a portable micro-Raman spectrometer, and a portable visible induced luminescence (VIL) spectrometer. Spot analyses were conducted on the areas that IRFC and MA-XRF had revealed as the most intriguing. VIL spectroscopy of a highlight in the Virgin's blue drapery (Fig. 4a) (strong red response in IRFC) revealed a strong fluorescence peak at around 900 nm when excited by red light (632 nm). This peak is highly characteristic of Egyptian blue and immediately signalled the unexpected presence of this pigment (Fig. 4b). This technique has proved to be an efficient analytical method for identifying

Egyptian blue, capable of providing characteristic spectra on samples regardless of origin or age.²⁶ The XRD measurement produced a diffraction pattern that contained peaks characteristic of lazurite, azurite and cuprorivaite (Fig. 4c).²⁷

To confirm the presence of Egyptian blue, to understand the build-up of the paint layers, and to identify in which layer(s) Egyptian blue had been used, a microsample was taken from a light blue area of the Virgin's gown next to the spot measured with VIL spectroscopy and XRD (Fig. 5a). Light microscopy of the embedded paint sample revealed a complex stratigraphy with four different blue layers (2–5), applied over the white *imprimatura* (Fig. 5b and c). Using scanning electron microscopy with energy dispersive X-ray spectroscopy (SEM-EDX) (Fig. 5d and e), it was possible to identify the pigment composition of the individual layers.

The first two blue layers (2 and 3) contain a coarse-grained, copper-based blue pigment, most probably azurite, the second layer (3) having a higher proportion of lead white²⁸ and a small quantity of organic red lake. The third blue layer (4) consists of particles of Egyptian blue mixed with lapis lazuli and lead white, while the topmost layer (5), a thin glaze, contains lapis lazuli alone. Quantitative EDX detected silicon (Si), calcium (Ca) and copper in the Egyptian blue particles, with the atomic ratios corresponding to the molecular formula of Egyptian blue detailed above (Fig. 5f and Table 1). These particles were found to be homogeneous in composition. No other mineral or glass phases inside the grains were observed. The blue lazurite particles (the coloured component of lapis lazuli) were identified by the co-presence of sodium (Na), aluminium (Al), silicon (Si), and sulphur (S) (Fig. 5g). In addition to Egyptian blue and lazurite, colourless particles of phlogopite ($\text{KMg}_3(\text{AlSi}_3\text{O}_{10})(\text{OH})_2$), sodalite ($\text{Na}_8\text{Al}_6\text{Si}_6\text{O}_{24}\text{Cl}_2$ similar to lazurite but containing chlorine instead of sulphur), feldspar and quartz (SiO_2), all accessory minerals of lapis lazuli,²⁹ were identified in the uppermost two blue layers based on their elemental composition (Fig. 5h and i and Table 2). Most of the Egyptian blue grains have an elongated shape and are approximately 10–20 μm in length. They have a light blue colour as opposed to the lazurite particles, which have a more intense hue.

Once the identification of Egyptian blue had been confirmed, VIL imaging³⁰ was used to determine the extent to which Egyptian blue had been employed in the pictorial

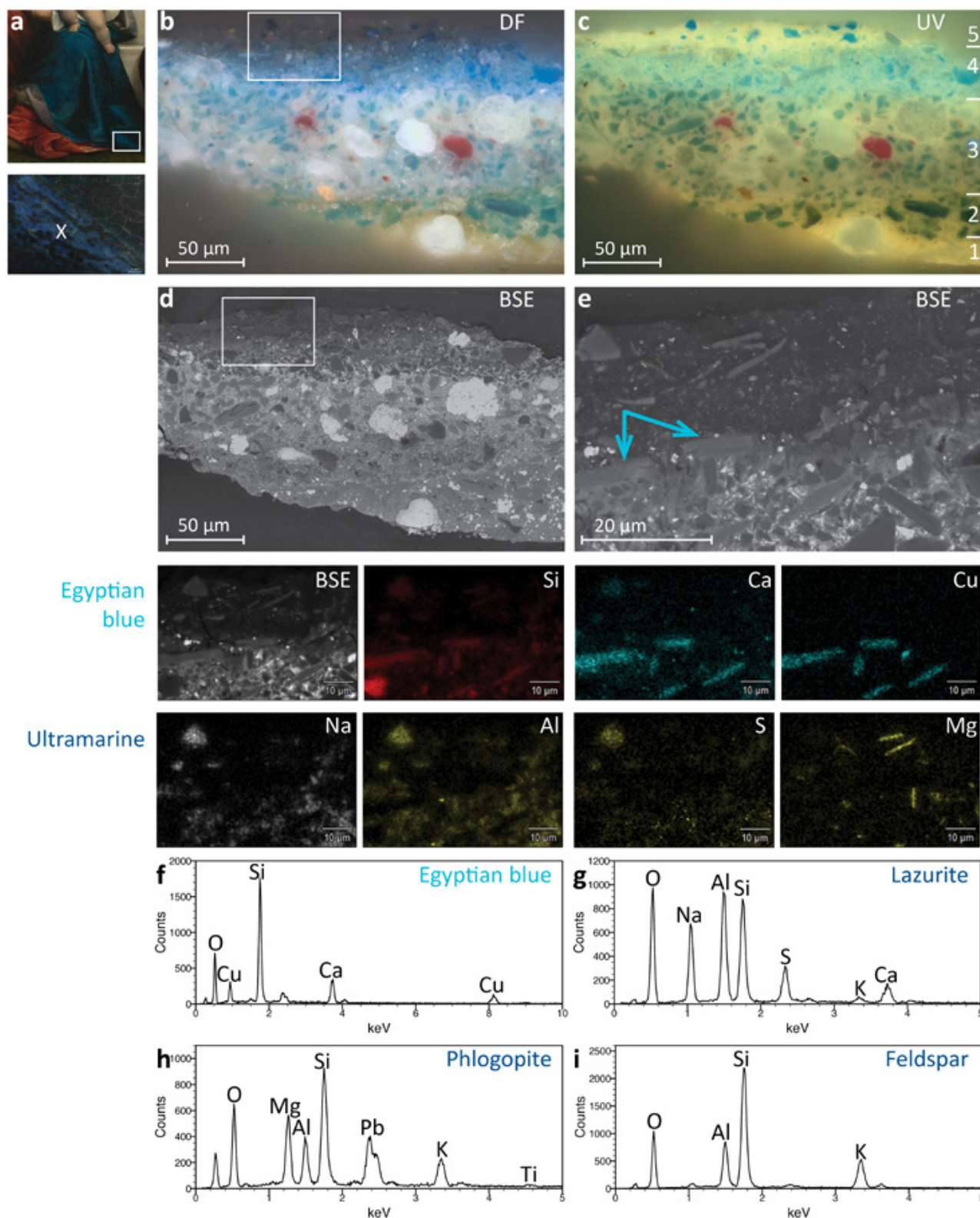


Fig. 5 Garofalo, *Adoration of the Magi*: (a) the location of paint cross-section SK-A-114_01 and (b) the appearance in dark field, (c) UV, (d) backscattered image, (e) detail of the backscattered image with corresponding elemental maps, (f) EDX spectra of Egyptian blue, (g) lazurite, (h) phlogopite and (i) feldspar.

Table 1 EDX analyses of Egyptian blue particles.

Compound %	Garofalo, <i>Adoration of the Magi</i>				Ortolano, <i>St Margaret</i>			
	Spot 1	Spot 2	Spot 3	Spot 4	Sample 595a Spot 1	Sample 595b Spot 2	Sample 595b Spot 1	Sample 595b Spot 2
SiO ₂	63.8	65.0	63.3	64.8	65.0	64.7	65.0	63.0
CaO	16.4	14.8	16.5	16.0	15.7	15.6	15.1	15.1
CuO	19.8	20.2	20.1	19.2	19.3	19.7	19.9	21.0

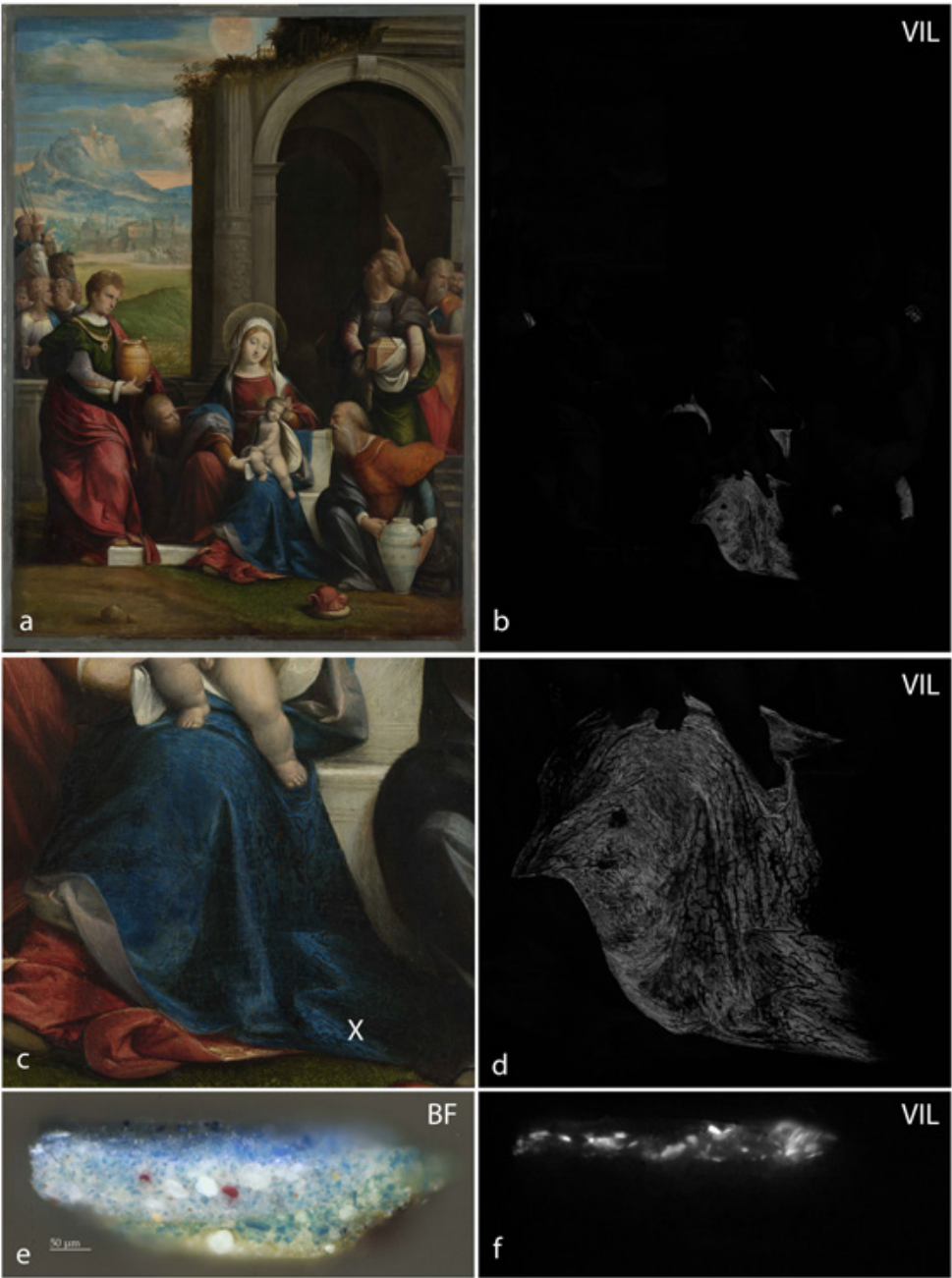


Fig. 6 Garofalo, *Adoration of the Magi*: (a) visible light photograph overall and (c) detail of Virgin's drapery; (b) VIL of the painting overall and (d) VIL of detail of Virgin's drapery. The paint cross-section from the Virgin's blue drapery (SK-A-114_01) is shown in (e) bright field and (f) VIL.

Table 2 Overview of minerals identified in Egyptian blue/ultramarine paints.

