

Pigmenta et Colores: The Artist's Palette in Pharmacy Price Lists from Liegnitz (Silesia)

Andreas Burmester, Ursula Haller and Christoph Krekel

Artists' treatises list numerous recipes for pigments. However, at least in the German language area, most if not all artists' pigments were commercially available at pharmacies. From the thirteenth century onwards, a system of price fixing existed for pharmaceutical products. The local city councils or governors laid down legal handwritten or printed price lists (*Taxae*). This paper presents the general phenomenon and the structure of the *Taxae*, some of which contain separate sections on pigments and colours that are of particular interest for art technology and history. As an example for the use of the *Taxae* in general, this contribution investigates four lists from the Silesian town of Liegnitz (Legnica, Poland). Dated 1568, 1584, 1614 and 1662, their sections on *Pigmenta et Colores* offer rich information about the range of pigments, their nomenclature and price.

Documentary source texts from medieval times to the nineteenth century occasionally refer to the fact that pharmacies also traded in pigments, binding media and related materials (Fig. 1).¹ Due to legal regulations, since the medical statutes of Friedrich II (first half of the thirteenth century) the prices for all materials traded in a pharmacy had to be published by the local authorities and made accessible to the public in the form of pharmacy price lists (*Taxae*). Typically, they contain long lists of different materials including artists' materials and their prices. As well as drugs, general everyday products such as herbs, soap and candles, candied fruits, confectionery and liquors are listed. The Munich *Taxae* Project (The Münchner Taxenprojekt) has the goal of researching, recording, evaluating and editing printed price lists between around 1450 and 1800 in particular.²

PIGMENTA ET COLORES

As with every new type of documentary source, the relevance of the *Taxae* has to be carefully evaluated. This has recently been done in the light of the Kolberg inventory list of the *Ratsapothek* of 1589.³ The Kolberg pharmacy stocked large amounts of materials of use in artists' studios

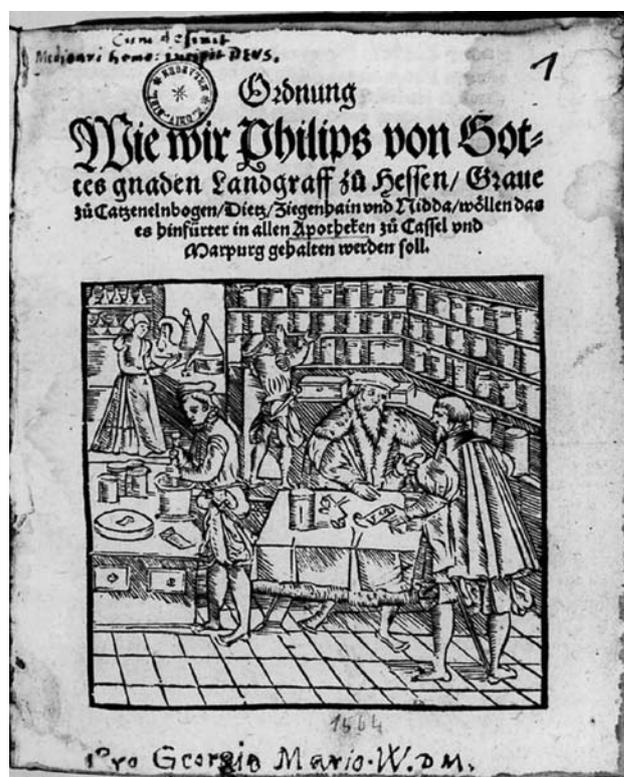


FIGURE 1. Internal view of a historic pharmacy as illustrated on the Kassel and Marburg *Taxa* of 1564. Universitätsbibliothek Erlangen-Nuremberg.

and craftsmen's workshops. However, in the Kolberg inventory list these materials are not specified as being for artists' use alone. In short, we have to answer the question as to whether the materials listed in a *Taxa* were *de facto* sold to artists and craftsmen and used as pigments and colours.

