72 FLORIN FOR COLOURS, WHITE AND GLUE: THE TIEPOLOS, THE VENINOS AND WÜRZBURG

Andreas Burmester and Stefanie Correll

ABSTRACT During their stay in Würzburg, Germany around 1750, Giovanni Battista and Giovanni Domenico Tiepolo created not only the ‘Europe fresco’ in the grand staircase of the Würzburg Residence, a World Heritage Site, but also many canvas paintings, oil sketches and drawings. Our contribution revisits the palette of five Tiepolo paintings that was identified in 1996. The aim is to embed the palette, as characterised in 1996, into the historic context. Recent research on the colour trade in Würzburg in the 18th century is used to identify the place where the Tiepolos bought their ‘colours, white and glue.’ The role of the Würzburg pharmacies and that of a special type of merchant (the so-called ‘Materialisten’) is discussed. Recently discovered price lists and other documents of the Würzburg ‘materialist’ Carl Venino have enabled the development of a thorough understanding of the 18th-century colour-trading scheme, which differs from earlier periods. For the first time, documentary sources allow a time-dependent description of the Tiepolos’ palette. This contribution demonstrates the urgent need for documentary research and its impressive power in the interpretation of modern scientific results.

Introduction

Every man’s life knows successes and failures: on the occasion of a large exhibition on the Tiepolos in Würzburg in 1996, one of the authors of this contribution (A.B.) was asked to contribute as a scientist. The editor, an art historian, decided to print the article on the Tiepolos’ colourful palette in black and white and as the very last paper in a two-volume catalogue. The colourful cross-sections were printed separately from the text. Furthermore, AATA online (the Getty online abstract database) referenced the catalogue, including four of the 19 papers, but the one on colour was not abstracted. This omission laid the foundation for the present contribution.

Around 1750, the Venetian painters Giovanni Battista (‘Gianbattista’) Tiepolo (1696–1770), his son Giovanni Domenico Tiepolo (1727–1804) and their workshop were active at the Würzburg Residence. This remarkable site was built between 1720 and 1780 by the renowned Baroque architect Johann Balthasar Neumann (1687–1753). Today it is a UNESCO World Heritage Site with the famous ‘Europe fresco’ in the grand staircase. Created between 1752 and 1753, it was the largest fresco ever painted by the Tiepolos. It is their major work of art and was commissioned by Prince-Bishop Carl Philipp von Greiffenclau (1690–1754). During their stay in Würzburg, the Tiepolos created various canvas paintings, including the large format Adoration of the Kings, painted in 1753 by Gianbattista for a monastery close to Würzburg and now at the Alte Pinakothek, Munich (Fig. 1). Other paintings of a smaller format and painted by the son, Domenico, are still in situ: they are integrated as supraportas (overdoors) into the overwhelmingly rich Rococo decoration of Neumann’s imperial hall.

What do we know about the Tiepolos’ palette? Although there are art history contributions on the role of colour in the Tiepolos’ colourful oeuvre, the pigments used on their paintings have only rarely been studied. In general, publications on 18th-century colour are few and far between. The 1996 contribution pointed the reader to the very early use of Naples yellow and Prussian blue on Italian paintings. Whereas Naples yellow slowly replaced lead-tin yellow, Prussian blue competed with the expensive azurite and ultramarine, especially in green tones. Yellow ochre and green earth enriched the narrow palette during this period of transition towards the stronger yellows and saturated greens of the 19th century. The 1996 contribution concluded with four general observations:

1. The palettes of Tiepolo father and of Tiepolo son (‘the Tiepolos’) did not show any differences.
2. The paintings created by the Tiepolos in Venice around 1739 did not show a different palette compared to those created 12 years later in Würzburg.
Fig. 1 Giovanni Battista Tiepolo, *The Adoration of the Kings*, 1753, canvas, 408 × 210.5 cm, Alte Pinakothek, Munich (inv. no. 1159). (Photo © Bayerische Staatsgemäldesammlungen Munich.)
3. The findings supported the view that the first half of the 18th century was a time of change. Prussian blue and Naples yellow were introduced, azurite, verdigris, mountain green, smalt and lead-tin yellow disappeared and the ochres and green earth which appeared for a short period created a new palette.