			Garofalo, <i>Adoration of the Magi</i>	Ortolano, <i>St Margaret</i>	
Mineral	Molecular formula	Characteristic elements by SEM-EDX	Sample SK-A-114_01	Sample 595a	Sample 595b
Egyptian blue/cuprorivaite	CaCuSiO_{10}	O, Si, Ca, Cu	×	×	×
Lazurite	$\text{Na}_3\text{Ca}(\text{Al}_3\text{O}_{12})\text{S}$	O, Na, Al, Si, S, Ca	×	×	×
Sodalite	$\text{Na}_8\text{Al}_6\text{Si}_6\text{O}_{24}\text{Cl}_2$	O, Na, Al, Si, Cl	—	×	×
Diopside	$\text{MgCaSi}_2\text{O}_6$	O, Mg, Si, Ca	×	×	×
Phlogopite	$\text{KMg}_3(\text{AlSi}_3\text{O}_{10})(\text{OH})_2$ (often contains Ti impurities)	O, Mg, Al, Si, K, Ti	×	×	×
Feldspar	KAlSi_3O_8	O, Al, Si, K	×	×	×
Quartz	SiO_2	O, Si	×	×	×

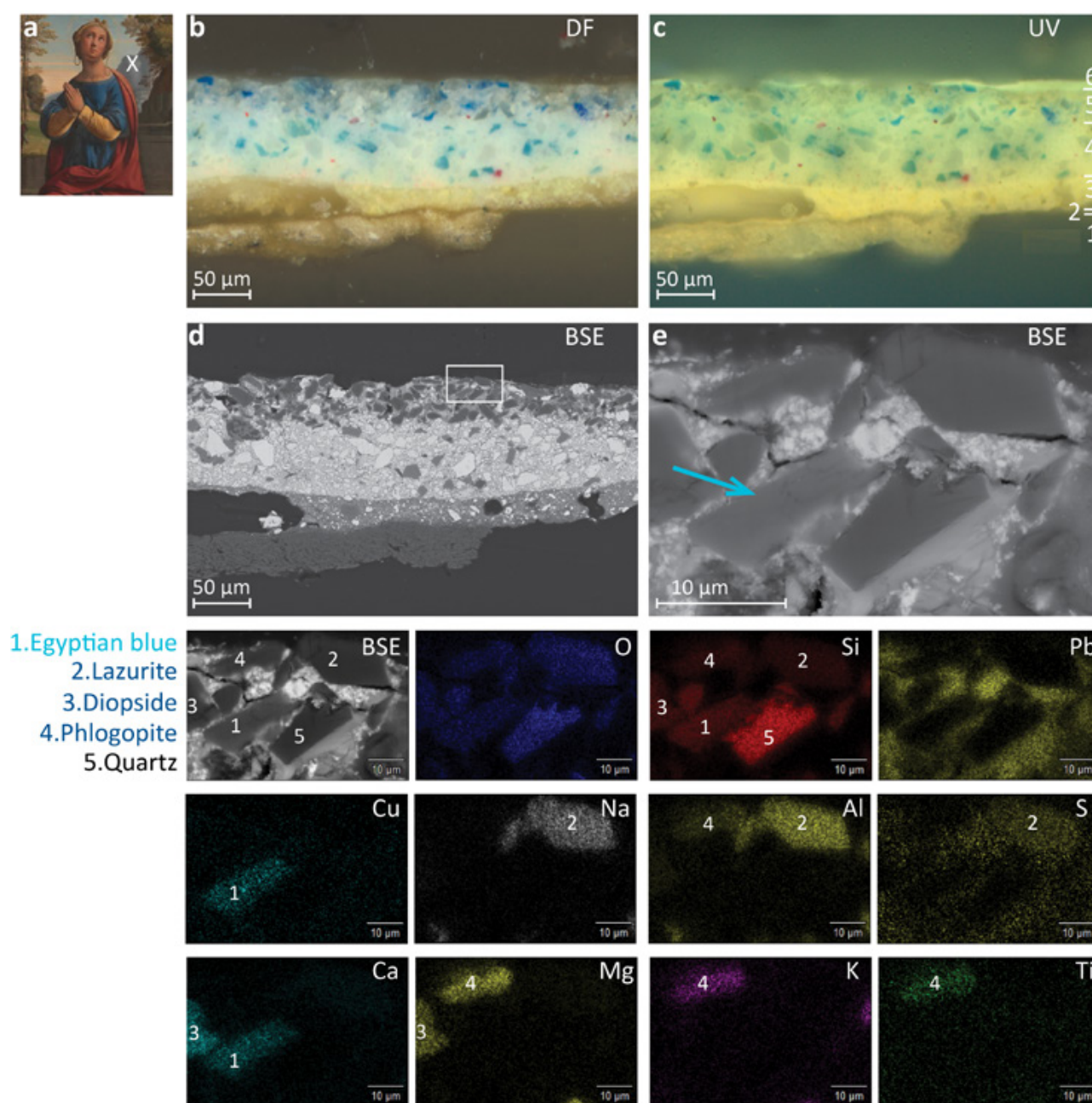


Fig. 7 Ortolano, *St Margaret*: (a) the location of paint cross-section 595a, (b) the appearance in dark field, (c) UV, (d) backscattered image and (e) detail of the backscattered image with corresponding elemental maps.

composition.³¹ This technique allowed for mapping of the spatial distribution of Egyptian blue over the entire painted surface (Fig. 6a and b), revealing its extensive presence in all the deep blue areas including the Virgin's cloak, the sleeves of the kneeling Magus, the book held by the standing figure on the right, and the shawl of a figure in the background. In a VIL detail it is clear that the distribution of Egyptian blue in the drapery follows the shape of the final folds, suggesting its presence in the upper layers (Fig. 6c and d). In the darkest part of the fold (at the right of the image) no Egyptian blue was detected, although MA-XRF analysis showed a strong signal for copper (Fig. 3e) that must be exclusively related to the presence of azurite. VIL was also applied to the study of the paint cross-section to obtain an image of all the Egyptian blue particles that glow in IR

(Fig. 6e and f).³² Due to their strong fluorescence both the exposed and non-exposed particles are recorded, visualising the distribution of all the Egyptian blue particles within layer 4 of the cross-section.

Comparative study of paint samples from *Adoration of the Magi* by Garofalo and *St Margaret* by Ortolano

Two paint cross-sections containing Egyptian blue from Ortolano's *St Margaret* altarpiece in the National Gallery of Denmark were kindly made available to us for comparison.³³ These samples came from areas that had shown a

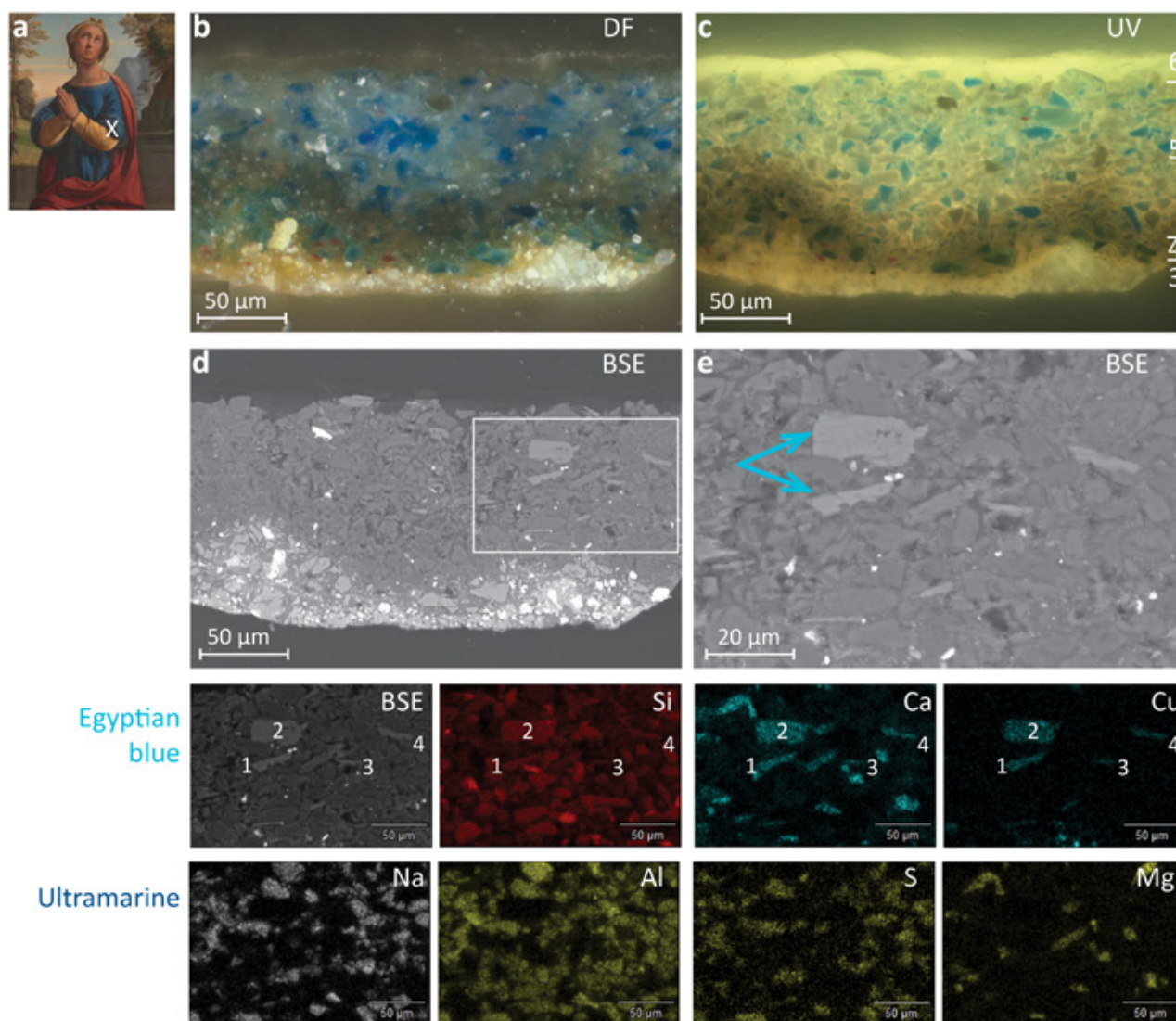


Fig. 8 Ortolano, *St Margaret*: (a) the location of paint cross-section 595b, (b) the appearance in dark field, (c) UV, (d) backscattered image and (e) detail of the backscattered image with corresponding elemental maps.

strong VIL signal as part of a previous investigation in 2011: the mountain behind the saint at the right (Fig. 7) and the dark area on St Margaret's sleeve (Fig. 8). These paint cross-sections exhibit similarities in the build-up of the paint layers compared to those from the Garofalo in the Rijksmuseum: azurite is present in the underlayer in both paintings. Concurrent SEM-EDX analysis of the samples from the Ortolano confirmed the presence of high quality Egyptian blue particles (no glassy phases) in the blue top layers in mixtures with ultramarine (Fig. 7e). Various types of particles that can be interpreted as impurities of the lapis lazuli were also identified in the blue top layers of the Ortolano (Figs 7 and 8): diopside, phlogopite, sodalite, feldspar and quartz (Table 2). These accessory minerals – with the exception of diopside ($\text{MgCaSi}_2\text{O}_6$), which is a common impurity of lapis lazuli³⁴ – were also found in the sample from the Garofalo. The EDX detail map of the sample from Ortolano's mountain illustrates the co-presence of different minerals in the top blue layer (Fig. 7). The absence of diopside in the Garofalo sample indicates

that the lapis lazuli came from a different batch from that used in the Ortolano. It is noteworthy, however, that in both paintings the Egyptian blue is used in a mixture with lapis lazuli.

VIL imaging of the Ortolano painting indicates that the Egyptian blue used in the saint's dress is employed only in the shaded areas and is absent from the lighter areas.³⁵ In contrast, the VIL of the Garofalo shows that it was only used in the light and mid-tones of the Virgin's blue drapery, and not in the deeper shadows, therefore the Ortolano and Garofalo paintings differ in the way the lighter blue draperies were constructed. No Egyptian blue was detected in the sky of the Garofalo (azurite was used instead) whereas in the Ortolano it was found in the saint's dress as well as other light coloured areas of the composition. In the London Garofalo (*Holy Family with Saints*), Egyptian blue was confirmed in various areas of the composition including the deep blue draperies, 'mixed with lead white in the shadows of the clouds below God the Father and in the blue-grey shadows of Saint Elizabeth's veil'.³⁶



Fig. 9 (a) Egyptian blue balls from excavations at Pompei, inv. 117333, Museo Archeologico Nazionale, Naples (© MANN) and (b) detail from the Egyptian blue wall mosaic tesserae from the Nymphaeum from Villa di Pipiano in Massa Lubrense, currently exhibited in the Museo Archeologico Territoriale della Penisola Sorrentina Georges Vallet, Villa Fondi, Piano di Sorrento, Italy.

Discussion

The question of how and why Egyptian blue could have been available for a limited period in Ferrara in the 1520s and 30s, long after it is assumed to have become obsolete, invites various hypotheses, as scholars have already pointed out,³⁷ including (1) continued production, perhaps within the Byzantine Empire, (2) the discovery of a supply left over from an epoch when the pigment was still being manufactured and (3) the harvesting of blue from archaeological material. The first hypothesis was formulated in connection with the aforementioned Castelserpio frescoes in which the Egyptian blue contains copper and zinc in constant ratios.³⁸ This indicates the use of brass when making the pigment, which would be consistent with the widespread production of brass in the Byzantine world and corresponds with the art-historical suggestion that this cycle was painted by artists from the East. In the samples from the Garofalo and the Ortolano paintings discussed in this paper, however, no zinc was detected, ruling out the use of brass and thus refuting that hypothesis.