The 300 or so *Taxae* investigated so far are structured in different ways. One large group of *Taxae* is sorted alphabetically according to the names of the materials. Another large group is structured into single chapters of materials of similar use or nature. There are chapters on composed pharmaceuticals such as pills or plasters (*Composita*), which are

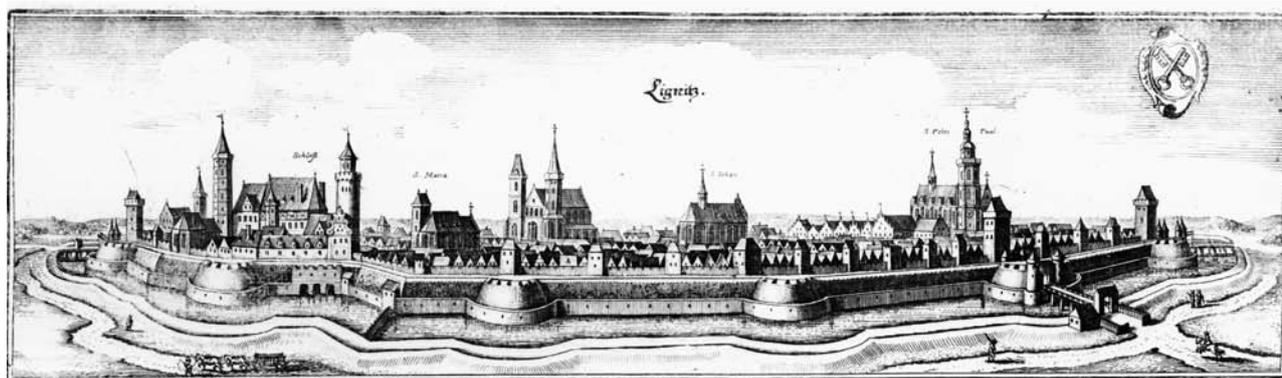


FIGURE 2. View of Liegnitz as illustrated by Matthäus Merian in 1650. Bayerische Staatsbibliothek, Munich.

of no further relevance for us, and chapters on pure drugs or raw materials (*Simplicia*). Within these *Simplicia*, many materials are mentioned that could be expected to be of use to artists. Among the *Simplicia*, unprocessed materials such as *Radices* (containing, for example, madder root) or *Ligna* (with sandalwood or brazilwood), and processed materials such as *Succi* (eg sap green), *Olea destillata* (such as turpentine oil) or *Olea expressa* (such as linseed oil) are to be found. Other chapters list *Mineralia*, *Metalla* and related compounds (such as azurite or lead white) as well as *Lapides* (eg malachite used as a gemstone). The heading of the *Metalla* chapters sometimes refers to mining and colours. This structure is modified slightly according to the views of each local *Collegium Pharmaceuticum* and the *Pharmacopoea* used. A third type of *Taxa*, a small and less interesting group, lists only a selection of materials of pharmaceutical relevance. Here the *Simplicia* are either summarised in an abbreviated manner or even left out altogether. Usually the records of the annual inventory conducted by the local *Collegium Pharmaceuticum* follow this third type.

Obviously, the second group of *Taxae* is of greatest importance for the Munich *Taxae* Project. To focus on the chapters where pigments and colours – *Pigmenta et Colores* – are to be found, *Taxae* of the Silesian town of Liegnitz (Fig. 2) have been selected. Four price lists from 1568, 1584, 1614 and 1662 allow a thorough analysis of their development, structure and content.

LIEGNITZ TAXA OF 1568

As far as is known today, the earliest printed *Taxa* with a separate *Colores* chapter is that released in Liegnitz in 1568 (Fig. 3) and entitled *Apothecken Tax und ordnung aller Ertzneien/so der Apothecken der Fürstlichen Stadt Lignitz/ im Jahr nach Christi ... geburt 1567 durch die verordnete Visitatoren der billigkeit nach gestelt*.⁴ This *Taxa* was printed by Johann Schwertel in Wittenberg, a considerable distance from Liegnitz, a once-important town in former Silesia (Schlesien). In 1439, a privilege for a pharmacy – located at the Quergasse – was granted by the local court.⁵ Published only 15 years after the very first printed *Taxa* of Dresden issued in 1553, the Liegnitz 1568 *Taxa*'s chapter on colours gives a first impression of the materials listed (Fig. 4). Only