4. However, the contribution could not firmly answer two key questions: Did the Tiepolos buy their colours in Würzburg or did they bring them from Venice? And, there was another point, which in 1996 was more a feeling rather than a certainty: Does the palette described in modern terms in 1996 have anything to do with historic reality?

Whereas the second question was addressed in different projects and led to a paradigm shift between 1998 and 2006, the first question had to wait for the discovery of a small receipt in the building accounts of the Würzburg Residence. This receipt tells us that the Würzburg merchant Carl Venino received ‘72 florin for colours, 810 pounds of white and a half centner of glue’. This small document correlates a certain site, the Würzburg Residence, and a person, the merchant Carl Venino, who obviously sold colours and other artists’ materials. But who was Carl Venino?

To answer this, we have to find out what was on offer in the rich town of Würzburg around 1750. Similar to the palette with all its innovations, there was a great change in the way colours or any kind of painting material were traded in the 18th century. People producing colours on a small scale, such as colour burners or early chemists, gained importance over those with mining experience as in earlier centuries. Intermediate traders replaced the large trading companies, and direct connections between merchants superseded the fairs and markets as earlier places of exchange. A difficult question to answer concerns the role of pharmacies in a period of emerging small-scale companies, where customers, such as the artist, a monk or an employee of the residence, bought colours, white and glue.

A visit to Würzburg pharmacies

In the case of Würzburg, did the artist patronise a pharmacy or a common colour shop? In the Franconian region, both possibilities are supported by documents, the first of which is a receipt from the monastery of Ebrach (50 km east of Würzburg) for the sum of 2 Florin, 7 Kreutzer and 2 Heller for colours collected by the painter from the pharmacy. Thus the pharmacy served as the place where the artist bought colours. In the case of Ebrach, we can only guess that the painter went to the pharmacy of the local monastery, which was probably the only pharmacy in that small town. The situation in the much larger city of Würzburg was different: this rich town had at least two pharmacies, one of which is the pharmacy of...
the Julius hospital with its wonderful furnishings of 1765 and which can still be visited today (Fig. 2).

However, hospital pharmacies in larger communities often restricted themselves to medicines, whereas artists' supplies were provided by a secular pharmacy. For Würzburg, this was the pharmacy Zum Hirschen, which received a privilege in 1609. Although regrettably the pharmacist's wife and daughter were burnt at the stake in 1627, this pharmacy is still active today. All sales in these two pharmacies were regulated by a number of price lists (‘Taxae’) that were valid for Würzburg and the Franconian region. For instance, a price list from 1735 reflects the wide range of ‘Simplicia’, ‘Composita’ and ‘Praeparata’ offered in Würzburg and the Franconian region.9 This list and its amendment from 1743 do indeed contain some of the materials we are interested in, such as lead white and cinnabar, which are also of pharmaceutical use. However, there is (1) no mention of lead yellow, yellow ochre, green earth, Naples yellow or Prussian blue, and (2) there is no chapter on ‘Pigmenta et Colores’.10

The Venino merchants

The rich archival material of the Venino shop provides a detailed insight into their trade and trade relations.13 Obviously, his shop was so successful that he commissioned no less a person than Balthasar Neumann to build a grand commercial building, so successful that he commissioned no less a person than Balthasar Neumann to build a grand commercial building, which received a privilege in 1627. However, if we look at that of 1681, there is a big surprise: it lists lead yellow, yellow ochre, green earth, Naples yellow or Prussian blue, and (2) there is no chapter on ‘Pigmenta et Colores’.10

The Venino merchants

To get to know Venino, we have to go back to 1716, when the spice merchant (Spezereihändler) Carl Antonio Venino from Lierna on Lake Como became a citizen of Würzburg and was given permission to open a shop.12 Obviously, his shop was so successful that he commissioned no less a person than Balthasar Neumann to build a grand commercial building, the so-called Rombachhof, in the middle of the city, close to the Würzburg Residence (Fig. 3).

In 1740, Venino opened his new shop for materials and spices (Material- und Spezerewaren) at Eichhornstrasse (Squirrel Street) 23. The impressive three-storey building included business premises on the lower floors and domestic premises on the upper floor. Customers were received in a spacious salesroom behind the rusticated façade and the open arcades (Fig. 4). In the centre was a sales counter with a cash desk and an account book in which every transaction was recorded. The walls of the shop were fitted with storage shelves (Fig. 5).

