

The Colour of Money: Dealing in Pigments in Sixteenth-Century Antwerp

Filip Vermeulen

Finally they refine here, with great art and skill, metals, waxes, sugars and other merchandise, and here, uniquely, vermilion is made, which we others call *cinabro*.¹

During the sixteenth century, Antwerp could boast one of the most advanced art markets in Europe. It has been well documented that the city harboured a sizeable community of artists, and painters were particularly well represented. It will suffice to name Quinten Massys, Jan Gossaert, Pieter Bruegel the Elder, Frans Floris and Maarten De Vos as the most famous representatives of the Antwerp school of painting, but there were scores of lesser gods, often anonymous painters, who were active in the city as well.² Recent estimates indicate that there were already 100 workshops operating in the city in 1515; that number would steadily rise in the decades to come, a situation unparalleled in any other European city with the exception of Rome.³

The Antwerp art market had grown exponentially since the end of the fifteenth century. I have argued elsewhere that the growth of a market for painting, and also other branches of the luxury industries, has to be seen in the context of Antwerp's newly gained position as the leading commercial hub north of the Alps.⁴ The growth of the city's economy and its commercial boom rested mainly on three pillars: English merchants started using Antwerp as the gateway to the East to facilitate the export of cloth, while the Portuguese descended on the city to supply Europe with Indian spices and traders came from southern Germany, loaded with silver and eager to purchase spices and cloth.⁵ It is precisely in the wake of this general economic expansion that the port of Antwerp found itself in a position to attract and develop luxury industries such as tapestry weaving, diamond cutting, silk weaving, glass work and woodcarving, while many other trades flourished, as did painting.

This growing international metropolis (Fig. 1) attracted countless artists and skilled workers from elsewhere to the city, to set up a workshop of their own or to join one of the existing workshops as an apprentice or wage earner (*knecht*). The factors that lured them to the port of Antwerp are legion,

but one of the major trump cards was the commercial infrastructure available in the city, whereby artists could exhibit their art work at one of the many *panden*.⁶ These venues can loosely be described as sales rooms designed to market a specific category of luxury goods, such as books, jewellery, tapestries or paintings. Special galleries for the marketing of painting had already emerged in the middle of the fifteenth century and these facilitated large-scale trading. One of the first *panden* where paintings were sold was Our Lady's *pand* (erected in 1460) located off the Groenplaats, which was open during the bi-annual fairs. Around 1540, a new and far bigger *pand* called the *schilderspand*, or painters' gallery, opened on the top floor of the New Bourse, Antwerp's financial centre. No less than 100 stalls were outfitted and turned into shops where art work was put on display and sold, mostly to an international clientele. As far as we know, the *schilderspand* was the first art gallery to be opened all year round. It played a crucial role in the spectacular growth of an art market where painters tended to produce works of art speculatively or 'on spec' – in other words, ready-made rather than on commission, so produced at the initiative of the artist (or dealer) in an attempt to anticipate demand. Antwerp was, therefore, a highly commercialised market and signified a break with what tended to be the norm in the Italian art centres and even in Bruges a century earlier.

Against the backdrop of this booming art market, it should come as no surprise that Antwerp could boast a very lively trade in artists' materials as well. Indeed, there is abundant evidence that Antwerp was a net exporter of pigments during the sixteenth century. First of all, a sizeable home market needed to be supplied with the necessary pigments, colorants and dyestuffs, but also with canvases, panels and brushes. Furthermore, archival evidence suggests that these artists' materials were also exported widely, an aspect that has not been highlighted in the existing literature. Therefore, in the remainder of this paper, I will first briefly comment on the organisation of the local market for pigments before considering the international trade in painting materials originating in Antwerp. Vermilion, an Antwerp staple, will be singled out as a case study. In doing so, I will attempt to



FIGURE 1. Map of Antwerp, engraved by Hieronymus Cock, Antwerp 1557. London, British Library (Maps * 31145.(3.)). © All Rights Reserved. The British Library Board. Licence Number: NONEXIJ6.

sketch the conditions that allowed Antwerp to develop into a leading market for pigments in northern Europe.

SUPPLYING THE LOCAL MARKET

Producing pigments in Antwerp

In view of the large numbers of painters active in the city of Antwerp and the great quantity of pictures produced, a reliable and steady supply of artists' materials had to be guaranteed. Therefore, the demand for all sorts of pigments and dyes – either produced locally or imported – must have been substantial. It was certainly the case that Antwerp's commercial ties with even the most remote destinations through its port secured a supply of raw materials that were otherwise difficult to obtain. The availability of a wide variety of foreign pigments and dyes serves as a good example. For instance, rather exotic colouring agents such as New World cochineal, yielding a red dye, were imported from Mexico by the Spaniards.⁷ Pigments retrieved from regions as far as India were brought into the city by Venetian merchants who engaged in long-distance trade with the Levant (see below). This allowed Albrecht Dürer, when visiting Antwerp in 1521, to purchase some precious ultramarine.⁸

While the import of foreign pigments was without a doubt considerable, the know-how present in the city allowed it to engage in a quasi-industrial production of pigments in sixteenth-century Antwerp itself. Technical research under-

taken by Molly Faries, Micha Leeflang, Nico van Hout and many others is only now starting to shed light on the wide range of pigments that was used by Antwerp artists during the sixteenth and seventeenth centuries.⁹