a few pigment names are given in Latin; the majority are in German, an indication of their non-pharmaceutical use. All the pigments are sold in *lot* (around 15 g). As so often occurs, the currency and its conversion factor pose severe problems: in this case, the currency is interpreted as *Weißgroschen* (*wit*, a crossed out *w*) and *Heller* (*hl*) with 1 *Weißgroschen* = 12 *Heller*. All the materials except *Lasur* and *Maler Lacca* are priced. Due to the fact that the price – literally *Taxa* – of a material is listed, the name of the colour is given in its genitive form if shown in Latin (such as *Taxa Auri pigmenti*). The *Colores* chapter contains orpiment (*Auri pigmenti* and its synthetic form *Rauschgelb*),⁶ tin sulphide or silver coloured metal alloys (*Auri musici*, *Argenti musici*), copper-based mountain greens (*Berck grün* and *Schiffer grün*),⁷ lead white from Venice (*Venedisch Bleyweis*), lead yellow (*Bley gelb*),⁸ cinnabar (*Cinober*),⁹ indigo (*Indich*), copper-based mountain blue (*Lasur*), red lakes (*Maler Lacca* and *Paris rot*), yellow ochre (*Ocker gelb*), verdigris (*Grün span*), red lead (*Rubricke*), smalt (*Schmelch blaw*), sap green (*Safft grün*), and copper brown (*Kesselbraun*).¹⁰ The red lakes, cinnabar and *Aurum* as well as *Argentum musicum* are the most expensive. Interestingly, the non-priced *Lasur* entry carries the addition 'mancherley sort darnach er farben', meaning that a variety of differently coloured mountain blues (azurite and other non-artificial blue copper compounds) was offered, the price of each depending on their colour quality. The non-priced *Lacca* entry has the addition 'Maler' and 'darnach es hoch in farben', again underlining the exclusive use of this material by the painter and its availability in different shades or qualities at varying prices.

LIEGNITZ TAXA OF 1583

In 1583, a second *Taxa* was released by the council of Liegnitz, with a title almost identical to the first of 1568.¹¹ As in the case of the first *Taxa*, Liegnitz did not yet have its own printing house so it was printed at Frankfurt/Oder by Andreas Eichorn in 1584. The *Colores* chapter of the *Taxa* of 1583 (Figs 5 and 6) that follows the chapters on *Emplastra* (plasters) and *Suppositoria* (suppositories) as in the 1568 *Taxa*, evidences only small, but important changes. Although the selection of pigments remains the same, there

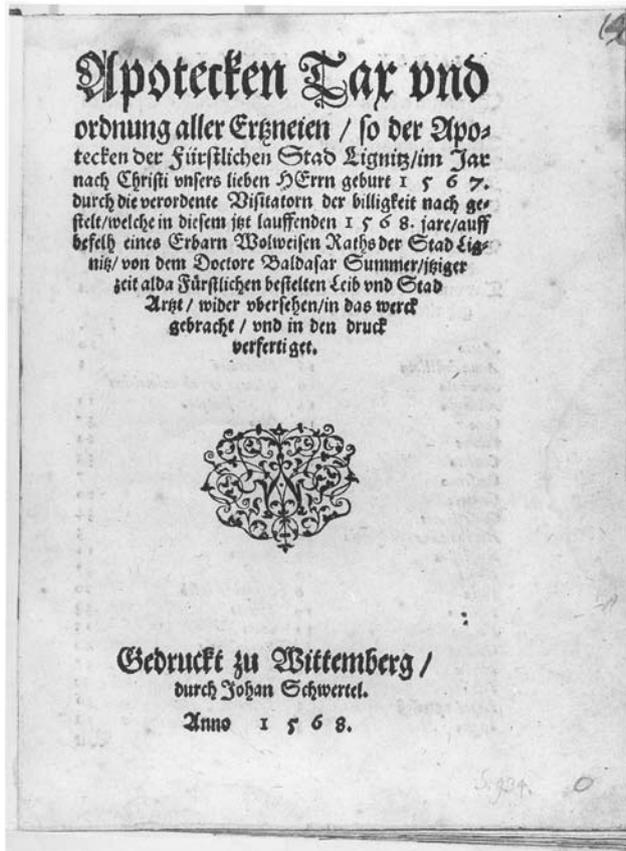


FIGURE 3. The title page of the Liegnitz Taxa of 1568. Universitätsbibliothek Erlangen-Nuremberg.