Venino, known at that time as a ‘materialist’, offered an enormous variety of goods: spices (including aniseed, valerian, cardamom, coriander, caraway, curry, cumcuma, laurel, oregano, lemon balm, nutmeg, clove, pepper, vanilla and cinnamon) as well as fruits and vegetables (such as dates, figs, fennel, ginger, coconut, carrots, plums, quinces, radishes and lemons). He also stocked different roots, seeds and berries as well as animal products such as castoreum, muskrat and several species of fish (pike, herring, salmon, anchovy and dried cod). Manufactured foods, such as bread, cheese, noodles, sausages, honey and different varieties of oil were also found within the assortment. Customers could even buy luxury items such as sugar, coffee, cacao, chocolate, tobacco, wine and schnapps. This broad range of daily goods was supplemented by houseware (knives, yarns, wicks, firestones and smoke candles) and even cosmetic products, for example hair powders, artificial beauty patches, toothpicks and wigs.

Thanks to meticulous bookkeeping we know that colour-ware (Farbware) was an essential part of Venino’s business: remarkable, handwritten price lists from 1727 (Fig. 6) and 1790 (Fig. 7) reveal that pigments, dyestuffs and binders as well as additives and accessories for painting and drawing were bought in, stored and traded by the Venino merchants. As can be concluded from these price lists, all common pigments and dyestuffs – such as lead white, chalk, coloured earths, auripigment, Naples yellow, Schüttgelb, cochineal, minium, cinnabar, mountain green, verdigris, green earth, Schweinfurt green, indigo, Prussian blue, soot and bone black – were available in different qualities, prices and packaging sizes. In conclusion, the Venino shop provided all the materials required by artists and craftsmen working in Würzburg within the period under consideration.

The rich archival material of the Venino shop provides a detailed insight into their trade and trade relations.13 Obviously, the Veninos occupied a central position within the European
trade chain. Numerous contacts to other ‘materialists’, chandlers and suppliers in Liverpool, London, Copenhagen, Amsterdam, Rotterdam, Straßbourg, Marseille, Trieste, Augsburg, Nuremberg, Magdeburg, Hamburg, Bremen, Cologne, Mainz and, finally, Frankfurt (Main) can be found in the large number of price lists, waybills, order coupons and invoices. For pricing purposes, the Veninos systematically archived these price lists, so-called Preiscourants, which were collected regularly from all their business partners (Fig. 8).

The Preiscourants listed all available goods and current prices for a particular day. They also sometimes contained information on the quality, origin and trading units of the stocked materials. These data, in conjunction with information from additional archival material, reveal well-defined alliances between the Veninos and suppliers, transport companies and customers. For the first time, the documentary sources can be used to trace a detailed network of trading partners in the colour business, which reveals that the Veninos operated within a national and European network.

On a more general level, a number of professional guilds were involved in trading in former times: merchants (Kaufleute), wholesalers (Grossisten), chandlers (Krämer), materialists, spice merchants (Spezereihändler), druggists and pharmacists. But what kind of traders were the Veninos? In common terms, a merchant was always a wholesaler, in contrast to a chandler, who was a retailer. Thus merchants and wholesalers refer to the quantity of goods traded and not to one specific type. Unlike merchants and wholesalers, chandlers traded with small units, measured in ells, loaths and pounds. At the beginning of the 18th century, the business split into separate branches. This diversification was stimulated by the general expansion of trade, for example, in manufactured goods and products from the colonies. The range of offered products was now divided into categories based not only on the products’ origin, but also on the consumer’s demands, and promoted the opening of shops by materialists, spice merchants and druggists. All these terms refer to a specialised trade, regardless of the quantity of traded goods. In 1783, Krünitz wrote that a ‘material’ means a natural product, so a ‘materialist’ means a trader who is trading in all raw products, including products artificially manufactured and those made by chemistry. A spice merchant (Spezereihändler) or druggist (Droguist) refers to a trader involved in wholesaling or detail business with spices or drugs. A trader exclusively engaged in detail business was known as a spice chandler (Gewürzkrämer): he dealt in special goods, including selected spices, balms, fragrant woods, essential oils and other oriental products (Morgenländische Produkte).