However, the rise of Antwerp as a centre of knowledge for pigments is not evident, particularly since the art of painting was not very well developed in the city before 1500. I propose that the expertise that had been developed in the dyeing of textiles resulted in a spin-off that would become the main source of pigments for artists. After all, since the late fifteenth century, a sizeable dyeing industry emerged to meet the demands of the growing trade in textiles. This is underscored by registration lists of new citizens (*poortersboeken*) which demonstrate that specialised *ververs* or expert dyers migrated to Antwerp.¹⁰ Furthermore, there is abundant evidence that unfinished cloth was sent to Antwerp in order to be given colour. English cloth in particular and also many Flemish fabrics were brought to Antwerp in very large numbers to be dyed, before being exported to (among other places) the German hinterland and France.¹¹ It is quite conceivable that this interest in colour would eventually stimulate the production of paints for artists as well, even if the technology of dyeing textiles and the formulas applied to make verdigris, red lead, vermilion or lead white are quite different.¹²

Indicative of the wealth of available pigments is the publication and availability in Antwerp of several treatises and recipe books on the making of pigments and colorants. A particularly interesting sixteenth-century manuscript is kept in the Plantin Moretus library in

Antwerp.¹³ The Plantin manuscript lists several recipes for vermilion, azurite, indigo, verdigris, lead white and so forth. Jan Van Damme argues that most of these recipes are authentic Netherlandish formulas as they do not appear to be translations from, for instance, known Italian texts.¹⁴ Moreover, several variations are given for most pigments, which may indicate a high degree of specialisation in a sophisticated market for pigments, and suggests that the technology for the production of colorants was widely available. Indeed, the availability of several foreign manuals containing recipes further underlines the wealth of information present in the city of Antwerp during the sixteenth century.¹⁵

Nevertheless, precisely how and where pigments and dyes were produced in Antwerp remains unclear. There is very little information at this point about the facilities that were in place to meet the demand of more than 100 workshops. Traditionally, apothecaries or grocers would provide the necessary materials to artists, but a number of specialised dealers and producers appear to have taken on that role in Antwerp.

Dealers and markets for pigments

As a result of the increasing size and scope of the art market, specialised dealers supplying the local community of artists came on the scene during the second half of the sixteenth century. Indeed, research in the Antwerp archives has revealed the names of middlemen who specialised in the trade in artists' materials. These intermediaries called themselves *verfvercopere* or *marchand de couleurs*, which translates as 'seller of paint' or 'merchant in colours'. A number of those *marchands de couleurs* were members of the Guild of Saint Luke, the corporation that united all artists and also art dealers. The earliest one to be registered as such was Merten Alleyns in 1561.¹⁶ A guild account book dating from the years 1585–6, when the Antwerp art market was in a severe crisis due to the siege of the city by the Spaniards, indicates that about four individuals were recorded as full-time dealers in pigments in Antwerp at that time: Pieter van Eycken, Merten Alleyns, David Mermans and Andries Cock.¹⁷ Alleyns was the first to be mentioned specifically as a dealer in pigments in the membership lists in 1561.

In addition, there is evidence that at least one other dealer in pigments was a member of the mercer's guild: Bartolomeus De Momper in 1562.¹⁸ Interestingly, De Momper registered in the Guild of Saint Luke as well, but as an art dealer. Other individuals claimed to be both a dealer in pigments and in paintings themselves and were generally registered in the guild as a *cunstvercopere*, as an art dealer without further qualification.¹⁹ I have not encountered any specific regulations or decrees stipulating that these intermediaries were required to join the guild, but they may have done so voluntarily, not least for networking and marketing purposes. In other words, being part of the guild gave them access to their main pool of clients and lent them credibility.

Not much is known about the dealers in paint, but in the Antwerp City Archives an account book of one of these dealers, Michiel Cock, has been preserved.²⁰ In this account book and partial inventory, Cock's business transactions during the early 1580s are noted down in considerable detail.

Judging from these folios, Cock was a highly specialised and presumably successful dealer in paint. No fewer than 60 contemporary artists bought pigments from his workshop. Among them were virtually all the important painters still active in Antwerp at that time such as Hans, Jacques and Roelant Pourbus, the landscape painters Lucas van Valckenborg and Gillis van Coninxloo and, last but not least, Marten de Vos. The account book further indicates that Michiel Cock owned substantial stocks of colorants. Vermilion and smalt, in particular, are mentioned frequently, as well as about a dozen other colouring agents and different types of varnishes.²¹ In general, the workshop also harboured a wide variety of substances connected with the preparation of paints, canvases and wooden panels. For instance, references are made to turpentine from Strasbourg and oil (presumably to make varnish) and glue to prepare wooden panels.²² The presence of these raw materials suggests that Cock may have been a producer of pigments as well. This account book awaits further scrutiny but, as a whole, the cash flow that emanated from his shop suggests that dealing in pigments was a viable business in sixteenth-century Antwerp, and that it was handled by professionals.

Michiel Cock had probably converted part of his house into a shop which was visited by customers looking for artists' materials, but there are indications that some of his colleagues rented stalls at the *pand* from where they would sell their goods. The earlier mentioned Bartholomeus De Momper, for instance, rented up to four stalls at the painters' gallery. Given that he officially declared himself to be a dealer in pigments, it can be assumed that various pigments were for sale at the *schilderspand*.²³ A painting attributed to François Bunel II and generally known under the title *The Confiscation of the Contents of a Painter's Studio* (Royal Picture Gallery Mauritshuis, The Hague, about 1590) may, in fact, be something rather different and may give us an idea of what a shop in the painters' gallery may have looked like (Figs 2 and 3).²⁴ Upon closer scrutiny of the picture, we can distinguish a certain number of vessels on the back shelf which may very well have contained colorants or other artists' materials. While it is unlikely that the Bunel painting is an actual depiction of the Antwerp *schilderspand*, it may give some support to the suggestion that pigments were offered for sale at such art galleries.