The widespread use of Egyptian blue in the Italian Peninsula during classical antiquity could account for its survival at archaeological sites from which it might have been harvested (Fig. 9a). Unused balls of Egyptian blue have been found in modern excavations at Pozzuoli, Pompei³⁹ and at an ancient colourman's shop near the church of Sant'Omobono in Rome.⁴⁰ Indeed, in Giuseppe Errante's *Saggio sui Colori* of 1817 he states that in the excavations at the Etruscan city of Veii, on the northern outskirts of Rome, he had found not only *terra verde* but also 'balls of artificial blue which are also found in the excavations at Pompei and elsewhere in Rome',⁴¹ which he also recognised as the substance that Vitruvius had specified as coming from Alexandria and later made at Pozzuoli.

It is also worth pointing out that Egyptian blue may also have been harvested from the type of solid tesserae that were cut from lumps of Egyptian blue described above⁴² used in Roman mosaics during the first century AD, often in small nymphaea with extended fields of background blue (Fig. 9b).⁴³ Such nymphaea were common in Roman villas throughout the Italian Peninsula and although there is no direct evidence, it seems plausible that tesserae from ruined surviving

examples could have been ground to produce a pigment suitable for Renaissance (or later) painters to use.⁴⁴

Whatever its source, the question remains as to whether the Egyptian blue was used by our Ferrarese artists knowingly. Some indication of intentional use might be gleaned from the attention paid by both Garofalo and Ortolano to achieve precious coloristic effects and from the overall richness of their palettes, as well as from the fact that they use the pigment only in the upper, finishing, paint layers. But the possibility that Egyptian blue had been added by an unscrupulous colourman to adulterate a batch of notoriously expensive ultramarine cannot be ruled out. In all the samples analysed, the Egyptian blue is mixed with lapis lazuli, and it is quite possible that the painter was unaware that he was using anything but the latter. Indeed, as the impurities associated with lapis lazuli occur in different ratios in the samples from both paintings by Ortolano and Garofalo, it seems likely that the Egyptian blue had been mixed with different batches of high quality ultramarine. It is perhaps also possible that each artist may have added it to the ultramarine they happened to be using. Regardless, there seems to have been a sufficient source of Egyptian blue in Ferrara to have furnished more than one batch of blue.

Conclusions

The finding of Egyptian blue in blue areas of the *Adoration of the Magi* by Garofalo in the Rijksmuseum in Amsterdam, coupled with the two recently published discoveries of the pigment in London and Copenhagen, suggests that the pigment might have been more widely available in the 16th century than has hitherto been suspected. It is possible that its presence in Italian paintings has been overlooked, especially if used in a mixture with ultramarine. By drawing attention to the presence of Egyptian blue in these three paintings, as revealed by the application of non-invasive techniques including VIL (spectroscopy and imaging), further findings will hopefully be made to shed more light on the fascinating life and persistence of this anachronistic pigment.

Appendix: Analytical techniques and equipment

Non-invasive imaging techniques

- IRR InGaAs array, 900–1700nm, Osiris camera, Opus Instrument, distance painting/camera-body 90 cm, F n° between 8 and 11, two lights placed equidistantly at c.30 degrees angle to the painted surface.
- IRFC obtained digitally combining a visible, colour-corrected CIE image, with an infrared photograph acquired with a CCD sensor, Canon EOS450D modified removing the build-in filter to acquire IR, in combination with B+W 093 Filter (blocking VIS radiation), lights as in IRR.
- MA-XRF Rh-target microfocus X-ray tube, 30 W, 50 kV, 600 μ A, pPolycapillary optics, 30 mm² SDD (XFlash Silicon drift detector with beryllium Be window), energy resolution < 145 eV (see note 45 for instrumental details). Scan parameters: a single scan, c.300 μ m spot size, step size 550 μ m, dwell time 80 min.
- VIL Canon EOS450D, CCD sensor, modified to acquire IR, and B+W 093 Filter, 2 white LED lamps litepanels D-flood equidistant to the object, acquisition being carried out in a darkroom with no IR stray radiation.

Non-invasive spot analysis

- VIL spectroscopy acquired using a MULTI-SYS-TII/BLACKComet-SR/DH2000-BAL-SP portable spectrometer.⁴⁶
- XRD consisting of a θ - θ goniometer, a Cu X-ray tube (MAGPRO 60 kV, 12W/200 μ A) and an SDD detector. PT-APXRD- III Techno-X Inc., Osaka, Japan⁴⁷ (dimensions: 29 × 20 × 17 cm/ weight: 5.5 kg). The X-ray beam size is 2 mm in diameter; typical scan range (2 θ) 25–70°; step size 0.1°/3 sec, minimum 0.01°; FWHM of Si (111) = 0.65° in 2 θ ; typical measurement time 40 min. The instrument is equipped with a laser beam focus that helps to locate the exact measurement spot on the painting. It was mounted on a tripod and positioned in close contact with the paint surface. Spectra were smoothed.

Microsample analysis

- Sample preparation: the samples were embedded at the different institutions following in-house protocols: the Garofalo sample was embedded in a methacrylate mounting resin (Technovit 2000 LC, Heraeus Kulzer GmbH, Germany). The Ortolano samples were embedded in Easy Sections (VWFecit, UK). The three samples were wet-polished on a polishing machine to expose the complete paint layer build-up, with the assistance of a sample holder. The final polishing steps were obtained with MicroMesh sheets up to grit 12000 (Micro-Surface Finishing Products Inc., Wilton, Iowa, USA), using the dry polishing method.⁴⁸
- Optical microscopy: A Zeiss Axio Imager.A2m light microscope was used to examine the polished cross-sections, up

to ×1000 magnification. Light microscopic images of the cross-sections were taken in bright field (BF), dark field (DF) and ultraviolet (LED 365 nm light source; filterset EX G 365, BS FT 395, EM LP 420), using a Zeiss AxioCam MRc5 digital camera.

- SEM-EDX: the samples were analysed under high vacuum using a FEI Nova NanoSEM 450 variable pressure electron microscope at an accelerating voltage of 20 kV. The SEM was outfitted with a Thermo EDX system to yield elemental composition of the pigments within the paint layers.
- VIL on X-section acquired with Canon EOS450D modified to acquire IR, in combination with a Kodak wratten 87C filter between lens and objective in a Leica DM-LM microscope. White LED lights were used to illuminate the sample and the acquisition took place in a dark room.

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Notes

1. See Vitruvius, *De architectura libri decem*, Libro VIII cap. XI: 'Methods of making blue were first discovered in Alexandria, and afterwards Vestorius set up the making of it at Pozzuoli.'
2. For an extended description of Egyptian blue, see J. Riederer, 'Egyptian blue', in E.W. FitzHugh (ed.), *Artists Pigments: A Handbook of their History and Characteristics*, vol. 3, Washington DC, National Gallery of Art/Oxford, Oxford University Press, 1997, pp. 23–47; N. Eastaugh, V. Walsh, T. Chaplin and R. Siddall, *Pigment Compendium: A Dictionary and Optical Microscopy of Ancient Pigments*, Oxford, Routledge, 2008.
3. See V. Daniels, R. Stacey and A. Middleton, 'The blackening of paint containing Egyptian blue', *Studies in Conservation* 49(4), 2004, pp. 217–230.
4. Mazzocchin *et al.* tested various kinds of firing containers, including modern ones, demonstrating that cheap earthenware

- crucibles, easily obtainable in areas of ancient production, are by far the best technological choice: G.A. Mazzocchin, D. Rudello, C. Bragato and F. Agnoli, 'A short note on Egyptian blue', *Journal of Cultural Heritage* 5, 2004, pp. 129–133.
5. See M.S. Tite, M. Bimson and M.R. Cowell, 'Technological examination of Egyptian blue', in *Advances in Chemistry Series* 205, Washington DC: American Chemical Society, 1984, pp. 215–242.
 6. It has never been identified in artefacts from Central or East Asia, where two analogous barium calcium silicates were produced instead: Han blue and Han purple.
 7. See C. Boschetti, 'Vitreous materials in early mosaics in Italy: faience, Egyptian blue, and glass', *Journal of Glass Studies* 53, 2011, pp. 59–912.
 8. According to Tite *et al.* 1984 (cited in note 5), who examined specimens with various origins, a parallel invention in various centres cannot be ruled out.
 9. L. Lazzarini and M. Verità, 'First evidence for 1st century AD production of Egyptian blue frit in Roman Italy', *Journal of Archaeological Science* 53, 2015, pp. 578–585.
 10. After various attempts it was reinvented in the 19th century.
 11. M.C. Gaetani, U. Santamaria and C. Seccaroni, 'The use of Egyptian blue and lapis lazuli in the Middle Ages: the wall paintings of the San Saba church in Rome', *Studies in Conservation* 49(1), 2004, pp. 13–22.
 12. M. Nicola, M. Aceto, V. Gheroldi, R. Gobetto and G. Chiari, 'Egyptian blue in the Castelseprio mural painting cycle: imaging and evidence of a non-traditional manufacture', *Journal of Archaeological Science: Reports* 19, 2018, pp. 465–475.
 13. P. Santopadre, G. Tamanti, P. Bianchetti and G. Sidoti, 'Studio delle tracce di pigmenti azzurri in due affreschi della chiesa inferiore di San Clemente a Roma', *Bollettino ICR new series* 22–23, 2011, pp. 85–95.
 14. A. Lluveras, A. Torrents, P. Giráldez and M. Vendrell-Saz, 'Evidence for the use of Egyptian blue in an 11th century mural altarpiece by SEM-EDX, FTIR, and SR XRD (Church of Sant Pere, Terrassa, Spain)', *Archaeometry* 52(2), 2010, pp. 308–319.
 15. H. Howard, *Pigments of English Medieval Wall Painting*, London, Archetype Publications, 2003, pp. 39–40.
 16. G. Chiari and D. Scott, 'Pigment analysis: potentialities and problems', *Periodico di Mineralogia* 73, 2004, pp. 227–237; G. Pozza, D. Ajo, G. Chiari, F. De Zuane and M. Favaro, 'Photoluminescence of the inorganic pigments Egyptian blue, Han blue and Han purple', *Journal of Cultural Heritage* 1, 2000, pp. 393–398. The authors do not provide extensive analytical data.
 17. C.S. Salerno, '"Cartapeste d'autore" berniniane e algardiane, contributo alla storia, alla tecnica e al restauro della cartapesta nelle botteghe rinascimentali e barocche', *Bollettino d'arte* 99, 1997, pp. 67–98. The author refers to the identification of Egyptian blue by polarised light microscopy unfortunately without supporting analytical data.
 18. J. Bredal-Jorgensen, J. Sanyova, V. Rask, M.L. Sargent and R.H. Therkildsen, 'Striking presence of Egyptian blue identified in a painting by Giovanni Benvenuto from 1524', *Analytical and Bioanalytical Chemistry* 401, 2011, pp. 401–433.
 19. G. Mancini and N. Penny, *The Sixteenth Century Italian Paintings*, vol. III, Bologna, Ferrara/London, National Gallery Company, 2016; M. Spring, R. Billinge and G. Verri in *National Gallery Technical Bulletin* 40 (forthcoming).
 20. Other examples are listed in P. Bensi, 'Blu egiziano, il pigmento che visse due volte', *Kermes* 100, 2017, and Nicola *et al.* 2018 (cited in note 12).
 21. This is part of a wider initiative to produce new comprehensive catalogues of the Rijksmuseum's collection, of which two volumes have already appeared: J. Bikker (ed.), *Dutch Paintings of the Seventeenth Century in the Rijksmuseum Amsterdam*, Amsterdam, Rijksmuseum, 2007; J.P. Filedt Kok (ed.), *Early Netherlandish Paintings in the Rijksmuseum, Amsterdam. Volume I: Artists Born before 1500*. Available at: <https://www.rijksmuseum.nl/en/collection-catalogues/early-netherlandish-paintings> (accessed 15 April 2019).
 22. See G.S. de Vivo and D. Bull, 'Approccio metodologico allo studio della collezione dei dipinti italiani del Rijksmuseum di Amsterdam', in *Lo Stato dell'arte 16, Atti del XVI Congresso Nazionale IGIIC, Castello del Buonconsiglio, Trento, 25–27 October 2018*, Florence, Nardini, 2018.
 23. For recent studies, see A.M. Fioravanti Baraldi, *Il Garofalo: Benvenuto Tisi; pittore; catalogo generale*, Rimini, Luise Editore, 1993 and *Garofalo: pittore della Ferrara estense*, exh. cat., Milan, Skira, 2008.
 24. See P. van Vliet, 'Spaanse schilderijen in het Rijksmuseum, afkomstig van schenkingen van Koning Willem I', *Bulletin van het Rijksmuseum* 14, 1966, pp. 131–149.
 25. See I. Rose Wagner de Viejo, *Manuel Godoy, patrón de las artes y coleccionista*, doctoral thesis, Complutense University of Madrid, 1983.
 26. Pozza *et al.* 2000 (cited in note 16).
 27. Preliminary results were presented in 2017: I. Nakai, A. Hirayama, S. Akagi, Y. Abe, K. Tantrakarn, K. Taniguchi, A. van Loon, P. Noble, G.S. de Vivo and K. Janssens, 'On-site analysis of paintings by means of portable XRD', oral presentation, *Technart: Non-destructive and Microanalytical Techniques in Art and Cultural Heritage*, Bilbao, 2–6 May 2017.
 28. Lead white particles have been identified by the characteristic morphology and white appearance in the backscattered image and Pb element identified with EDX.
 29. J. Klaas, *Die 'Ultramarinkrankheit' (Doktors der Philosophie genehmigten Dissertation)*, Studien zu Veränderungen in ultramarinhaltigen Farbschichten an Gemälden, Munich, Institut für Bausgeschichte, Kunstgeschichte, Restaurierung mit Arkitekturmuseum Technische Universität München 2011.
 30. Imaging techniques are generally carried out before sampling. In this case, visible induced luminescence (VIL) imaging was conducted after sample-taking since the technique was not available in-house at that time. The technique is specific to the study of Egyptian blue whose occurrence in the Rijksmuseum collection is exceptional.
 31. G. Accorsi, G. Verri, M. Bolognesi, N. Armaroli, C. Clementi, C. Miliani and A. Romani, 'The exceptional near-infrared luminescence properties of cuprorivaite (Egyptian blue)', *Chemical Communications* July, 2009, pp. 3392–3394. Available at <https://www.spiedigitallibrary.org/conference-proceedings-of-spie/7391/739105/The-application-of-visible-induced-luminescence-imaging-to-the-examination/10.1117/12.827331.short?SSO=1> (accessed 15 April 2019); J. Dyer, G. Verri and J. Cupitt, *Multispectral Imaging in Reflectance and Photo-induced Luminescence Modes: A User Manual*, London, The British Museum, 2013. Available at: <https://www.britishmuseum.org/pdf/charisma-multispectral-imaging-manual-2013.pdf> (accessed 15 April 2019).
 32. F. Aramini, G. Sidoti and P. Santopadre, 'L'identificazione del blu egiziano nelle sezioni stratigrafiche mediante fotoluminescenza', *Bollettino ICR new series* 27, 2013, pp. 20–24.
 33. Thanks to the kind collaboration of Troels Filtenborg and colleagues in the National Gallery of Denmark.
 34. Klaas 2011 (cited in note 29), p. 16.
 35. Bredal-Jorgensen *et al.* 2011 (cited in note 18)
 36. Mancini and Penny 2016 (cited in note 19), p. 232.
 37. See P. Bensi, 'I materiali coloranti come indicatori cronologici in pittura e nella tintura delle stoffe', in *A.I.Ar. Atti del I*