In contrast, pharmacists handled goods, regardless of whether they were natural (Simplicia), mixed (Composita) or prepared for, in most cases, pharmaceutical purposes (Praeparata). In addition, pharmacists acted within strictly controlled legal regulations that defined all duties. Price lists (T塔xe) released by the local authorities contained all the materials on offer. Trade in toxic materials was restricted to the pharmacies, which were closely controlled by the local physician (Collegium Pharmaceuticum); however, some toxic materials of non-pharmaceutical relevance, such as lead white and cinnabar, could be sold by materialists as well.

The Venino merchants are regarded as wholesalers because of the large amount of traded products, and as materialists, due to the type of their assortment. Various delivery notes, bills and customs receipts from different traders prove...
that there was active merchandise traffic at Venino’s shop. This provides an insight into the mode of transportation,\textsuperscript{18} which was also subject to strict regulations and high costs, depending on customs duties from a great number of territories scattered over Germany around 1800. The largest fraction of the costs can be assigned to the numerous customs facilities. To make matters worse, customs tariffs were not regulated consistently because each territory had its own tariff schedule.\textsuperscript{19} If the Veninos wanted to transport goods from one town to another, they had to pay customs at several stations, which were usually close to roads, bridges, rivers and town gates. For example, between Augsburg and Nuremberg,
which each had their own toll points, there were at least four other customs facilities.

A client usually made a payment in addition to the commodity price to cover all extra costs such as customs duties, outgoings for packaging or crane charges. The Venino documents include a number of waybills that detail freightage for special goods and routes. Goods were sent by carrier, carter or skipper, each kind of transportation entailing other costs. A carrier was only employed for short distances and small deliveries. Materialists, such as the Veninos, or wholesalers traded huge quantities of goods over long distances using carters and skippers. To assign all the goods on a carriage or a ship to a specific sender, each waybill and the item itself was marked with the sender’s symbol. These property signs, drawn with a brush loaded with soot black in glue, often carried an ornate monogram or another memorable symbol (Fig. 9).

The transport itself was characterised by a high level of work division. Besides carters and skippers, other guilds were involved in packing and loading goods onto wagons and ships: bale binders (Ballenbinder),stashers (Stauer), packers, porters, unloaders, uploaders and menials for weighing who were responsible for storing and tying the goods into barrels and packages. Especially sensitive and precious goods were to be handled with care to endure long transportation distances. Within the Veninos’ price lists there are several hints on the type of packaging used including big and small bales, barrels (8 bushel barrels, 12 bushel barrels), bottles, different types of boxes and parcels. They also contain information on the use of ropes, linen and baskets as well as on the costs of the packages or ‘emballage’. Precious goods were wrapped in woven fabrics or, in the case of materials such as indigo or cochineal, into ‘Serons, Surons, Suronen’ or ‘Saronen’, which were sacks made of animal skin. Such products were placed in a barrel or box within their first packing. Finally, they were wrapped in waxed mats of linen or laid on straw. Today, we no longer

Fig. 7 Price list from the Würzburg merchant Venino, 1790. (Staatsarchiv Würzburg, Signature StAWÜ/Broili/box 207 Diverse Papiere 8.)
know the sizes of all the boxes and packing units mentioned therefore we can often only estimate the size of bushels or barrels. These are defined in very different ways, depending on the respective territory. If the goods survived the arduous transportation, they were either stacked in warehouses or placed in the salesroom where the customer could find all the products presented in packets, boxes, glasses, paper or textile covers and laid out on shelves and in drawers.

With all this in mind, it is obvious that the Veninos played an important role within the network by connecting suppliers and wholesalers with retail dealers and end consumers. Among the most prominent customers were monasteries, such as Ebrach, and stately homes and castles, such as Veitshöchheim and Werneck, as well as the Würzburg Residence mentioned above. Because of their frequent deliveries to the residence, the Venino merchants were entitled purveyors to the Bavarian court (Königlich Bayerische Hoflieferanten). In the residence’s account book of 1751, which is part of the so-called Residenzbaurechungen, a number of deliveries from Venino are listed, including items sold to the Tiepolos and their day labourers:

- Total sum of money spent […]
- 14 [fl = florin] for 810 [lb = pounds] of white and a ½ centner glue paid to Carl Venino […]
- 50 [fl] 6 [bz = Batzen] for colours handed out by Carl Venino […]
- 4 [fl] 12 [bz] paid to two day labourers from the painter Dieplo [read Tiepolo] […]
- 4 [fl] 6 [bz] paid to the same [two day labourers] […]
- 4 [fl] 12 [bz] paid to the same [two day labourers] […]
- 4 [fl] 6 [bz] paid for day wages of those two labourers from the painter Dieplo [read again Tiepolo].