It is noteworthy that the distribution of pigments to artists in other art centres across Europe, such as Florence, appears to have been handled mostly by apothecaries. Based on the activities of dealers in paint such as Michiel Cock and what is known about the retailing of dyestuffs and pigments in foreign art centres, it can be deduced that some Antwerp dealers were quite specialised in artists' materials only. Julia DeLancey has demonstrated that in Florence at least, painters called on apothecaries to supply their needs. The so-called *speziali*, however, also sold medicinal items and appear to have lacked the specialisation found in the north.²⁵ On the other hand, the *vendecolori* active in Venice – as shown by Louisa Matthew and Barbara Berrie – have much more in common with their Antwerp counterparts.²⁶ It is not easy to account for these differences, but a comparison made by Neil de Marchi and Hans van Miegroet between the art markets



FIGURE 2. Attributed to François Bunel II, *A Dealer's Shop*, catalogued as *The Confiscation of the Contents of a Painter's Studio*, c.1590? Oil on panel, 28 × 46.5 cm, Royal Cabinet of Paintings Mauritshuis, The Hague (inv. no. 875). Photograph © The Friends of the Mauritshuis Foundation, The Hague, Holland.



FIGURE 3. François Bunel II *attrib.*, *A Dealer's Shop – The Confiscation of the Contents of a Painter's Studio*. Detail showing shelf of containers at the back of the room.

of Florence, Bruges and Antwerp led them to conclude that the size of the Antwerp art market and its focus on exports demanded more specialist dealers.²⁷ In other words: economies of scale determined the high degree of specialisation of these merchants in pigments.

ANTWERP AS AN INTERNATIONAL DISTRIBUTION CENTRE FOR PIGMENTS

Sources

While Venice dominated the trade in pigments in the Mediterranean basin during the sixteenth century, Antwerp appears to have played a seminal role as the distribution centre for artists' materials in northern Europe. The Italian

merchant and commentator Ludovico Guicciardini was the first to draw attention to the central position held by the city in the European trade network for artists' materials in his *Descrittione di tutti i Paesi Bassi*, initially published in Antwerp in 1567.²⁸ Guicciardini's keen observations, excellent connections with the international merchant community in Antwerp and astute business sense make him a fairly reliable source.²⁹ I have confronted and supplemented his statements by data gathered from various toll registers dating from the middle of the sixteenth century. These toll books allow us to trace the nature and, to some extent, volume of the materials that were subject to exports and to map their destinations. Basically, these toll books consist of detailed records of all goods leaving the city on a daily basis and thus contain a plethora of information. A typical entry would include the date, the name of the merchant or carrier, the destination, the nature and quantity of the goods, the value of the merchandise and, lastly, the 1 per cent tax that was paid on the value.³⁰ For reasons that are not entirely clear, the registers tend to be more detailed in reporting the commercial exchanges with the Iberian peninsula compared to other destinations, which renders compiling comparative statistics far from evident. This is particularly the case for the subject matter of this paper, as the export registers most often do not mention the exact kind of colouring material that was being loaded onto a ship or wagon. References to the trade in pigments or dyestuffs are mostly indicated in rather vague terminology, such as *une mande de teinture tres fines* (a basket of fine colours), and there are dozens of such entries in the toll books each year. However, there is enough information to give us at least an idea of the range and scope of Antwerp as a distribution centre for colorants. Finally, the data from

the toll books were supplemented with evidence from *certificatieboeken*, which provide information regarding the price, nature and quantities of pigments that circulated on the Antwerp art market.³¹

In analysing these materials, we need to take into account and distinguish between those colouring matters that were primarily used as a dye for textiles and those that were used as pigments by artists. For instance, madder was exported wholesale, but was intended foremost for the colouring of textiles.³² Alum arrived in extraordinary quantities from Venice, but was primarily used as a mordant in the textile industry. The most eye-catching example in this respect is *pastel* or woad, which was imported in massive amounts from France, mainly from the Toulouse region and was used to generate a blue colour in textiles.

On the other hand, dyestuffs had multiple uses and it is not always clear from archival commercial documents such as toll books what the intended destination was for a particular colouring agent. For instance, brazilwood by itself was used to make stringed instruments, but it was also a valued source for a red dye that found its application mainly in textiles, but also in pigments for painting and to produce red ink. Cochineal and madder lakes were essentially by-products of the dyeing industry as well; in both cases the dye was extracted from textile shearings or clippings. Another telling example is woad, the colouring matter of which is indigo, whereby the blue for use as a pigment could be obtained from the dyeing vat. The blue matter floating on the top could be scraped off, washed and used.³³

Iberia

Spain and Portugal were the main international trading partners for the Low Countries and this applies to pigments as well. Through their colonies, the Spanish and Portuguese were in a position to supply Antwerp artists with a range of exotic pigments and dyes. The *Descrittione* contains frequent references to brazilwood from Brazil, the source of an attractive red or pink pigment that was obtained by boiling chips of brazilwood in water. In addition, cochineal had been extracted by the Spanish from their Latin American colonies since 1523 and was sent to Antwerp on a regular basis. Louis Bril used the toll books dating from the 1550s to calculate the financial values of the various pigments and dyes that arrived in the port of Antwerp from the Iberian peninsula. The dyes or mordants intended more exclusively for the textile industry, such as alum and woad, represent a huge share of the imports, but the monetary worth of imported cochineal and brazilwood is impressive nonetheless (see Table 1).