- congresso nazionale di Archeometria, Verona, 2–4 December 1999, Bologna, Patron editore, 2000, pp. 493–501. Howard 2003 (cited in note 15), p.40: '[recent findings] seem to point to a survival of the technology for the manufacture of Egyptian blue at least into the Carolingian and Anglo-Saxon periods'. See also Chiari and Scott 2004 (cited in note 16)
38. See Nicola *et al.* 2018 (cited in note 12)
39. See S. Augusti, *I colori pompeiani*, vol. 1, Ministero della Pubblica Istruzione, Direzione Generale delle Antichità e Belle Arti, 1967; L. Cavassa, F. Delamare and M. Repoux, 'La fabrication du bleu égyptien dans les champs phlégréens (Campanie, Italie) durant le I^{er} siècle de notre ère', *Revue Archéologique de l'Est* 28e supplement, 2010, pp. 235–249.
40. See H. Becker and M. Ceci, 'Le botteghe dei colori e la scelta dei pigmenti nel mondo romano', paper presented at *Picta fragmenta* international conference, Naples 13–15 September 2018.
41. G. Errante, *Saggio sui colori*, Rome, 1817, pp. 8–9: 'Dalla medesima cava [di Veio] ho avuto ancora della terra verde, e delle palle di azzurro artefatto, che vennero trovate negli scavi di Pompejano, ed in altri fatti in Roma. Vitruvio dice, che questa composizione fu la prima volta scoperta in Alessandria, e di poi fu introdotta in Pozzuolo (Vitruvio Cap. XI. Lib. VII).'
42. See Boschetti 2011 (cited in note 7) and C. Pilolli, I.D. van der Werf, L.C. Giannossa, A. Mangone, M.C. Caggiani, G.E. De Benedetto, R. Laviano, N. Ditaranto, A. Traini and L. Sabbatini, 'Rivestimenti musivi da Ercolano: indagine archeometrica su tesserae', in A. Coralini (ed.), *Vesuviana: Archeologie a confronto*, Bologna, Ante Quem Editoria, 2009, pp. 639–656.
43. For the identification of Egyptian blue in the example shown in Fig. 9b, see E. Campani, A. Casoli, A. Montenero, C. Piccioli and S. Salvini, 'Le tessere in pasta vitrea in mosaici romani: esame di alcuni frammenti dal ninfeo della villa di Pipiano a Marina della Lobra', in *Atti del Primo Convegno interdisciplinare sul vetro nei beni culturali e nell'arte di ieri e di oggi*, Parma, 27–28 November 2008, Parma, Tipocrom, 2009, pp. 42–47.
44. This seems a more likely source, and an easier one to use, than Roman or Etruscan wall paintings. Although wall paintings were sometimes scraped in order to obtain the expensive azurite or ultramarine, it seems unlikely in the case of Egyptian blue applied *a fresco*, as it would have been more difficult to scrape off and would have contained impurities such as calcium carbonate and sand.
45. M. Alfeld, J. Vaz Pedroso, M. van Eikema Hommes, G. van der Snickt, G. Tauber, J. Blaas, M. Haschke, K. Erler, J. Dik and K. Janssens, 'A mobile instrument for in situ scanning macro-XRF investigation of historical paintings', *Journal of Analytical Atomic Spectrometry* 28(5), 2013, pp. 760–767.
46. S. Akagki, Y. Abe, A. Izumi, A. Hirayama, M. Murakushi, I. Nakai and S. Shimoyama, 'Development of a portable ultraviolet-visible absorption/fluorescence spectrometer and application for nondestructive on-site analysis of original drawings by Katsushika Hokusai', *Bunsekikagaku* 68, 2019 (forthcoming).
47. A. Hirayama, Y. Abe, A. van Loon, N. de Keyser, P. Noble, F. Vanmeert, K. Janssens, T. Kriengkamol, K. Taniguchi and I. Nakai, 'Development of a new portable X-ray powder diffractometer and its demonstration to on-site analysis of two selected old master paintings from the Rijksmuseum', *Microchemical Journal*, 138, 2018, pp. 266–272.
48. A. van Loon, K. Keune and J.J. Boon, 'Improving the surface quality of paint cross-sections for imaging analytical studies with specular reflection FTIR and static-SIMS', in *Proceedings of Art'05 Conference on Non-destructive Testing and Microanalysis for the Diagnostics and Conservation of the Cultural and Environmental Heritage*, Lecce (Italy), 15–19 May 2005. Available at: https://www.researchgate.net/publication/305688025_IMPROVING_THE_SURFACE_QUALITY_OF_PAINT_CROSS-SECTIONS_FOR_IMAGING_ANALYTICAL_STUDIES_WITH_SPECULAR_REFLECTION_FTIR_AND_STATIC-SIMS (accessed 15 April 2019).

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THE POLYCHROME WOODEN SCULPTURES OF THE JESUIT REDUCTIONS IN PARAGUAY: A TECHNICAL STUDY

Julia Brandt, Corinna Gramatke and Isabel Wagner

ABSTRACT This paper presents the results of a research project, carried out from 2015 to 2018 at the Technical University of Munich, which aimed to investigate the materials and techniques used for the production of polychrome wooden sculptures in the former Jesuit missions (reductions) in the period 1609–1767. A significant amount of the work involved the analysis of archival documents. According to these sources, not only tools and painting materials but also whole sculptures and paintings were sent to South America. Skills too were traded, with references to sculptors travelling between reductions to spread their knowledge, possibly teaching their craft to the Guaraní. Supplementing this source-based research was the technical examination of a number of original sculptures from Paraguay, which focused on both the analysis of materials used and the specific painting techniques employed. Techniques proved to be influenced by Spanish painting techniques, *estofado* being the prevailing method found for decorating the sculptures' clothes. Most of the identified pigments and fillers were available locally and already in use in precolonial times. However, colorants such Prussian blue, smalt and lac dye indicate the import of painters' materials. Locally available wood of *Cedrela* spp. was used for almost all of the analysed sculptures.

Introduction

This paper presents some preliminary results of the research project: 'The Polychrome Wooden Sculptures of the Jesuit Reductions in Paracuaria, 1609–1767: Art Technological Investigation with Regards to the Contribution of German Jesuits'. The project, which ran from 2015 to 2018, was affiliated to the Technical University of Munich (TUM), Chair of Restoration, Conservation Science and Art Technology and financed by the German Research Foundation (DFG). It explored how the artistic workshops of the Guaraní-Jesuit settlements or reductions in Paracuaria were organised, who the artists or artisans were who worked there, and which techniques and materials were used. For the project, 65 sculptures, one altarpiece and an easel painting were selected. These artworks are displayed in four Paraguayan museums created in the 1980s and in a parish church in the ancient reductions of San Ignacio Guazú, Santa María de Fe, Santa Rosa and Santiago (see the appendix). The project also included the study of documents in corresponding Latin American and European archives.

Historical background

The Company of Jesus was founded in 1534 by Ignatius of Loyola (1491–1556) as a missionary order and was approved in 1540 by Pope Paul III (1468–1548). Jesuits around the world were organised into geographic areas, called provinces, governed by a provincial superior. Every six years the province elected new representatives, the procurators, who travelled to Europe in order to give a full account to the central office of the order in Rome and lodge petitions to obtain permissions for new missionaries. They also had to purchase the goods the province needed.

The Province of Paracuaria was founded in 1607 in the north-eastern part of the viceroyalty of Peru in a region that today contains parts of Paraguay, Argentina, Brazil and Uruguay (Fig. 1). Compared to colonial centres such as Lima, the region was rather remote and inaccessible, and the Spanish crown did not send fleets to the nearest port, Buenos Aires, while there was no viceroy in place. In fact, the viceroyalty of the Río de la Plata was the last to be established, in 1776. During the time of the Jesuit mission, the



Fig. 1 Map showing the 30 reductions in their final locations in 1767 with the reductions from the four museums discussed in this paper marked in red. (Map: Julia Brandt.)

region therefore lacked substantial trade and commerce and many of the necessary commodities had to be imported via the port of Lima. The first reduction, San Ignacio Guazú, was established in 1609. Numerous further settlements followed among the different native ethnic groups, which were subsumed under the denomination Guaraní. The province, in those days a secluded region at the edges of the Spanish colonial empire, became the most successful and most debated mission in the Americas. Even today, the so-called 'Jesuit State' is discussed controversially by scholars: their verdicts range from 'implementation of a utopia' and 'ideal Christian community' to 'colonisation with other means' and 'Jesuit enrichment by exploiting and enslaving the Indians'.¹

However, what is incontestable is the artistic heritage that arose from the cohabitation of the Guaraní and European Jesuits. The artefacts reveal the fusion between European baroque and the indigenous culture, a fusion that according to the art historian Gauvin Alexander Bailey led to artworks of peculiar form, beauty and 'spiritual presence'.² After the expulsion of the order in 1768, 30 ornately decorated mission churches remained, furnished with altars, sculptures and paintings. During the 150 years of the Guaraní-Jesuit mission in Paracuaría, about 4000 sculptures were manufactured,³

of which nearly 600 have survived and are housed today in museums in the former reductions or major cities in Paraguay, Argentina, Brazil and Uruguay, as well as in private collections. Unfortunately, the archival documents reveal very little information on the artists, the workshops or the exact dates of production: as Josefina Plá observed, it is an 'eminently anonymous art'.⁴ Given this lack of artists' names and dates of creation, chronological and stylistic sequences can be little more than speculation.⁵

Approximately half of the 30 settlements have been conserved as ruins, and seven have been declared UNESCO World Heritage sites: San Ignacio Mini, Santa Ana, Nuestra Señora de Loreto and Santa María la Mayor in Argentina (1983), São Miguel in Brazil (1984), La Santísima Trinidad del Paraná and Jesús de Tavarangüe in Paraguay (1993). Others, such as San Borja and Santo Ángel, were incorporated into modern settlements. In some of these settlements, for example, Santa María de Fe and Santa Rosa, the layout of the reduction is still visible and parts of the buildings remain in use today.