Obviously, the colours, white and glue provided by Carl Venino were used by artists who worked at the residence including not only the Tiepolos, but also Antonio Bossi. During the years 1750/51, Bossi did the stuccowork within
the 'Sala Terrena' and the imperial hall (Kaisersaal) at the Würzburg Residence. At the same time, Giovanni Battista Tiepolo and his workshop created the famous 'Europe fresco' on the ceiling of the residence's grand staircase and the ceiling frescoes in the 'Kaisersaal'.

Returning to the question of why the pharmacy no longer supplied artists with colours, white and glue, in Würzburg, the 'materialist' Carl Venino supplied artists' materials on a grand scale. The Tiepolos, their workshop and other artists made ample use of Venino's assortment. Although this is not necessarily the case for all other German cities of the time, in Würzburg at least, the 'materialist' replaced the pharmacist as the supplier of artists' materials from 1716 onwards. Whereas the impressive building of the Veninos was totally destroyed by Anglo-American bombers at the end of the Second World War, the bulk of the business correspondence has survived in the Staatsarchiv Würzburg (Fig. 10).

One of the authors of this contribution (S.C.) has extracted all the information on colours (Farbwaren) and related artists' materials and entered it into a database, which is part of a publication on the Venino case. The 110 archival boxes (the so-called Broili family estate) at the Staatsarchiv Würzburg contain most of the documents from around 1790 and are awaiting future studies on other materials, such as tobacco.

In addition to art history and the technological aspects, the documents illustrate aspects of trading history and the role of former professional guilds. The archival material also contains additional information on many other goods and their type of transportation, packing and other details of the complex trading process of the 18th century.

The Tiepolos' palette

The palette of the Würzburg Tiepolo paintings of the 1750s was examined in the 1960s, 70s and 90s at the Doerner Institut, Munich, and has been discussed in detail elsewhere. As was common at that time, the colourful pigments were explicitly described on the basis of their chemistry and mineralogy, i.e. in modern terms. This contribution enables translation of the modern descriptions into historic terms with the help of the two Venino lists of 1727 and 1790.

Both lists include white chalk (called Weiße Kreid(t)te in the Venino lists) and three types of lead white (Bleyweiß). Cheap chalk or the cheapest type of lead white, blended with chalk, was used as a filler for the ground layers. The lead white used in the paint layers was of better quality: three times as expensive as the ordinary grade, it was sold as Venetian lead white (Bleyweiß venetian[iisch]). Another grade, listed in 1790 as Schiffer weiß, has an even higher price. Dutch lead white was not offered by Venino. Cröker states in 1736 that the ordinary grade and the Venetian lead whites are common on the painters’ palette, but not Schiffer weiß. Cröker continues that lead white is produced in different places, whereas the Venetian is the most beautiful and the best, even more expensive than the Dutch lead white. He knew that lead white from Venice was beautiful, hard and snow-white.

The Veninos offered different cheap qualities of yellow ochres (Ocker), light and dark, very fine and ord[inaire] as well as green earth. The identified red-brown ochre was correlated with cheap English red (Englisch Roth) in different qualities and was the only red earth offered. At the Venino shop, Naples yellow was available as Neapolitanischgelb ff, whereas lead-tin-antimony yellow, which has only recently been identified in the Tiepolo cross-sections for this study, is not listed. A detailed search in the pigment database of the Doerner Institut reveals that, in the 1960s and 70s, Hermann Kühn frequently identified antimony containing lead-tin yellow on 17th/18th-century paintings from the Netherlands, Italy and France. Kühn decided not to give a name to this yellow, which disappeared from the artist’s palette in the 19th century. His position is supported by the Venino price lists, in which the different types of lead oxides are concealed within the term lead yellow (bley gelb), which is absent from the 1727 list but appears on that of 1790. In the middle of the 18th century, the Tiepolos used both bley gelb and Neapolitanischgelb, the price of Naples yellow being a little higher than that of lead yellow. Cröker mentions that lead yellow is a ‘nice yellow colour’, although the one from England exceeds all others. He adds, still in the tradition of the Kunstbüchlein of earlier centuries, that it is prepared from lead, but is cheaper to buy than to make it. Although Naples yellow is a lead-antimony yellow, the secret of its production may have prevented it from being known under the term lead yellow: Cröker knew it as Neapolitanisch Gelbe without giving any details. As a consequence, one pot with Neapolitanischgelb, but several pots with different grades of bley gelb must have been on the
shelves in Venino’s shop. The client simply picked the pot containing the yellow of his choice without having any idea of the chemistry behind it – just the yellow shade and the price guided his decision.35