In terms of exports to Iberia, the Spanish had a huge appetite for verdigris. In the year 1553 alone, they imported 19,602 *guilders*-worth of this green pigment from Antwerp (see below). Other pigments such as vermilion, white lead and various ochres were exported in smaller quantities, but on a regular basis, in addition to varnish.³⁴ It should be noted that the total exports of colouring matters to Iberia amounted to 65,142 *guilders* (excluding madder which

TABLE 1. Imports of colouring matters and related materials from Iberia, April 1552–August 1554. Source: Bril 1962 (cited in note 31), p. 159.

	Import in <i>guilders</i>
Alum	686,928
Cochineal	15,186
Brazilwood	13,074
<i>Pastel</i>	9,474
'Paint'	1,008
Varnish	252
Madder	12

was principally used as a dye) in the roughly 15 months compiled by Louis Bril, more or less double the value of imported colorants during the same period. Finally, it is noteworthy that other artists' materials besides pigments and dyes were exported; references to canvases and paint brushes are also found in the toll books.³⁵

Italy

When discussing trade with Italy, Guicciardini highlights the transit function of the Italian city states for various pigments coming from the Far East, and India in particular. Indeed, the key position that Venice has played in the Levant trade since the time of the Crusades has long been recognised. The Afghan gemstone lapis lazuli, from which a brilliant blue (ultramarine) can be extracted, is probably the most well-known colouring agent that found its way via Venice to the Low Countries, as well as the copper mineral azurite, from which a deep and clear blue was obtained. According to Guicciardini, a variety of pigments was imported from Venice and used for both dyeing and painting.³⁶ Furthermore, he also alludes to the import of Moroccan dyes into Antwerp via Italy without being specific.³⁷

In terms of exports, Italians turned to Antwerp, where the Spanish sold to an international clientele, for supplies of Mexican cochineal. The cochineal was shipped to Venice, Milan and Ancona, and Guicciardini stresses that great sums of money changed hands in these transactions. Occasionally, indigo was exported to Italy as well.³⁸

France

Verdigris was imported in significant quantities from Montpellier in the south of France.³⁹ It is conceivable that large quantities – if not most – of this green pigment were subsequently re-exported to Spain. Our Italian commentator explains how brazilwood also found its way, somewhat unexpectedly, by way of France into the Low Countries:

From France via the sea was brought in ... heaps of brazilwood, for which the French put their lives at stake to retrieve it from a region in America called Brazil, owned by the Portuguese. Nevertheless, the French build a good strong fort there as well.⁴⁰

A screening of the export registers indicates that vermilion, azurite and cochineal were exported from Antwerp to Paris, Lyon and Rouen. In fact, the trade with France intensified in the 1570s as it emerged as an alternative destination when the outbreak of the Dutch Revolt against Philip II of Spain in 1566–68 made maritime trade via the Scheldt increasingly difficult. For instance, the art dealer Peter Goedkint (he is called *marchant de couleur et peinture* in this document) attested in 1576 that he travels about twice a year to Paris to sell paintings and pigments in order to make a living. A few years later, he is known to have rented a stall at the famous market for luxury goods at Saint Germain-des-Prés. And there were quite a few art dealers like Goedkint who also dealt in pigments on the side. The painter-dealer Jacques van de Wyere, for example, included 53 pounds of three different pigments in a large shipment of paintings to Lyon in 1579.⁴¹

Germany and England

Germany and England did not claim a central place in the international trade in pigments during the sixteenth century, but there were modest exchanges nonetheless. The toll books do not mention any specific pigments that were imported from Germany, and neither does Guicciardini, but the raw materials necessary to produce pigments, such as mercury and sulphur, needed to produce vermilion, came from southern Germany (see below).

An assortment of pigments and dyes was sent from Antwerp to various towns such as Hamburg, Frankfurt and Munster, but above all to Cologne where the local textile industry made extensive use of dyestuffs and related commodities such as *garance* (madder root), alum and brazilwood.⁴² Compared to the above-mentioned destinations however, both the range and volume remained modest. Moreover, with the exception of vermilion, there is hardly any indication that pigments were sent to Germany to be used in the arts.

The Antwerp export registers do not offer much information on the trade with England since the Merchant Adventurers, who held the monopoly on this trade, were exempt from paying the tax. However, in a set of London port books dating from 1567–8, it is noted that 5,744 pounds-worth of colorants were imported from Antwerp in that short time span, which is substantial.⁴³

A THICK RED LINE: ANTWERP VERMILION

Karel Van Mander, the Vasari of the north, wrote in 1604 that vermilion ‘makes all the flesh parts glow’.⁴⁴ In the Low Countries, the pigment was already used by scores of Flemish Primitive painters such as Rogier van de Weyden, Dieric Bouts and Hans Memling, and later by countless sixteenth-century artists such as Pieter Bruegel the Elder, as they applied it to obtain an intense red colour in draperies and so forth. Its vibrant colour is demonstrated by the garment of the king on the extreme left of Bruegel’s *The Adoration of the Kings* (London, The National Gallery;