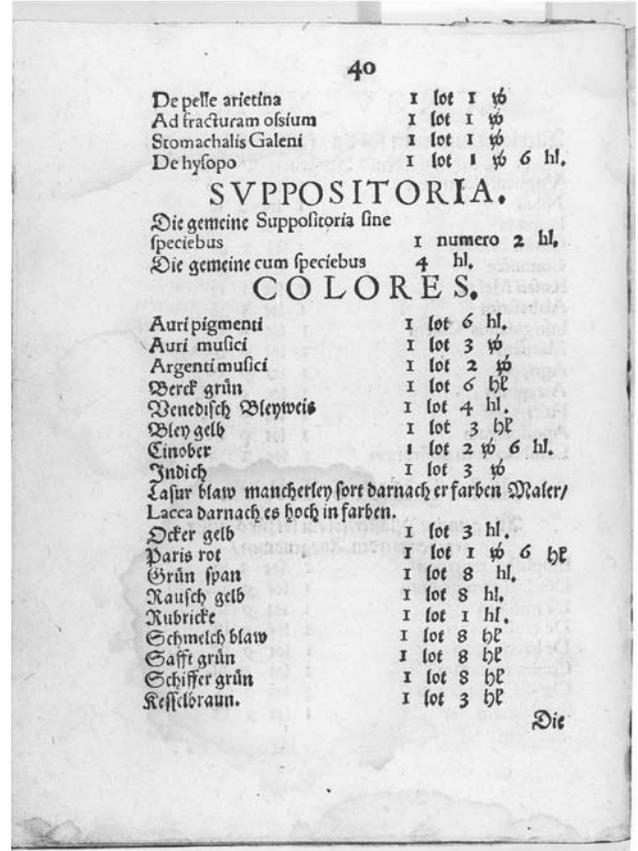


FIGURE 4. A page from the Colores chapter in the Liegnitz Taxa of 1568. Universitätsbibliothek, Erlangen-Nuremberg.



FIGURE 5. A page from the Colores chapter in the Liegnitz Taxa of 1583. Germanisches Nationalmuseum, Nuremberg.

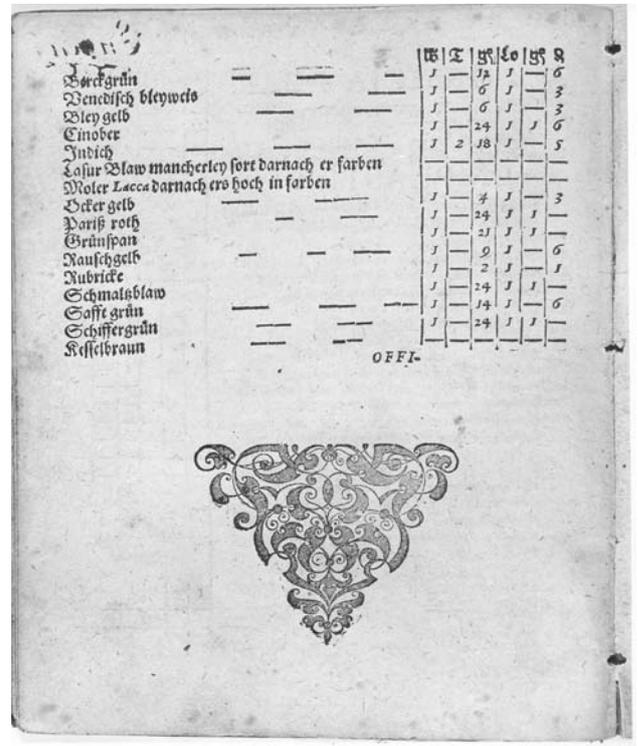


FIGURE 6. A page from the Colores chapter in the Liegnitz Taxa of 1583. Germanisches Nationalmuseum, Nuremberg.

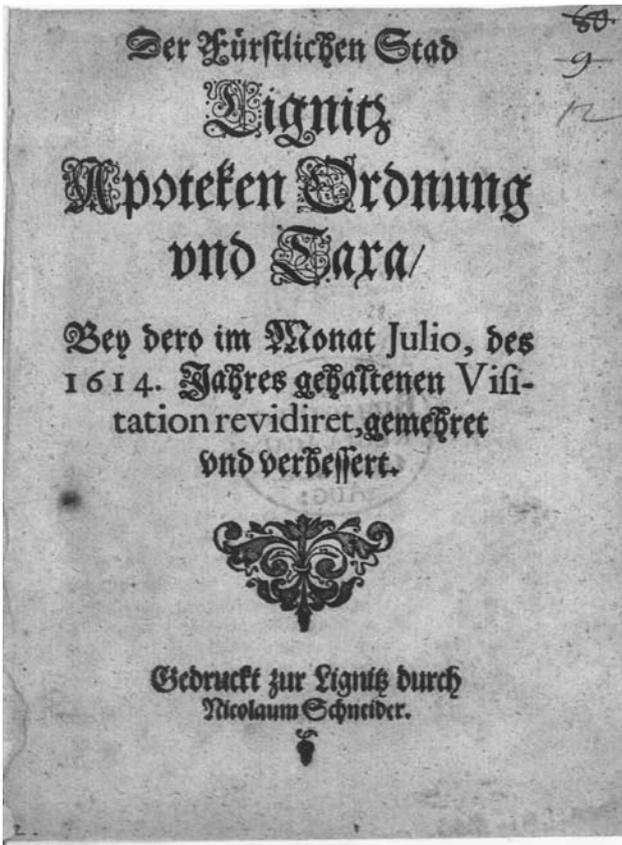


FIGURE 7. The title page of the Liegnitz *Taxa* of 1614. Niedersächsische Staats- und Universitätsbibliothek Göttingen.