Ultramarine and different qualities of Prussian blue are also included in the Venino lists. The price for natural ultramarine (Ultra marin) increased considerably from nine times as expensive as verdigris in 1727 to around 150 times in 1790 for a dark grade (dunklen Ultramarin). The early use of Prussian blue has already been mentioned and it is supposed that the Tiepolo workshop was one of the earliest to use this new blue.36 The analytical results do not reveal which grade of Berliner Blau was used on the Tiepolo paintings examined but its high aluminium content is typical of early production forms.37 It is remarkable that Berliner Blau already appeared as Berliner blau fein and Berliner blau Mitte, that is, in two different grades, on the Venino list of 1727. A few years after its introduction,38 it was being offered in pounds! Its recipe was published in 1724 and soon became the main blue in greens, and mixed with yellows it produced an astonishingly wide range of hues. Only a few years later in 1730, Minerophilo pointed out that Prussian blue was available cheaply and in large amounts.39 It was praised by Cröker in 1736 as a very nice blue,40 invented in Berlin, and as a replacement for ultramarine, indigo and woad. However, we still do not know where the Veninos obtained the brand new Berliner blau in 1727. The second list of 1790 contains two grades, Berliner blau fein and ordinaire, again both offered in pounds. The price was around two to six times higher than verdigris, depending on the quality. Thus Berliner Blau clearly became cheaper over the century.

As an opaque red, cinnabar is listed as Zinober gestosfen fein in the 1727 price list, and as mountain cinnabar or Berg Cinobar (the unprepared mineral) or slotted cinnabar (Cinobar gestosfen) in 1790.41 At that time, this red powder was used either for pharmaceutical purposes or as a pigment. Its price was four to five times higher than that of verdigris.

The early analyses used here do not reveal the exact nature of the red-purple lake. This is mirrored in the colour Kugellack – small balls or droplets (called laccia in globulis in the pharmacy price lists) of a red lake – offered by the Veninos; no plant or animal source is given.42 In the 1727 list, both Kugel Lacc fein and Kugel Lacc Mittel are cheap. The simplest type, as well as the very expensive Florentiner lacc, does not appear. Indicating its nature as a common recycling material, the price of Kugellack is even lower than that of verdigris! In the 1790 list, Florentiner lacc is 10 times as expensive as verdigris, whereas the price for Kugellack is just one and a half times higher than that of verdigris. These observations are reflected in the documentary sources of the time: Cröker comments that the expensive Florentine lake is used for good paintings, whereas Kugellack is sufficient for simpler works.43 For our case with the high ranking court commissioners, the importance of the order for the Würzburg Residence as well as the Europe-wide reputation of the Tiepolos suggest the use of Florentine lake for the examined Tiepolo paintings. It should be noted that pharmacy price lists of the time frequently mention Kugellack as a so-called painter lake (Mahlerlack). Moreover, Florentine lake and Kugellack are usually both found in chapters on ’Pigmenta et Colores’.

In the pre-industrial era of the Veninos, nothing was wasted, and every waste material found its use. Our first example is Kessel braun, a metallic brown-black, which is simply waste from hammering, sawing or filing hot iron or copper.44 The brown iron oxide identified on our paintings
could thus be **Kessel braun**. Due to its unclear nature as a waste product in kettlemaker workshops or in farriers, the historical term is ambiguous for a good reason, whereas today, the term **Kessel braun** is controversially discussed as a copper or an iron compound. The second example is **Kienruß**, plant soot black: resin containing pine and spruce bark or rootstocks was carbonised in specially designed ovens (Fig. 11).