Populations within the reductions varied from 2000 to 7000 inhabitants; usually only two Jesuits resided in each. In terms of layout, all 30 reductions followed a uniform plan with the buildings grouped around a central square.



Fig. 2 Guaraní workshop, *Immaculate Conception*, 17th/18th century, painted and gilded wood, height 153 cm, Museo Diocesano de San Ignacio Guazú, Paraguay. (Photo: Fernando Franceschelli.)



Fig. 3 Guaraní workshop, *Christ at the Column*, 17th/18th century, painted wood, height 170 cm, Museo Diocesano Santa María de Fe, Paraguay. (Photo: Fernando Franceschelli.)

The church and the cemetery occupied one side of the compound and the natives' dwellings were located on the other three sides. The priests' quarters and the school encompassed the first inner yard next to the church. Around the second inner yard, the Jesuits located workshops for all the crafts they considered necessary to form a civilised village, such as forging, silver and goldsmithing, carpentry, turnery, weaving, painting and sculpting. The Jesuits supervised the daily life of the mission, ensuring that the Guaraní attended mass and worked in the farms, fields and workshops.⁶

Prior to joining the Jesuit reductions, the Guaraní lived in small semi-nomadic groups. Their artistic expression mainly revolved around dance, oral transmission, feather art, body painting, basketwork and ceramic art;⁷ they did not use mimetic or iconic arts in the European sense. According to Gauvin Alexander Bailey, the reality of things was not expressed by imitating their visual appearance, but by capturing their essence. He describes the Guaraní style as schematic and geometric; conceptual rather than perceptual. It is based on stylised, simple forms, taken from patterns found in nature, which the Guaraní ascribed with strong symbolic meaning.⁸ The colonisation led to the gradual decimation of this indigenous culture, including their rites, ceremonies and artistic expression.⁹ This was actively stimulated by the Jesuits, who set up artistic workshops for

the natives in order to turn indigenous artistic efforts away from idolatry and towards the celebration of Christian rites. However, compared to contemporary European sculpture, Guaraní mission statues are evidently more geometrical, symmetrical and frontal (Fig. 2), with straight eyes and serenity, as for example in this sculpture of *Christ at the Column* (Fig. 3).

According to preserved documents, the artists in the workshops used mostly European prints and engravings as models, but they also had access to paintings and sculptures. Several records indicate that artistically skilled Jesuits were very rare in the reductions – the few talented artists travelled from mission to mission to teach art to as many natives as possible. As there was a pressing need for artisans and only a few Spanish craftsmen were available, many German Jesuits with artistic skills came to Paracuaria.¹⁰ Different historians have assigned them an important role in the production of the polychrome sculptures in the reductions, but the results of our archival research contradict this thesis by showing that they were active in the colonial cities but not in the reductions.¹¹ The stylistic disparities in Guaraní sculpture have prompted many scholars to attribute the more canonical ones to European and European-born Jesuit artists, and the more unusual ones to indigenous hands.¹²

Archival research

The archival research focused on shipping lists from Seville (Archivo General de Indias), books of accounts (Archivo General de la Nación, Buenos Aires), the exchange of letters between Jesuits (Archivo Histórico Nacional, Madrid) and contemporary descriptions of the life and nature in Paracuaria, such as the manuscript *El Paraguay natural ilustrado* by the Jesuit missionary José Sánchez Labrador (Archivum Romanum Societatis Iesu, Rome).

To what extent goods such as tools, painting materials and whole artworks were imported to the province has long been debated by scholars. One of the early researchers who examined the importation of artworks to Paracuaria is José Torre Revello,¹³ whose 1939 article concerning a shipment of European sculptures to the reductions had a significant impact on the field. The author cited a royal decree from 1661 as proof for a shipment of 17 European sculptures sent directly to the reductions, concluding that it was common to send sculptures to the missions. However, Torre Revello did not refer to the original royal decree but to an edition from 1911, whose editor had provided each decree with a self-invented heading, in this case 'Royal decree for tax free import of commodities, bound for the reductions'.¹⁴ A certified copy of the original decree forms part of the dossier in the Archivo General de Indias in Seville and demonstrates that the Spanish king gave his permission only for the tax-free entrance to the port of Buenos Aires. The only goods listed in this decree that were explicitly bound for the reductions were tools, paper, books and medicines – none of the 17 itemised sculptures.¹⁵ Goods arriving in Buenos Aires were also destined for other parts of the Province of Paracuaria and not necessarily for the reductions.

Torre Revello's interpretation that the reductions were equipped with numerous European sculptures has survived until today. But our current study of the shipping lists in the Archivo General de Indias led to another conclusion. In this archive, 130 documents are conserved containing bills of lading from nearly all the ships that had sailed from Spain to Buenos Aires in the period from 1648 to 1767. The majority of these documents coincide with the procurators' voyages: between 1609 and 1767 about 22 voyages took place.¹⁶ From the foundation of the province in 1607 up to 1640, due to the personnel union, the ships set sail from Lisbon. Unfortunately, documents concerning those ships were lost during the 1755 earthquake. In Seville, 16 dossiers are conserved and one copy is accessible in the Archivo General de la Nación, Buenos Aires; all of them mention goods and commodities the order took to Paracuaria including sculptures.

Despite the development of crafts in the reductions, the archival research revealed that the Jesuits transported more or less the same types of goods to their province including church furnishings, devotional objects, tools, books, prints, paintings, sculptures, fabrics, musical instruments, everyday objects, scientific instruments, glasses and gifts for the indigenous people. But we have to bear in mind that the artworks were probably mostly reserved for the Jesuit institutions in the colonial cities.

The only significant change of importation trends seems to be in the shipment of altarpieces. Until the mid-17th century, entire (dismantled and crated) altars are listed crossing the Atlantic, but from the mid-century on they are no longer mentioned in the lists. This corresponds with other documents, which confirm that by this time the Jesuits had already installed well-running workshops in the reductions producing altars and furniture for the whole province, explaining why imports were not necessary. The production of sculptures in the mission workshops also started at that time and increased at the beginning of the 18th century.¹⁷

Nevertheless sculptures are noted on nearly all of the lading lists, presumably because the inhabitants of the colonial cities preferred the aesthetic of European artworks. Their iconography is not always specified but most were representations of the founder and co-founders of the order, followed by representations of the Virgin Mary, Christ and individual saints. It was not easy to ship big sculptures: correspondence between the Spanish assistant of the Jesuit order in Rome and his friend, the Procurator of the Indies in Madrid during 1761 and 1762, elucidates these ventures. The assistant reports to his friend how difficult it was to find a good and economic sculptor in Rome, and after finally having found one (unfortunately the letters do not reveal the name of the artist), how slowly the work progressed. Finally completed, the sculpture was too large to fit in one crate. The assistant suggested sawing off the base but in the end the sculpture was sent in one piece to Andalusia where it arrived badly damaged.¹⁸

It is difficult to determine the exact number of sculptures shipped because they often appear simply as 'some sculptures' or 'crates with sculptures', but the shipping lists of the procurators' return voyages record between five and ten sculptures at a time. For the 22 voyages, this average of seven sculptures amounts to around 150 sculptures in total. From the mid-18th century on, sculptures of jasper and wax feature on the shipping lists, items that were also held in high esteem in Europe. The documents indicate that all goods were designated for use in religious or educational institutions, churches and missions of the order.¹⁹ None of the studied documents, however, prove that a sculpture was explicitly bound for a reduction: this does not mean that none arrived there, but the number was probably considerably lower than might be expected. The inventories of the Guaraní reductions made during the expulsion mention just 13 sculptures as being 'from Europe'.²⁰ This raises the suspicion that the imported sculptures were mainly reserved for the Jesuit institutions in the colonial cities.

Sculptors' tools, painting materials and fabrics

Whenever missionaries travelled to South America, they took with them tools and instruments needed for farming, carpentry, cabinet making, metal working and weaving. Very rarely

are tools specified for sculptors, but it can be assumed that they used those designated for carpenters. Pigments, gold leaf and bole could only be found in one single document: it is not clear if this is because they were not mentioned by the shipping agents or because the Jesuits had easier and cheaper local channels of supply. Peru, for example, was an important provider of locally produced and imported painting material. José Sánchez Labrador indicates in his manuscript *El Paraguay natural ilustrado* that painters used pigments from the region of Paracuaria, from Europe and from Peru.²¹

The documents kept in the Archivo General de Indias reveal shipments of glass eyes, carved hands and heads to be used on sculptures, as well as fabrics to dress them. A book of accounts in Buenos Aires also mentions wigs for sculptures designated for the reductions. These wigs were probably used together with the glass eyes and real clothes to make the sculptures look more naturalistic, a common practice in baroque Europe.²² A large number of bales of all kinds of fabrics – ranging from simple linen used for habits to sumptuous gold and silver brocades, and other precious, fashionable fabrics such as *moiré* or *angaripolas* (painted or printed fabrics) – were brought from Europe to the reductions. They were used to decorate the churches, to dress sculptures and for costumes worn by the Guaraní during religious festivities. These types of textile were imitated in the polychromies of the sculptures as an *esgrafiado* or as decorative motifs painted on water gilding or silvering (Figs 4 and 5).

Technical studies

Wooden supports

During the first research trip to Paraguay in 2016, small samples of polychromy and wood from 44 sculptures in four different museums were taken and brought to Germany for analysis and to answer the following questions: what kinds of material (type of wood, pigments and fillers) were used to produce the sculptures in the reductions? What painting techniques were applied? Were any of the sculptures imported from Europe? Were different wood species used to produce the heads, hands and bodies of the sculptures as stated by the aforementioned missionary José Sánchez Labrador?

In total, 76 wood samples were taken from the main working block and, if possible, from heads and hands.²³ For stability and to improve handling properties, the fragile samples were embedded in a synthetic resin. Subsequently, they were oriented and slices of 20–30 mm were cut off in the three main anatomical directions: cross-section, radial section and transverse section. The slices were mounted using a natural resin to ensure durability for future examination and then stored in a heating cabinet for six weeks at 60 °C to ensure full curing of the mounting agent.²⁴ When possible, the wood sample was divided and one part saved as a non-treated sample for future analysis.



Fig. 4 Guaraní workshop, *Saint Peter*, 17th/18th century, painted and gilded *Cedrela* wood, height 161 cm, Museo Diocesano de San Ignacio Guazú, Paraguay: detail of the cloak with an *esgrafiado* imitating a brocade. (Photo: Fernando Franceschelli.)



Fig. 5 Guaraní workshop, *Immaculate Conception*, 17th/18th century, painted and gilded wood, height 153 cm, Museo de San Ignacio Guazú, Paraguay: detail of the dress with an *estofado a punta de pincel*. (Photo: Fernando Franceschelli.)

First, anatomical features were identified under the microscope using the databases INTKEY and INSIDEWOOD.²⁵ The anatomical features listed in these databases are based on the International Association of Wood Anatomists (IAWA) criteria.²⁶ Only visible and positive anatomical features were taken into account as the absence of criteria in a small sample cannot speak for the whole tree. Thus,

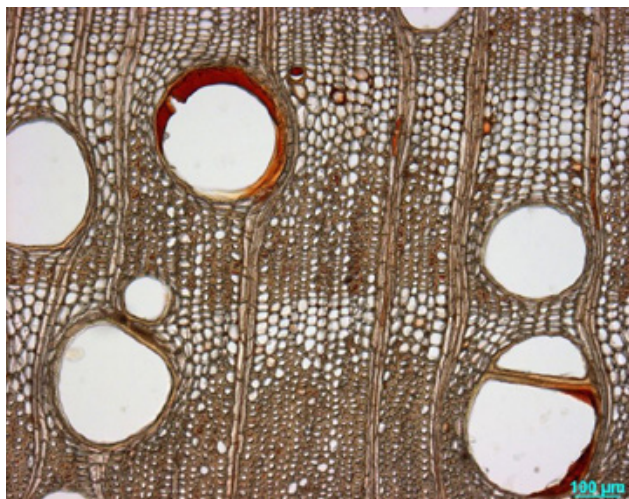


Fig. 6 Cross-section of *Cedrela* spp. (Sample preparation: Isabel Wagner.)



Fig. 7 Radial section of *Cedrela* spp. (Sample preparation: Isabel Wagner.)