Figs 4 and 5) painted in 1564. Vermilion was also mixed with a little white or ochre to paint flesh tones, for instance, to achieve pale pink faces of women and children. It was used by artists in the sixteenth century both in the north and in Italy, including the leading Italian painters such as Raphael, Michelangelo, Titian and Tintoretto, and subsequently by Rubens and Rembrandt in the seventeenth century.⁴⁵

Making vermilion was an uncomplicated, but rather vile process which may explain why few painters (as far as we know) ventured to produce it themselves and instead turned to specialised dealers. The above-mentioned recipe book lists four different ways to prepare vermilion, of which this is the first recipe:

Take a glass vial, cover the outside with *luto sapiente*, when it is dry take a weight of quicksilver as much as thou wishest to make, add this to two parts of sulphur and put them together in the vial and set it over the fire on a clean iron plate, then start heating and cover the mouth of the vial so long until thou seest blue smoke issuing therefrom then cover again until yellow smoke comes forth then vermilion comes at the same time so remove and let cool and break the vial in two.⁴⁶

Figure 6, from the *Pirotechnia* of Vannoccio Biringuccio (Venice 1540), shows a similar apparatus for sublimation on the right-hand side of the illustration.⁴⁷ The main ingredients necessary to produce vermilion are thus mercury and sulphur, both of which were imported from Germany (Fig. 7).⁴⁸ The degree of expertise to be found in Antwerp may be revealed by an interesting reference in the seventeenth-century treatise *Pictoria, sculptoria, tinctoria et quae subalternarum artium spectantia* in which Théodore Turquet de Mayerne declares that a man in Antwerp makes vermilion three times more red than the ordinary: ‘En Anvers vn homme fait vermillon trois fois plus rouge que l’ordinaire & le vent 10 s. g. la livre’.⁴⁹

Besides the local consumption, which must have been quite significant, vermilion was regularly exported. Guicciardini made a point of stressing twice that this trade represented ‘large sums of money’.⁵⁰ The red colouring matter was the most commonly mentioned pigment in these export registers (at times labelled *teinture rouge*), and it was shipped to all of the destinations mentioned in the previous section. Indeed, the toll books indicate that the red pigment was mainly shipped to Lyon, Rouen, Lisbon, Hamburg and Cologne. For instance, the Flemish merchant Jan Van Berchem loaded no less than 400 pounds of vermilion onto a wagon on 12 December 1543, destined for Cologne.⁵¹ The magnitude of this shipment probably indicates that Cologne functioned as a distribution centre for the wider German hinterland. Irrespective of its destination, a pound of vermilion tended to be valued at 7 *stivers*, which makes it a medium-priced pigment.⁵² Jo Kirby arrives at a similar assessment by comparing prices for vermilion in England and Italy, and the same appears to be true for Germany as well.⁵³



FIGURE 4. Pieter Bruegel the Elder, *The Adoration of the Kings*, 1564. Oil on oak, 111.1 × 83.2 cm, The National Gallery, London (NG3556). © The National Gallery, London.



FIGURE 5. Pieter Bruegel the Elder, *The Adoration of the Kings*. Detail of the left-hand king. © The National Gallery, London.

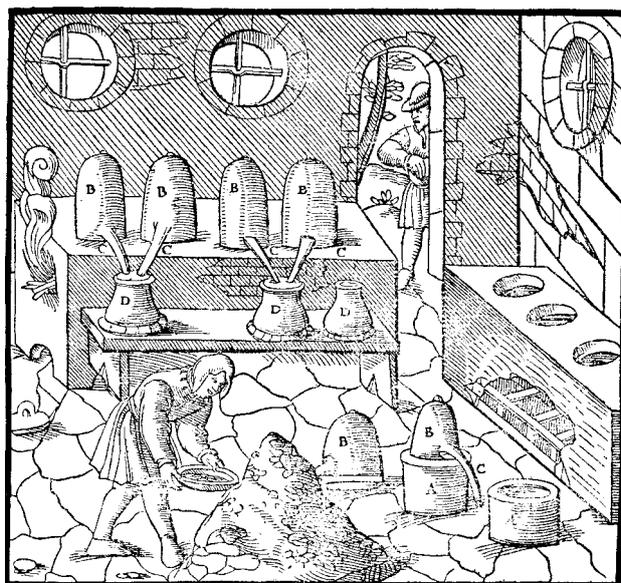


FIGURE 7. Example of furnace and apparatus for the distillation of mercury from its ore: A, pots containing crushed ore (to be placed in the furnace); B, bell-shaped lids with, C, nozzles; D, gourd-shaped earthenware vessel to collect the mercury. From Georgius Agricola, *De re metallica libri XII*, Basel 1556.



FIGURE 6. Two types of apparatus for sublimation; left, by descent; right, by ascent, the type suitable for the preparation of vermilion from mercury and sulphur. From Vannoccio Biringuccio, *De la pirotechnia*, Venice 1540.

CONCLUSION

In summary, a picture emerges of a highly sophisticated and large-scale market for artists' materials in Antwerp, one that was, perhaps, not very different from Venice. The economies of scale that resulted from a lively international trade in dyestuffs and a substantial local demand certainly forced the dealers in pigments to operate on a professional level. This meant that a high degree of specialisation was found in this fascinating segment of the art market. Much of this remains unexplored and research needs to be done with regard to the technical analysis of extant paintings from the period, the production of the different pigments and their application.