The cheap and lovely black was sold by the Veninos as **Kienruß** in large barrels. Recent analyses have shown that a sample of contemporary Swedish *Kimrö* contains traces of sodium, magnesium, silicon, sulphur, potassium, iron, calcium and phosphorus, all of which are involved in the metabolism of trees. Traditionally, the microscopic morphology and the presence of the last two elements indicate a mixture of bone and plant black. However, in our case study, the single source is **Kienruß**. Not surprisingly, many particles in the single source is interpreted as bone black. However, none of the account books listed Kienruß. Not surprisingly, many particles in the single source is interpreted as bone black. However, none of the account books indicate acquisition of plant black. This view is supported by the historical technical books: as mentioned by Cröker, **Kienruß** was the most important black at that time. There is no doubt that it was used in large quantities in the 18th century. As is pointed out, its quality and composition were dependent on the production process and from which part of the oven the cold soot was collected. In contrast to bone black, which is difficult to produce, **Kienruß** is very cheap.

In summary, the combination of analytical findings, the Venino lists and the technical literature of the time allow us to reconstruct the historic palette of the Tiepolos which consisted of *Weyßle Kreite*, *Bleyweiß* and/or *Bleyweiß venetianisch*, **Ocker ordinair**, *Grüne Erden*, *Englisch Roth*, *Berliener Blau* fein and/or **ordinair**, *dunklen Ultramarin*, *Bleygelb*, *Neapolitanisch Gelb*, *Cinober geßtoßen*, *Florentiner Lack*, *Kessel braun* and **Kienruß**.

**Conclusions**

During their Würzburg years, the Venetian painters Giovanni Battista and Giovanni Domenico Tiepolo and their workshop bought all they needed from the local merchant (‘materialist’) Carl Venino. Examination of the Würzburg pharmacy price lists reveals that, as soon as Venino’s shop opened in 1716, the previous role of the pharmacy as a supplier of artists’ material was taken over by ‘materialists’. Their wide range of goods included a large number of artists’ colours. In Venino’s shop, these were listed in as yet unexplored handwritten price lists of 1727 and 1790. Additional information regarding the grades offered, the origin of the material and the price pattern is also found in these lists. Price lists of other merchants (Preiscourants) give an insight into which national and European networks the Veninos were embedded. The rich information extracted from these documentary sources has been used for an interpretation of the palette identified on several masterworks of the Tiepolos of the 1750s, allowing us to verbally describe the Tiepolo palette as published in an earlier communication in 1996; however, it is now deeply rooted in the historic background.

The loss of relevance of the pharmacy in supplying artists is evident. As shown here, this is certainly true for Würzburg, but in other cases Taxae prove the pharmacy’s ongoing role. For instance, the price lists of Goslar from 1731 or Braunschweig from 1755, to mention just two, have impressive chapters on colours that include Naples yellow and Prussian blue. Our contribution, which had ‘72 florin for colours, white and glue’ as a starting point, exemplifies that all that is needed for this type of research is the right archive, an old-style education lost in the Bologna process, literacy and patience, years of time, the ability to overcome failure, a sense of humour and a considerable amount of luck. You may then experience that working in archives is indeed worthwhile. As we know, the application of science to the field of art has value in itself. However, in cases such as those of the Tiepolos and the Veninos only the combination of both creates meaning and increases our knowledge of the past.

**Notes**

10. A. Burmester, U. Haller and C. Krekel, *Pigmenta et colores: the artist’s palette in pharmacy price lists from Liegnitz (Silesia)*, in...


13. Ibid.


17. Andreas Burmester is grateful to Jo Kirby-Atkinson for an email discussion on ‘Kugellack’ in November 2014.


19. Heike Stege (Doerner Institut), personal communication, 9 July 2011.


22. The SEM-EDX examination of plant soot black (‘Kimmrök’) from Sweden (Eskil Åkerberg AB, Malmö) was conducted by Cornelia Tilenschl (Doerner Institut). The measured contents were around 5 at% for calcium and 0.5 to 1.5 at% for phosphorus.


**Authors’ addresses**

- Andreas Burmester, Doerner Institut, Barer Straße 29, 80799 Munich, Germany. (burmester@doernerinstitut.de)
- Stefanie Correll, Technical University Munich, Oettingen Str. 15, 80538 Munich, Germany. (stefanie.correll@web.de)