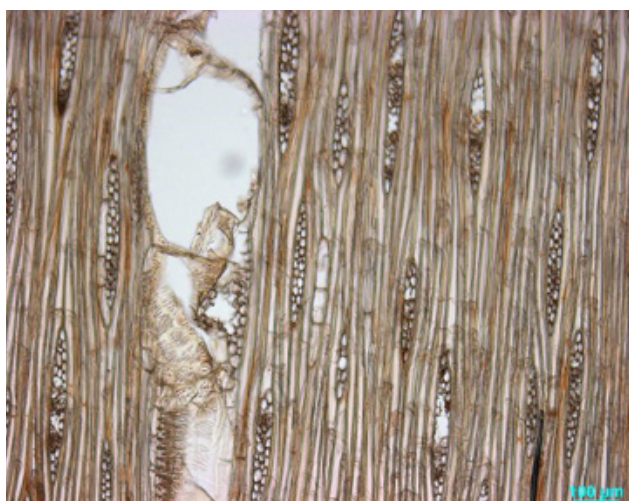


Fig. 8 Transverse section of *Cedrela* spp. (Sample preparation: Isabel Wagner.)

the possible wood species were narrowed down and the remaining selection compared to the Technical University of Munich's reference collection. From a total of 76 samples, 72 could be identified as *Cedrela* spp. (Figs 6–8). This genus comprises species that are commonly referred to as *cedro*

or Spanish cedar. This name can be confusing, as *Cedrela* is a hardwood, whereas the wood of cedar trees such as the Lebanon cedar is coniferous.

One sculpture was produced from the genus *Handroanthus*, some species of which are commonly referred to as *Ipé*. Another sculpture was identified as having been made of *Sapium* spp., which comprises species also known as *Lechero*. Samples of two architectural elements related to the sculptures were also analysed. The results indicated *Handroanthus* spp. in one case (a column), whereas the other architectural element (a lintel) was made of *Cordia* spp. This genus comprises species also known as *Peterebi*. The further distinction of wood species within these genera is not possible by means of light microscopy. *Cedrela* spp. is very similar to the genus *Swietenia* (some species, e.g. *Swietenia mahagoni*, are known as mahogany); the only criterion differentiating these two genera is the size of the vessel pits, therefore measurements were taken of the horizontal diameter of these pits to confirm that the samples were definitely *Cedrela* spp. and not *Swietenia* spp.

According to these results, the heads, hands and bodies of the sculptures were always produced from the same wood. No wood native to Europe was identified but the presence of *Cedrela* spp. does not necessarily mean that the sculptures were not imported from Europe: *cedro* (Spanish cedar) was traded from Mexico to Spain at that time and used for the production of sculptures and panel paintings.²⁷ In theory, sculptures produced from *Cedrela* spp. in Spain could then have been exported to the missions.

Painting materials

The goal of analysing the polychromy of the sculptures was to gain insight into the availability and use of pigments in the reductions. In total, 60 paint samples were taken from 24 sculptures during the first visit to Paraguay. The samples were mounted in a synthetic resin, sanded and polished.²⁸ The stratigraphy of the paint layers was investigated using a reflected light microscope. Polarised light microscopy (PLM), scanning electron microscopy-energy dispersive X-ray (SEM-EDX) analysis, Fourier transform infrared-attenuated total reflection (FTIR-ATR) and micro-FTIR spectroscopy, high performance liquid chromatography with diode array detection (HPLC-DAD) and micro-Raman spectroscopy were used for the identification of colorants, fillers and metal leaves.²⁹

Analyses revealed that 20 sculptures were painted using a ground layer of plaster ($\text{Ca}[\text{SO}_4] \cdot \text{H}_2\text{O}$), while one sculpture was prepared with a chalk-containing ground layer (CaCO_3). The red bole used for water silvering – lighter and coarser than that used for water gilding (Fig. 11) – contains lead white and red particles, possibly hematite, and black particles, probably ilmenite. The most common blue pigments are Prussian blue and indigo; smalt and azurite appear to have been used to a much lesser extent as they were only found on three sculptures. The red pigments in the visible layers are mainly vermilion and minium, while



Fig. 9 Guaraní workshop, *Saint Peter*, 17th/18th century, painted and gilded *Cedrela* wood, height 179.5 cm, Museo Diocesano Santa María de Fe. (Photo: Fernando Franceschelli.)

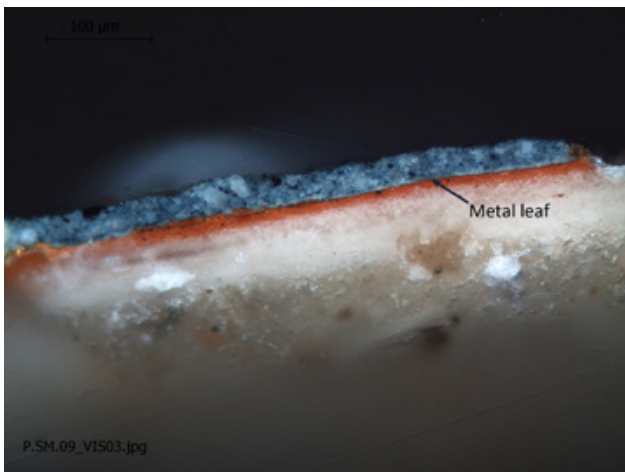


Fig. 10 Guaraní workshop, *Saint Peter*: cross-section of the inside of the saint's robe showing blue single-layer *esgrafiado* on gold leaf over red bole. (Sample preparation: Julia Brandt.)

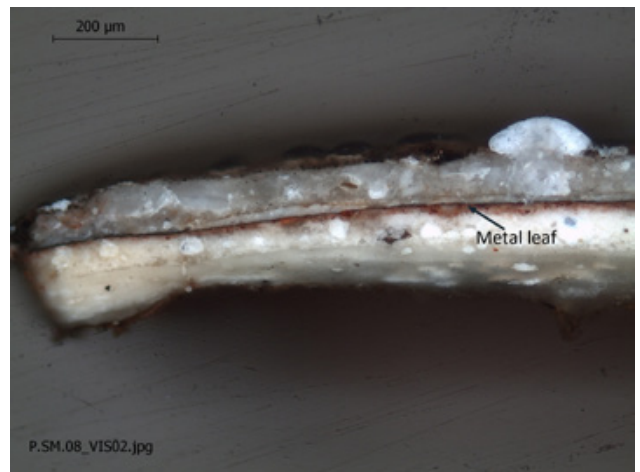


Fig. 11 Guaraní workshop, *Saint Peter*: cross-section of the outside of the saint's robe showing white single-layer *esgrafiado* on silver leaf over light red bole. (Sample preparation: Julia Brandt.)



Fig. 12 Guaraní workshop, *Christ as a Mayor (Niño Alcalde)*, 17th/18th century, painted and gilded *Cedrela* wood, height 111 cm, Museo Diocesano San Ignacio Guazú. (Photo: Fernando Franceschelli.)

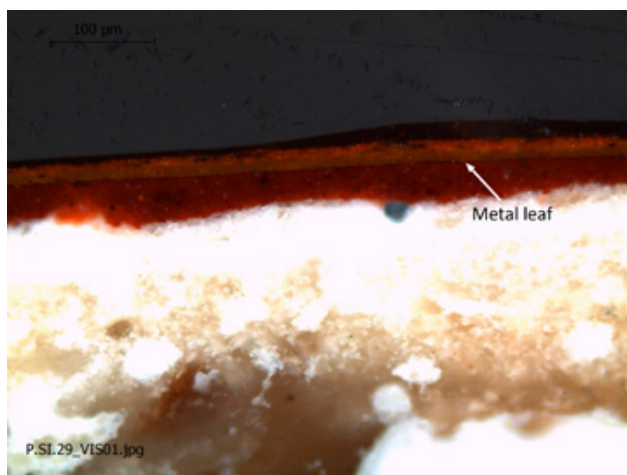


Fig. 13 Guaraní workshop, *Christ as a Mayor (Niño Alcalde)*: cross-section of the two-layer *esgrafiado* on the inside of Christ's robe showing reddish underpaint on gold with a red top layer. (Sample preparation: Julia Brandt.)

ochre pigments are frequently detected in the underpaint. Cochineal is the only organic lake identified so far. A singular result is the use of small amounts of lac dye mixed with cochineal on a sculpture of *Saint Peter* from the museum in San Ignacio Guazú. Lead white is by far the most common white pigment found while green pigments appear to be

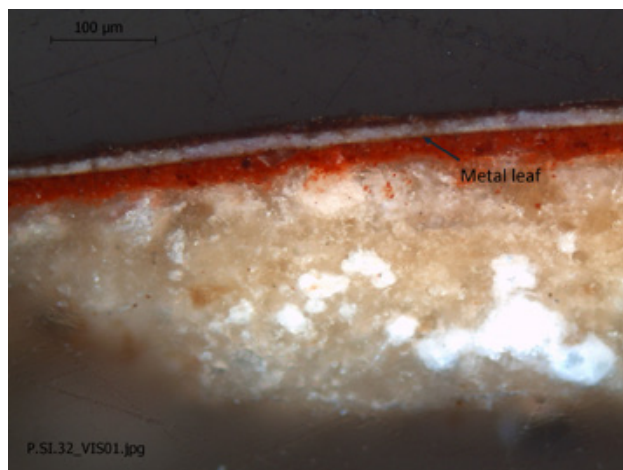


Fig. 14 Guaraní workshop, *Christ as a Mayor (Niño Alcalde)*: cross-section of the two-layer *esgrafiado* on the outside of Christ's robe showing white underpaint on gold with a red top layer. (Sample preparation: Julia Brandt.)

Table 1 Analysed pigments, fillers and lakes.

Fillers and ground layers	Gypsum and chalk
White pigments	Lead white, barite, aluminosilicates
Black pigments	Amorphous carbon
Blue pigments	Prussian blue, azurite, indigo, smalt
Yellow, red and orange pigments and lakes	Minium, vermilion, cochineal, lac dye, orpiment and ochres
Green pigments	Atacamite, antlerite and other green copper pigments

different copper pigments which can be subsumed under the term 'mountain green'. On one sculpture a green hue was achieved by mixing indigo and orpiment; the corresponding underpaint layer also contains orpiment. Apart from this one case, yellow tonalities were achieved with ochres (see Table 1).

Painting technique

The prevailing painting technique found on the sculptures in Paraguay is known as *estofado*, a popular method used on the Iberian Peninsula from the 16th to the 19th century mainly for imitating precious textiles such as brocades.³⁰ *Estofado* often involves water gilding or water silvering for which a fine clay type called bole is applied on top of a ground layer and polished using an agate. Gold or silver leaf is then applied on top of this smooth layer. By burnishing the gold or silver leaf with the agate, a sheen like solid gold or silver can be achieved.

Nearly all of the sculptures were decorated using either exclusively gold leaf or a combination of gold and silver leaf. So far, no example of an exclusive use of silver leaf has been encountered. The boles used as a base correspond with the type of metal leaf used and can, therefore, differ within the sculpture: on a sculpture of *Saint Peter* from Santa María de Fe (Fig. 9), the gold leaf is applied over a fine, intensely red bole (Fig. 10), whereas the silver leaf on the same sculpture is applied over the coarser, light red bole (Fig. 11).

For *estofado*, layers of paint are subsequently added on top of the metal leaf or a painted ground. We encountered two varieties of the *estofado* technique on metal leaf, one of which is known as *estofado esgrafiado*, similar to the Italian *sgraffito* wall painting technique. Instead of scraping away different toned plasters, the metal leaf was completely covered by paint layers and the ornament or pattern was then scratched out (see Fig. 4). In the second variety, called *estofado a punta de pincel*, an ornament was painted on the gold or silver leaf. We also found a combination of both techniques: after the ornament was painted on top of the gold, it was accented by scratching lines within the pattern (see Fig. 5).

The paint on the metal leaves was mostly applied in several layers. In the case of *estofado esgrafiado*, two layers of paint were typically encountered on the sculptures: only six out of 23 samples feature a single paint layer on top of the gold. With *estofado a punta de pincel*, up to three paint layers were observed. In 11 out of 17 samples the colour of the underpaint is a lead white-containing white layer (in one case a white earth pigment was found), while in five of 17 samples it is a reddish-brown layer containing earth pigments. Two samples show a light blue underpaint containing a white aluminosilicate pigment, mixed in one case with indigo and in the other with Prussian blue; both have a blue top layer. The colour selected for the underpaint and top layer is clearly intentional, as in some cases the colour of the underpaint is not consistent throughout the sculpture (Figs 12–14). Black paint layers always seem to have been applied on top of a reddish-brown underpaint. Due to past restorations and the general deterioration of the polychromy, it is not clear if the colour of the underpaint had a visual effect on the colour of the *estofado* or if the different tonalities of the underpaint were chosen for technical reasons, such as ease of removal of the layers from the metal leaf.