What is striking is that various pigments were imported into the port of Antwerp to be redistributed to other cities in Europe. New World cochineal brought in by Spanish merchants found its way via Antwerp to Italy and various destinations in northern Europe. Verdigris from the south of France followed the opposite route. On the other hand, it is clear that Antwerp could boast a sizeable pigment-producing industry of its own. Vermilion, in addition to a host of other colorants, was prepared by skilled *ververs* who may have learned their trade in the cloth-finishing industry, but at some point formed enough of a critical mass to supply a niche market that was fuelled by the growing number of pictorial painters within the city walls. The Cock account book demonstrates that these artists turned to specialised dealers, rather than producing their own paints. Such outsourcing proved cost effective and ensured the availability of a broad spectrum of many different pigments and dyes. Economies of scale and scope thus stimulated specialisation in the pigment industry. Moreover, Antwerp functioned as a hub for the international pigment trade and the fragmentary evidence that can be retrieved from the toll books indicates that it was a net exporter of pigments during the sixteenth century. That trade in pigments clearly focused on Spain and Italy, which is to be expected in light of the fact that painting was an important artistic discipline in these countries.

To conclude, the study of artists' materials is essential to our understanding of the development of the oeuvre of particular artists and styles, since the choice of the raw materials helps to explain why pictures look the way they do. Taken one step further, one could argue that by supplying workshops in foreign art centres with pigments and dyes, Antwerp dealers brought colour to many old master paintings created in cities across Europe.

ACKNOWLEDGEMENTS

My sincerest thanks goes to Jo Kirby for her enthusiasm, countless suggestions and corrections, and for her never-ending patience.