Discussion

The import of painters' materials and artworks into Paracuaria and the contribution of German Jesuit brothers to the sculpture production there have long been debated by scholars. Only combining the study of written sources with the investigation of the sculptures may help to prove or dismiss these hypotheses. None of the 65 sculptures selected could be determined as having been imported from Europe, and neither typical German techniques nor documents proving that German Jesuits worked in the reduction workshops as sculptors or painters could be identified. This contradicts the historians who underlined the enormous contributions of German Jesuits to the artistic production in the reductions.³¹

The findings of the technical investigations are consistent with contemporary sources and modern literature. According to contemporary Jesuit writers, trees of the genus *Cedrela* were very common in the region and the wood has

been analysed in previous studies on sculptures from the reductions.³² Typical European tool marks of chisels, gauges and even calliper punctures could be found on the wooden supports, corresponding with the import of tools for carpenters listed in the shipping lists. Such tools are registered in almost all inventories of the reductions made during the expulsion.³³

The identified pigments, lakes and priming materials in the polychromy were common in European and American painting practice at the time. The materials also appear in the abovementioned inventories with their corresponding Spanish denominations. According to Sánchez Labrador, nearly all the raw materials for the production of painting materials could be found in Paracuaria.³⁴ Vermilion and indigo, already in use in precolonial times and common in Spain, could be of South American origin or imported. There is no indication that colorants such as smalt or Prussian blue were locally produced. Together with the Asian lac dye, they therefore clearly evidence the import of painters' materials from Europe.³⁵ The identification of Prussian blue provides a *terminus post quem* for the sculptures as it was only produced from 1704 onwards. Imported Prussian blue was probably available in South America from the 1720s onwards.³⁶ The identification of indigo, antlerite and orpiment on South American colonial sculptures has not been published previously. Only a small part of the surviving sculptures has been investigated and more analyses will be necessary to make relevant statements on the use of pigments in the reduction workshops.

Conclusions

Until now, very little has been published on technical investigations of the sculptures from the reductions despite the fact that these artworks form an important part of the cultural heritage of the region. Supplementing the archival research with investigations of the artworks and analysing the materials used has proved to be a rewarding methodology which has contributed to the still widely unknown artistic practices in the reductions of Paracuaria.

Almost all the investigated sculptures are made of *Cedrela* spp., a locally available wood, and the Iberian *estofado* method is the predominant painting technique employed. The pigments identified include lead white, aluminosilicates, barite, amorphous carbon, Prussian blue, azurite, indigo, smalt, different copper pigments (atacamite and antlerite), minium, vermilion, cochineal, lac dye, orpiment and ochres. The main filler of the preparation layer is gypsum. While the study confirmed the import of painters' materials (smalt, Prussian blue and lac dye), some materials may have been sourced locally such as *Cedrela* spp. and possibly indigo and cochineal. The results of this project will hopefully serve as a point of departure for further research into the history, materials and techniques of the polychrome wooden sculptures of the Jesuit reductions in Paraguay.

Appendix: List of the Guaraní sculptures, 17th/18th century, including the components of the polychromy (where analysed)

Museum	Measurements (in cm)	Title	Support	Ground layer	Painting technique and colorants
San Ignacio Guazú	H: 153 × W: 79 × D: 48	<i>Immaculate Conception</i>	–	Gypsum	<i>Estofado a punta de pincel</i> and <i>esgrafiado</i> on water gilding, vermilion, ochre, smalt, lead white, indigo
San Ignacio Guazú	H: 151 × W: 48.5 × D: 56	<i>Virgin of the Miracle</i>	<i>Cedrela</i> spp.	Gypsum	<i>Esgrafiado</i> on water gilding, indigo (clouds), lead white
San Ignacio Guazú	H: 34 × W: 37.5 × D: 136	<i>Dead Christ</i>	–	–	Polychromed wood
San Ignacio Guazú, museum's chapel	H: 111 × W: 50 × D: 46.5	<i>Christ as Mayor (Niño Alcalde)</i>	<i>Cedrela</i> spp.	Gypsum	<i>Esgrafiado</i> on water gilding, cochineal, ochre
San Ignacio Guazú	H: 150 × W: 98.5 × D: 61	<i>Saint Michael the Archangel</i>	<i>Handroanthus</i> spp. (demon)	Gypsum	<i>Esgrafiado</i> on water gilding, lead white, white earth, vermilion
San Ignacio Guazú	H: 79 × W: 67.5 × D: 32	<i>Saint Michael the Archangel</i>	<i>Cedrela</i> spp.	Gypsum	Prussian blue, lead white
San Ignacio Guazú	<i>Raphael</i> H: 208 × W: 116.5 × D: 101.5 <i>Tobias</i> H with plinth: 128 × W: 65 × D: 38	<i>Tobias and Archangel Raphael</i>	–	Gypsum (<i>Tobias</i>)	Water gilding, minium, lead white (<i>Tobias</i>)
San Ignacio Guazú	H: 161 × W: 71 × D: 65.5	<i>Saint Peter</i>	<i>Cedrela</i> spp.	Gypsum	<i>Esgrafiado</i> on water gilding, indigo, aluminosilicate, cochineal, lac dye
San Ignacio Guazú	H: 179 × W: 77 × D: 103	<i>Saint Ignatius of Loyola</i>	<i>Cedrela</i> spp.	Gypsum	<i>Esgrafiado</i> on water gilding, ochre
San Ignacio Guazú	H: 178.5 × W: 81 × D: 53	<i>Saint Francis Xavier</i>	<i>Cedrela</i> spp.	–	<i>Esgrafiado</i> on water gilding
San Ignacio Guazú	H: 141 × W: 66 × D: 41	<i>Saint Stanislaus Kostka</i>	–	–	<i>Esgrafiado</i> on water gilding
San Ignacio Guazú	H: 179 × W: 84 × D: 58	<i>Saint Francis Borgia</i>	–	–	<i>Esgrafiado</i> on water gilding
Santa María de Fe	H: 134 × W: 66 × D: 54	<i>Virgin of Candelaria</i>	<i>Cedrela</i> spp.	–	<i>Esgrafiado</i> on water gilding
Santa María de Fe	H: 106 × W: 63 × D: 36	<i>Immaculate Conception</i>	<i>Cedrela</i> spp.	Gypsum	<i>Esgrafiado</i> on water gilding, lead white, organic orange lake
Santa María de Fe	H: 130 × W: 49 × D: 43	<i>Our Lady of Sorrows</i>	–	–	<i>Esgrafiado</i> on water gilding
Santa María de Fe	H: 115 × W: 54 × D: 43	<i>Our Lady of Sorrows</i>	–	Gypsum	<i>Esgrafiado</i> on water gilding, indigo, lead white
Santa María de Fe	H: 87 × W: 57.5 × D: 50.5	<i>Our Lady of Sorrows</i>	–	Gypsum	<i>Esgrafiado</i> on water gilding, orpiment, indigo
Santa María de Fe, parish church	H (without crown): 187 × W: 103 × D: 64.5	<i>Our Lady of Fé</i>	<i>Cedrela</i> spp.	–	<i>Estofado a punta de pincel</i> and coloured glazes on water gilding
Santa María de Fe	H (without crown): 139 × W + D (diameter of the construction): 52.7	<i>Virgin Mary. Imagen de vestir</i> (sculpture made to be dressed with real fabrics)	<i>Cedrela</i> spp.	–	Partially polychromed wood
Santa María de Fe	<i>Donkey</i> H: 81 × W: 30.5 × D: 101 <i>Christ</i> H: 96 × W: 45 × D: 35	<i>Christ on the Donkey. Imagen de vestir</i> (sculpture made to be dressed with real fabrics)	–	–	Partially polychromed wood
Santa María de Fe	H: 163 × W: 38 × D: 36	<i>Christ at the Column</i>	–	–	Polychromed wood
Santa María de Fe	H: 170 × W: 58 × D: 61.5	<i>Christ at the Column</i>	<i>Cedrela</i> spp.	–	Polychromed wood
Santa María de Fe	H: 166 × W: 48 × D: 67	<i>Christ Carrying the Cross</i>	–	–	Polychromed wood

Museum	Measurements (in cm)	Title	Support	Ground layer	Painting technique and colorants
Santa María de Fe	H: 117 × W (arms open): 118.5 × D: 34 H: 117 × W (arms closed): 66.5 × D: 34	<i>Christ</i> (with moveable arms)	<i>Cedrela</i> spp.	–	Polychromed wood
Santa María de Fe, parish church	H: 180 × W: 166 × D (without cross): 36	<i>Crucifix</i>	–	–	Polychromed wood
Santa María de Fe, parish church	H: 136.5 × W: 89 × D: 36	<i>Resurrected Christ</i>	–	–	Polychromed and gilded wood
Santa María de Fe	H (with tiara): 179.5 × W: 65 × 77 H (without tiara): 146 × W: 65 × D: 77	<i>Saint Peter</i>	<i>Cedrela</i> spp.	Gypsum	<i>Esgrafiado</i> on water gilding and silvering, lead white, indigo
Santa María de Fe	H: 100 × W: 51 × D: 38	<i>Saint Barbara</i>	–	–	<i>Esgrafiado</i> on water gilding
Santa María de Fe	H: 190 × W: 85 × D: 90	<i>Saint Sebastian</i>	<i>Cedrela</i> spp.	–	<i>Esgrafiado</i> on water gilding, ochre, antlerite
Santa María de Fe	H: 166 × W: 65.5 × D: 57	<i>Saint Anna</i>	<i>Cedrela</i> spp.	Gypsum	<i>Esgrafiado</i> on water gilding and silvering, lead white, organic red
Santa María de Fe	H: 130 × W: 78 × D: 61	<i>Saint Michael the Archangel</i>	<i>Cedrela</i> spp.	Gypsum	<i>Esgrafiado</i> on water gilding, azurite
Santa María de Fe	H: 161 × W: 80 × D: 59.5	<i>Saint Michael the Archangel</i>	<i>Cedrela</i> spp.	–	Water gilding
Santa María de Fe	H: 133 × W: 52.3 × D: 58.4	<i>Angel</i>	–	–	<i>Esgrafiado</i> on water gilding
Santa María de Fe	H: 152.5 × W: 71.4 × D: 54.5	<i>Saint Aloysius de Gonzaga</i>	<i>Cedrela</i> spp.	–	Polychromed wood
Santa María de Fe	H: 88 × W: 42 × D: 37	<i>San Saint Aloysius de Gonzaga</i>	<i>Cedrela</i> spp.	–	<i>Esgrafiado</i> on water gilding
Santa María de Fe	H: 151 × W: 60 × D: 66	<i>Saint Stanislaus Kostka</i>	<i>Cedrela</i> spp.	–	Polychromed wood
Santa María de Fe	H: 86 × W: 41 × D: 35	<i>Saint Stanislaus Kostka</i>	<i>Cedrela</i> spp.	–	<i>Esgrafiado</i> on water gilding
Santa María de Fe	H: 164.5 × W: 89 × D: 54	<i>Saint Francis Borgia</i>	–	Gypsum	<i>Estofado a punta de pincel</i> on water silvering, minium
Santa María de Fe	Figures are between 50 and 80 cm tall	<i>Nativity scene</i>	–	–	Polychromed wood
Santiago	H: 109.5 × W: 46 × D: 44.5	<i>Virgin of Easter Sunday</i> (<i>Virgen del encuentro</i>)	<i>Cedrela</i> spp.	–	Polychromed wood
Santiago	Height (without crown): 170 × W: 66.5 × D: 43	<i>Immaculate Conception</i>	–	Gypsum	Vermilion, Prussian blue, lead white
Santiago	H: 144 × W + D: 43.5 (diameter of the construction)	Unknown female saint. <i>Imagen de vestir</i> (sculpture made to be dressed with real fabrics)	<i>Cedrela</i> spp.	–	Partially polychromed wood
Santiago	H: 145 × W: 33 × D: 35	Unknown female saint. <i>Imagen de vestir</i> (sculpture made to be dressed with real fabrics)	<i>Cedrela</i> spp.	–	Partially polychromed wood
Santiago	H: 140 × W: 78 × D: 49	<i>Resurrected Christ</i>	<i>Cedrela</i> spp.	Gypsum	Water gilding, Prussian blue, lead white
Santiago	H: 212 × W: 121 <i>Body</i> H: 119 × W: 109 × D: 29.5	<i>Crucified Christ</i>	<i>Cedrela</i> spp.	–	Polychromed wood
Santiago	H: 156 × B: 32 × D: 20.5	Unknown male saint. <i>Imagen de vestir</i> (sculpture made to be dressed with real fabrics)	<i>Cedrela</i> spp.	–	Partially polychromed wood

Museum	Measurements (in cm)	Title	Support	Ground layer	Painting technique and colorants
Santiago	H: 97.5 × W: 64 × D: 51.5 cm	<i>Saint Gabriel the Archangel</i>	<i>Cedrela</i> spp.	–	Polychromed wood
Santiago	H: 154 × W: 82 × D: 57	<i>Saint Joseph with the Child</i>	<i>Cedrela</i> spp.	Chalk	Water gilding, Prussian blue, barite, vermilion
Santiago	H: 51 × W: 20 × D: 17	<i>Saint Paul</i>	–	–	Water gilding
Santiago	H: 50.5 × W: 22 × D: 14.5	<i>Saint Peter</i>	<i>Cedrela</i> spp.	–	<i>Esgrafiado</i> on water gilding
Santiago, parish church	H: 128.5 × W: 218 × D: 40	<i>Saint James the Moor-slayer</i>	<i>Cedrela</i> spp.	–	Polychromed wood
Santiago	H: 148 × W: 59 × D: 46.5	<i>Saint Ignatius of Loyola</i>	<i>Cedrela</i> spp.	–	<i>Esgrafiado</i> on water gilding
Santiago	H: 144 × W: 56.5 × D: 52	<i>Saint Francis Xavier</i>	<i>Cedrela</i> spp.	–	<i>Esgrafiado</i> on water gilding
Santiago	H: 128 × W: 55 × D: 51.5	<i>Saint Aloysius de Gonzaga</i>	<i>Cedrela</i> spp.	–	<i>Esgrafiado</i> on water gilding
Santiago	Figures are between 50 and 80 cm tall	<i>Nativity scene</i>	–	–	Polychromed wood
Santa Rosa, Loreto Chapel	H: 115.5 × W: 55 × D: 60	<i>Our Lady of the Annunciation</i>	<i>Cedrela</i> spp.	Gypsum	<i>Esgrafiado</i> on water gilding and silvering, water silvering (incarnation), green copper pigment
Santa Rosa, Loreto Chapel	H: 71 × W: 31.5 × D: 29	<i>Immaculate Conception</i>	<i>Cedrela</i> spp.	Gypsum	<i>Esgrafiado</i> on water gilding, lead white
Santa Rosa, Loreto Chapel	H: 120 × W: 74 × D: 57.5	<i>Pietà</i>	<i>Cedrela</i> spp.	–	<i>Esgrafiado</i> on water gilding
Santa Rosa, Loreto Chapel	H: 111 × W: 56 × D: 42	<i>Virgin of Loreto</i>	<i>Cedrela</i> spp.	Gypsum	<i>Esgrafiado</i> on water gilding, water silvering (incarnation), chalk, lead white, ochre, green copper pigment, indigo, Prussian blue
Santa Rosa, Loreto Chapel	H: 108 × W: 47.5 × D: 42.5	<i>Christ Carrying the Cross. Imagen de vestir</i> (sculpture made to be dressed with real fabrics)	<i>Cedrela</i> spp.	–	Partially polychromed wood
Santa Rosa, Loreto Chapel	H: 132 × W: 128 × D (without cross): 15	<i>The Penitent Thief</i>	<i>Sapium</i> spp.	–	–
Santa Rosa, Loreto Chapel	H: 142 × W: 93.5 × D: 50	<i>Saint Gabriel the Archangel (Annunciation)</i>	<i>Cedrela</i> spp.	–	<i>Esgrafiado</i> on water gilding, water silvering (incarnation)
Santa Rosa, parish church	H: 129 × W: 59 × D: 59	<i>Saint John</i>	<i>Cedrela</i> spp.	–	<i>Esgrafiado</i> on water gilding
Santa Rosa, parish church	H: 400 × W: 292 × D: 65	Main altar	<i>Cedrela</i> spp.	Gypsum	<i>Esgrafiado</i> on water gilding and silvering, coloured glazes on gilding and silvering, minium, vermilion, lead white
Santa Rosa, parish church	H: 65 × W: 30	Black angel from the altar	–	Gypsum	<i>Esgrafiado</i> on water gilding and silvering, minium, amorphous carbon, lead white
Santa Rosa, parish church	H: 60 × W: 38	White angel from the altar	–	Gypsum	Water gilding, lead white, minium
Santa Rosa, Loreto Chapel	H: 99 × W: 34.5 (thickness: 1.7)	Easel painting with <i>Virgin Mary and Saint Peter</i>	<i>Cedrela</i> spp.	–	Paint on wooden panel

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Notes

1. F. Fechner, *Entscheidungsprozesse vor Ort. Die Provinzkongregationen der Jesuiten in Paraguay (1608–1762)*, Regensburg, Schnell und Steiner, 2015, pp. 24–29.
2. G.A. Bailey, *Art on the Jesuit Missions in Asia and Latin America 1542–1773*, Toronto, University of Toronto Press, 1999, p. 165.
3. J. Plá, *El barroco hispano-guaraní*, Asunción, Universidad Católica, 2006, p. 97.
4. Plá 2006 (cited in note 3), p. 57.
5. A. Buchholz, 'The tipping point in mimesis: transcultural negotiation processes in the sculpture of the Paracuarian Jesuit missions (1609 to 1767–1768)', in M. Kern and K. Krüger (eds), *Transcultural Imaginations of the Sacred*, Paderborn, Fink 2018 (in press).
6. J. Cardiel, *Breve relación de las Misiones del Paraguay*, Buenos Aires, Academia Nacional de Historia, 1994, p. 48.
7. T. Escobar, *La belleza de los otros*, Asunción, Servilibro, 2012, pp. 38, 129, 165.
8. Bailey 1999 (cited in note 2), p. 145.
9. Escobar 2012 (cited in note 7), p. 45.
10. C. Gramatke, 'Ergebnisse nach dem "material turn". Zur Neubewertung der künstlerischen Produktion in den Guaraní-Reduktionen, am Beispiel der Jesuiten der Deutschen Assistenz', in N. Klein S.J., P. Oberholzer SJ and E. Schmid Heer (eds), *Transfer, Begegnung, Skandalon? Neue Perspektiven auf die Jesuitenmissionen in Spanisch Amerika*, Basel, Schwabe Verlag, 2018, pp. 217–243; p. 223.
11. Gramatke 2018 (cited in note 10), pp. 223–227.
12. Bailey 1999 (cited in note 2), p. 165.
13. J. Torre Revello, 'Un envío de imágenes con destino a las misiones jesuíticas', *Boletín de la comisión Nacional de Museos y de Monumentos y Lugares Históricos*, 1929, pp. 25–32.
14. Archivo General de la Nación (Argentina), *Época colonial: Reales cédulas y provisiones, 1517–1662*, vol. I, Buenos Aires, Talleres Gráficos de la Penitenciaría Nacional, 1911, pp. 466–467.
15. Archivo General de Indias, Seville, Contratación, 2725, N. 3, R. 2., ff. 174v–185v. A certified copy of the original decree is part of the dossier.
16. Fechner 2015 (cited in note 1), pp. 173–175.
17. C. Gramatke, 'Organisation und Ausstattung der künstlerischen Werkstätten für polychrome Holzskulpturen in den Jesuitenmissionen von Paracuaría (1609–1768)', in E. Emmerling and C. Gramatke (eds), *Die polychromen Holzskulpturen der jesuitischen Reduktionen in Paracuaría, 1609–1767. Kunsttechnologische Untersuchung unter Berücksichtigung des Beitrags deutscher Jesuiten*, vol. 1, Munich, Siegl, 2019, pp. 47–85.
18. Archivo Histórico Nacional, Clero-Jesuitas, Leg. 249 / Nr. 3 (13.5.1762)
19. This is written mostly at the end of the lists in a stereotyped way or even with standardised phrases, so it can be assumed that it provides little information on the actual destination of these goods.
20. F.J. Brabo, *Inventarios de los bienes hallados a la expulsión de los jesuitas y ocupación de sus temporalidades...*, Madrid, Rivadeneyra, 1872.
21. C. Gramatke, 'Materia y color: la fragua de un escondite: aproximación al sincretismo de las tallas policromadas de las reducciones Jesuíticas-Guaraníes de Paracuaría 1608–1768', in M. Bolaños and M. Arias (eds), *Tejne, Hacia una historia material de la escultura III. Encuentro Internacional de Museos y Colecciones de Escultura*, Museo Nacional de Escultura, Valladolid, Madrid, Ministerio de Cultura y Deporte, 2018, pp. 173–183; p. 177.
22. C. Gramatke, 'Kunsttechnologische Untersuchungen der Skulpturen in Paraguay', in E. Emmerling and C. Gramatke (eds), *Die polychromen Holzskulpturen der jesuitischen Reduktionen in Paracuaría, 1609–1767. Kunsttechnologische Untersuchung unter Berücksichtigung des Beitrags deutscher Jesuiten*, vol. 2, Munich, Siegl, 2019, pp. 7–31.
23. The samples were analysed in cooperation with the Chair of Wood Science at the Technical University of Munich.
24. The samples were embedded using LR White (1-methylethylidene)bis(4,1-phenyleneoxy-2,1-ethanediyl) bismethacrylate and mounted using Euparal, which contains sandarac resin, camphor and salol, and has a refractive index of 1.535.
25. INTKEY: <http://delta-intkey.com/www/programs.html> (accessed 25 October 2016); INSIDEWOOD: <http://insidewood.lib.ncsu.edu> (accessed 18 October 2016).
26. 'IAWA List of Microscopic Features for Hardwood Identification', *IAWA Bulletin* 10(3), 1989, pp. 219–332.
27. R. Bruquetas Galán, *Técnicas y materiales de la pintura española en los siglos de oro*, Madrid, Fundación de Apoyo a la Historia del Arte Hispánico, 2002, p. 227; J. Basset and M.-T. Alvarez, 'Process and collaboration in a seventeenth-century polychrome sculpture: Luisa Roldán and Tomás de los Arcos', *Getty Research Journal* 3, 2011, pp. 15–32; p. 20; J. Bauchand and D. Eckstein, 'Woodbiological investigations on panels of Rembrandt paintings', *Wood Science and Technology* 15, 1981, pp. 251–263; p. 252.
28. Technovit LC 2000 was used for embedding the samples.
29. PLM was used for the identification of selected pigments. In addition, all samples with metal leaf and some containing inorganic pigments were chosen for investigation by SEM-EDX conducted by Christian Gruber, Bayerisches Landesamt für Denkmalpflege, Munich. The equipment used was a Zeiss DSM 960 with BSE detector and X-ray microbeam XFlash, an X-ray detector by Bruker, the accelerating voltage was 20 kV, the working distance 20 mm. Further differentiation of green copper pigments and organic blue pigments was conducted by Martin Mach, Bayerisches Landesamt für Denkmalpflege, Munich using FTIR-ATR. Four samples, assumed to contain lakes and dyes, were sent to the Polychrome Artefacts Laboratory of the Royal Institute for Cultural Heritage (KIK-IRPA) in Brussels for micro-FTIR and HPLC-DAD. Dr. Jana Sanyova carried out y-FTIR measurements in transmission mode with a Hyperion 3000 spectrometer coupled to a microscope with a mercury cadmium telluride (MCT) detector. Micro-FTIR is an imaging technique that allows characterisation on a micrometre scale

similar to a cross-section. Dr. Sanyova also conducted the HPLC-DAD analysis using a spectra-SYSTEM from ThermoScientific. The extraction was performed at pH 2.0 using hydrofluoric acid mixed with organic solvents. Additionally, nine samples were analysed using micro-Raman by Prof. Dr. Thiago Sevilhano Puglieri (UFPeL) in the molecular spectroscopy laboratory of Prof. Dalva L.A. de Faria at Universidade de São Paulo. The equipment used was a Renishaw inVia Reflex fitted with a Peltier cooled CCD camera (Renishaw, 600 × 400 pixels) and coupled to a Leica microscope (DM2500 M). The spectra were produced using 785 nm (diode laser, Renishaw), 632.8 nm (He-Ne laser, Renishaw) and 532 nm laser lines, which were focused onto the samples by a ×50 Leica objective (NA 0.75) or a ×100 Leica objective (NA 0.85). The laser power was kept in values to avoid sample degradation.

30. M. Koller, 'Das Staffeleibild der Neuzeit', in H. Kühn, H. Roosen-Runge, R. Straub and M. Koller (eds), *Reclams Handbuch der künstlerischen Techniken. Bd. 1: Farbmittel, Buchmalerei, Tafel- und Leinwandmalerei*, Stuttgart, Reclam, 1984, pp. 261–435; p. 315.
31. Gramatke 2018 (cited in note 21).
32. A.T. Fazio, L. Papinutti, D. Parera *et al.* 'Fungal deterioration of a Jesuit South American polychrome wooden sculpture', *International Biodeterioration & Biodegradation* 64(8), 2010, pp. 694–701; Gramatke 2018 (cited in note 10), p. 182.

33. Brabo 1872 (cited in note 20).

34. Gramatke 2018 (cited in note 10), p. 176.

35. Technically lac dye could even have been imported from the Philippines or China. For more information on the trade between Asia and the Spanish colonies see M. Suárez Espinosa, 'The alternative circuits of silver: Lima and the intercolonial trade in the Pacific during the 17th century', in J. Martínez Ruiz (ed.), *A Global Trading Network: The Spanish Empire in the World Economy (1580–1820)*, Seville, Editorial Universidad de Sevilla, 2018, pp. 239–261.

36. J. Burucúa, A. Bustillo, M. Las Carreras *et al.*, *TAREA de diez años*, Buenos Aires, Ediciones Fundacion Antorchas, 2000, p. 39.

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