NOTES

- Guicciardini, L. (1567) *Descrittione [di M. Lodovico Guicciardini patritio fiorentino,] di tutti i paesi bassi, altrimenti detti Germania inferiore*, Antwerp, p. 114: *Raffinancisi finalmente con grande arte, & maestria metalli, cere, zuccheri & altre mercantie, & qui si fa unicamente il Vermiglione, che noi altri diciamo cinabro.*
- Ludovico Guicciardini, an Italian commentator and merchant, remarked in the 1560s that there were no fewer than 300 artists working in Antwerp, the majority of them pictorial painters: Vermeylen, F. (1999) 'Exporting art across the globe: the Antwerp art market in the sixteenth century', *Nederlands Kunsthistorisch Jaarboek*, 50, pp. 13–29.
- Martens, M.P.J. (2004/2005) 'Antwerp painters: their market and networks', *Jaarboek van het Koninklijk Museum voor Schone Kunsten Antwerpen*, 2004/2005, pp. 47–73; pp. 57, 73.
- Vermeylen, F. (2003) *Painting for the Market: Commercialization of Art in Antwerp's Golden Age*, Turnhout: Brepols Publishers.
- Historians have noted that Antwerp functioned primarily as a transit market in these early decades of growth: Limberger, M. (2001) 'No town in the world provides more advantages: economies of agglomeration and the golden age of Antwerp', in P.K. O'Brien, M. t'Hart, D.J. Keene and H. Van der Wee (eds) *Urban Achievement in Early Modern Europe: Golden Ages in Antwerp, Amsterdam and London*, Cambridge: Cambridge University Press, pp. 39–62; pp. 45–6.
- During the good years, the port could boast ship traffic of 2,500 seagoing vessels annually. Moreover, the *Hessegagens* guaranteed a dependable and regular, if not daily, overland connection to all of the major trade centres across the continent: Vermeylen 2003 (cited in note 4), p. 17.
- Guicciardini explicitly mentions the import of New World cochineal into Antwerp: Guicciardini 1567 (cited in note 1), p. 123. In an earlier section (p. 119), while discussing the trade between Antwerp and the Italian cities, cochineal is mentioned with reference to goods to Ancona: *il color'chermesi chiamato cucciniglia, che viene di Spagna* (the crimson colour called cochineal which comes from Spain) and, later (pp. 119–20), with respect to Venice, *il color chermisi per gran' valuta* (the crimson colour of great value).
- Dürer paid 12 ducats for an ounce of ultramarine of good quality: 'Methods and materials of Northern European painting in the National Gallery, 1400–1550' (1997) in L. Campbell, S. Foister and A. Roy (eds) *Early Northern European Painting: National Gallery Technical Bulletin* (special issue), 18, pp. 6–55; p. 34.
- For instance, see Leeflang, M. (2004/2005) 'Workshop practices in early sixteenth-century Antwerp studios', *Jaarboek van het Koninklijk Museum voor Schone Kunsten Antwerpen*, 2004/2005, pp. 233–74; Hout, N. van (2005) 'Functies van Doodverf. De onderschildering en andere onderliggende stadia in het werk van P.P. Rubens', PhD dissertation, University of Leuven; Faries, M.A. (2003) 'Technical studies of Early Netherlandish painting: a critical overview of recent developments', in M.A. Faries and R. Spronk (eds) *Recent Developments in the Technical Examination of Early Netherlandish Painting: Methodology, Limitations and Perspectives*, Turnhout: Brepols Publishers, pp. 1–37.
- Stadsarchief Antwerpen (1978) *Antwerpse poortersboeken 1533–1608*, 3 vols, Antwerp: Stadsarchief (Antwerp City Archives).
- Thijs, A.K.L. (1987) *Van 'werkwinkel' tot 'fabriek': De textielnijverheid te Antwerpen (einde 15de–begin 19de eeuw)*, Brussels: Gemeentekrediet; Wee, H. van der (1963) *The Growth of the Antwerp Market and the European Economy (Fourteenth–Sixteenth centuries)* (3 vols), vol. 2, The Hague: Martinus Nijhoff, p. 189.
- In addition, these particular pigments were used in house painting and also in other trades. Lead white and verdigris, for instance, had uses in pharmacy.
- Van Damme, J. (1974) 'Een 16e-eeuwse Zuidnederlands receptenboek', *Jaarboek van het Koninklijk Museum voor Schone Kunsten Antwerpen*, 1974, pp. 101–37.
- Ibid.*, pp. 104–7.
- For a survey of published recipe books in Antwerp during the sixteenth century, see Van Damme 1974 (cited in note 13), pp. 107–13.
- At that point in time, he was listed as Merten van Halewyn: Ph. Rombouts and Th. Van Lerijs (1864–76) *De Liggeren en andere historische archieven der Antwerpsche Sint Lucasgilde* (2 vols), vol. 1 (1864), Antwerp: [n.pub.]; vol. 2 (1876), The Hague: Martinus Nijhoff; see vol. 1, p. 224.
- Rombouts and Van Lerijs 1864–76 (cited in note 16), vol. 1 (1864), pp. 297–307.
- De Burbure, L. *Nota's*, unpublished notes (undated), Stadsarchief Antwerpen, vol. 10, p. 40.
- Peter Goedtkint, for instance, is referred to in 1576 as a *marchant de couleurs*. In the same document, it is stipulated that Goedtkint travels twice a year to Paris to sell paintings and pigments. Stadsarchief Antwerpen (hereafter SAA), Certificatieboeken, no. 36, f. 510 r–v (document dated 7 December 1576).
- SAA, Archives Notary P. Fabri, no. N 1485 (undated).
- 'Smalt is a pigment made from ground cobalt-blue glass. Smalt was clearly widely used by artists during the second half of the sixteenth century, and as a cheaper blue, it constitutes a form of process innovation', Faries 2003 (cited in note 9), p. 10.
- Instructions issued by the Guild of Saint Luke in the 1590s state that varnish can be produced by mixing turpentine from Strasbourg with oil, and letting the two fluids seethe in a bottle: SAA, Gilden en Ambachten, no. 4578 (undated).
- Vermeylen 2003 (cited in note 4), pp. 60–61.
- There is no consensus on the meaning of the painting, which is difficult to ascertain, or, indeed, on the attribution to François Bunel II. I believe that it may very well show a dealer's shop.
- DeLancey, J.A. (2003) 'Dragonsblood and ultramarine: the apothecary and artists' pigments in Renaissance Florence', in M. Fantoni, L.C. Matthew and S.F. Matthews-Grieco (eds) *The Art Market in Italy, 15th–17th Centuries/Il mercato dell' arte in Italia, secc. XV–XVII*, Ferrara: F.C. Panini, pp. 141–50.
- Also, see the paper by Louisa Matthew and Barbara Berrie in this volume (pp. 245–52).
- Marchi N. de and Miegroet, H. van (2006) 'The history of art markets', in V. Ginsburgh and D. Throsby (eds) *Handbook of the Economics of Art and Culture*, Amsterdam: Elsevier, pp. 70–108.
- Guicciardini 1567 (cited in note 1); for this paper I also made use of a later (revised) Dutch edition, *Beschryvinghe van alle de Nederlanden* (Amsterdam, 1612).
- Wilfried Brulez, among others, carefully examined Guicciardini's facts and figures relative to long-distance trade and concluded that they closely reflected reality: Brulez, W. (1966–7) 'De handelsbalans der Nederlanden in het midden van de 16de eeuw', *Bijdragen tot de geschiedenis der Nederlanden*, 21, pp. 278–310.
- For a discussion of this valuable source, see Brulez, W. (1959) *De firma Della Faille en de internationale handel van Vlaamse firma's in de 16de eeuw*, Brussels: Verhandelingen van der Koninklijke Vlaamse Academie voor Letteren en Schone Kunsten van België, klasse der letteren, no. 35, pp. 460–64.
- On the usefulness of *certificatieboeken* for research into various aspects of the art market, see Vermeylen 2003 (cited in note 4), p. 10; Bril, L. (1962) 'De handel tussen de Nederlanden en het Iberisch Schiereiland', MA thesis, University of Gent, p. 154.
- The numbers involved in the export of madder are staggering. During a period of 15 months in the early 1550s, madder worth 114,000 *guilders* was shipped from Antwerp to Iberia: Bril 1962 (cited in note 31), p. 154.
- Hommès, M. van Eikema (2004) *Changing Pictures: Discoloration in 15th–17th-Century Oil Paintings*, London: Archetype Publica-

- tions, pp. 98–9, 102. In addition, Hommes points out that indigo from the Far East had been imported for many decades and had been used in painting: see p. 102.
34. Brill 1962 (cited in note 31), p. 159.
 35. Goris, J.A. (1925) *Etude sur les colonies marchandes méridionales (portugais, espagnols, italiens) à Anvers de 1488 à 1567*, Leuven: Librairie Universitaire, p. 300. For instance, the merchant Pedro Dorosco loaded 10 bales of canvases, various brushes and pigments onto the ship heading to Spain in the winter of 1553. Brussels, State Archives, Rekenkamer, 23472, f. 111 r (document dated 22 November 1553).
 36. 'ende daer en boven azur ende andere verven om te verven ende schilderen': Guicciardini 1612 (cited in note 28), p. 5. Presumably, Guicciardini refers to colorants such as kermes, *grana* in Italian, or Old World cochineal-type insects. These are both dyes, but their dyestuff could appear in so-called lake pigments made from the textile shearings, and these could well have been exported: see Goris 1925 (cited in note 35) p. 252.
 37. Guicciardini 1612 (cited in note 28) p. 95.
 38. Vermeylen, F. (1989) 'De export vanuit de Zuidelijke Nederlanden naar Duitsland omstreeks het midden van de 16de eeuw', Master's thesis, University of Leuven, p. 86.
 39. Savary des Bruslons J. (1723) *Dictionnaire universelle de commerce* (3 vols), vol. 2, Paris, pp. 999–1000.
 40. 'Ut Vranckrijck werdt hier ter zee ghebracht ... Bresiliehout met hoopen, welck de Fransoysen met perijchel hares levens gaen halen op een ghewest van America Bresilien ghenoomt, toebehoorenden den Portugaloyzen ... hoewel dat de Fransoysen daer oock eenen nest met een goede sterckte ghemaect hebben': Guicciardini 1612 (cited in note 28), p. 97.
 41. 'Cinquante trois livres de couleur de trois sortes', unfortunately, it is not specified exactly which pigments were sent to France at this time. SAA, Collectanea 16, f. 238 (document dated 23 September 1579).
 42. Harreld, D.J. (2004) *High Germans in the Low Countries: German Merchants and Commerce in Golden Age Antwerp*, Leiden: Brill, pp. 29, 155; Vermeylen 1989 (cited in note 38), pp. 74, 114.
 43. Dietz, B. (ed.) (1972) *The Port and Trade of Early Elizabethan London: Documents*, London: London Record Society; Dietz, B. (1978) 'Antwerp and London: the structure and balance of trade in the 1560s', in E.W. Ives, R.J. Knecht and J.J. Scarisbrick (eds) *Wealth and Power in Tudor England: Essays presented to S.T. Bindoff*, London: Athlone Press, pp. 186–203; p. 196. See also Jo Kirby in this volume (pp. 339–55).
 44. Mander, K. Van (1994) *The Lives of the Illustrious Netherlandish and German Painters, from the First Edition of the Schilderboeck (1603–1604)*, ed. H. Miedema, vol. 5, Doornspijk: Davaco, p. 218.
 45. Wallert, A., Tauber, G. and Murphy L. (2001) *The Holy Kinship: A Medieval Masterpiece*, Amsterdam: Rijksmuseum and Zwolle: Waanders, pp. 33–4; Gettens, R.J., Feller, R.L. and Chase, W.T. (1993) 'Vermilion and cinnabar', in A Roy (ed.) *Artists' Pigments: A Handbook of their History and Characteristics*, vol. 2, Washington, DC: National Gallery of Art and Oxford: Oxford University Press, pp. 159–82; pp. 174–8.
 46. Van Damme 1974 (cited in note 13), p. 115. I used the translation of this recipe provided by Wallert *et al.* 2001 (cited in note 45), p. 34.
 47. Biringuccio's description of sublimation by ascent is very similar to that quoted; he comments that the method is used by alchemists to make cinnabar from mercury and sulphur: Biringuccio, V. (1540) *De la pirotechnia. Libri X dove ampiamente si tratta non solo di ogni sorte & diversita di Miniere, ma anchora quanto si ricerca intorno à la prattica ... a l'arte de la fusione over gitto de metalli* [etc], Venice, f. 130r–v; reprinted as *The Pirotechnia of Vannoccio Biringuccio*, ed. and tr. C.S. Smith and M.T. Gnudi, New York: Dover, pp. 352–4.
 48. 'geheel ende in klompen quicksilver': Guicciardini 1612 (cited in note 28), p. 96. See also the illustration of the distillation of sulphur in the paper by Roland Krischel in this volume (Fig. 5, p. 258).
 49. Mayerne, T. Turquet de (1620–46) *Pictoria, sculptoria, tinctoria et quae subalternarum artium spectantia*, London, British Library, MS Sloane 2052, f. 94 r–v; see Graaf, J.A. van de (1958) 'Het de Mayerne Manuscript als bron voor de Schildertechniek van de Barok', PhD thesis, University of Utrecht, no. 29, p. 149. Van de Graaf speculates that this may be silver *guilders*.
 50. Guicciardini 1612 (cited in note 28), p. 95.
 51. Brussels, State Archives, Rekenkamer, no. 233558/1, f. 196v (document dated 18 December 1543).
 52. Harley came to the same conclusion for the seventeenth century, when it was listed at 16 pence per pound: Harley, R.D. (1982) *Artists' Pigments c.1600–1835: A Study in English Documentary Sources*, 2nd edn, London: Butterworth, pp. 125–6.
 53. Kirby, J. (2000) 'The price of quality: factors influencing the cost of pigments during the Renaissance', in G. Neher and R. Shepherd (eds) *Revaluing Renaissance Art*, Aldershot: Ashgate, pp. 19–42; p. 29. For Germany, see Burmester, A. and Krekel, C. (1998) 'Von Dürers Farben', in G. Goldberg, B. Heimberg and M. Schawe (eds) *Albrecht Dürer: Die Gemälde der Alten Pinakothek*, Heidelberg: Braus, pp. 54–107.