are no prices given for *Aurum musicum* and *Argentum musicum*. This might indicate that both materials were no longer available at the annual fairs or in demand by the customers. In comparison to the Liegnitz *Taxa* of 1568, and due to the different printer, there are also some minor changes in typesetting. The main change, however, is the introduction of three additional columns, which in some cases contains the price for one pound of each substance. This is a further indication of their non-pharmaceutical use, since the pound was equal to 32 *lot*, and materials of non-pharmaceutical relevance were usually sold in this so-called *Civil- or Krahmerpfund*, whereas the common Nuremberg *Medizinal- or Apothekepfund* (medical pound) was 24 *lot*. Different from the 1568 *Taxa*, the currency is given in *Thaler* (T, 1 T = 30(?) *Groschen*) and *Groschen* (gl, with 1 gl = 12 *Pfennig*). As for the weights, all the currencies vary regionally and over time, and no certain conversion factors are known unless explicitly cited in the *Taxordnung* (the local legal regulations usually added to the *Taxa*).

LIEGNITZ TAXA OF 1614

About 30 years later, the local authorities released a new *Taxa* (Fig. 7) of relevance to us,¹² the second to be printed at Liegnitz by Nicolas Schneider, and entitled *Der Fürstlichen Stad Lignitz Apoteken Ordnung und Taxa/Beyhero im Monat Julio, des 1614. Jahres gehaltenen Visitation revidiret,*

	G	hell.
Creta preparata gerieben Krejde	—	2
Lazurina hemetica Blaw BrechErde	6	—
Terra lemnia Rothe Lemnische Erde	2	—
preparata bereit Lemnische Erde	3	—
Turc. vulg. gemein Türckisch Erde	2	—
Terra Serig. lucea Besigelt Serigisch Erde	1	6
Goldbl. luc. gelb gefigelt Goldberg. Erde	1	6
cinericea Lebersarb Goldbergische Erde	1	—
alba Weis Goldbergische gefigelt Erde	1	—
argentea Silberarb Goldberg. Erde.	1	6

Caput VI.
DE PIGMENTIS SIVE COLORIBUS
PICTORUM CRUDIS ET PRÆPARATIS.

Von rohen vnd zugerichten Mahlerfarben sol. j. Lot gegeben werden.

	G	hell.
Auripigmenti crudi, Unbereit Opment	—	4
subtilis, triti wolgeriben Opment	—	9
Boli armenj Armenisch Bolus	3	—
vulgaris gemein Bolus	—	3
Caerulei cineritii, Bergasch/ Eschblaw	2	—
subalbidi Lichtblaw	2	—
Caerulei nativi fini beste Bergblaw	3	—
mediani mittel Bergblaw	2	—
Caerulei factitii opt. Tunkel Lasur	—	4 1/2
vulgaris, lichte Lasur	—	4
Fein Oelblaw / # j. ein Pfund 4 Thal.	3	—
Gemein Oelblaw	1	6

Cerulea

FIGURE 8. A page from the *Colores* chapter of the Liegnitz *Taxa* of 1614. Niedersächsische Staats- und Universitätsbibliothek Göttingen.

gemehret und verbessert.¹³ As explained in the title, the whole *Taxa* including the chapter on pigments and colours (Figs 8–10) was revised, expanded and improved. The chapter's heading *De Pigmentis sive Coloribus Pictorum crudis et præparatis/Von rohen vnd zugerichten Mahlerfarben*¹⁴ clearly indicates that the intended consumers were painters. Most of the materials were sold in *lot*; however, for some the additional price for a pound (*Civilpfund*) is given. Currencies cited are *Groschen* (gl.) and *Heller* (hell.); the conversion factor is supposed to be 1 *Groschen* = 24 *Heller*. For some of the materials, the mode of preparation is given. The first example (Fig. 8) is the entry on orpiment, which is sold in raw form (*crudi, unbereit*) and finely crushed (*triti, wolgeriben*). The second entry differentiates between Armenian and common bole, the first being 24 times as expensive as the latter.¹⁵ The following three entries record different grades of artificial and non-artificial copper blues of varying shades and qualities, ranging from a nearly colourless mountain blue ash (*Caerulei cineritii, Bergasch/ Eschblaw*) to a deep, natural mountain blue (*Caerulei native fini, beste Bergblaw*). Far cheaper than all the natural copper-based mountain blues, a dark (*Tunkel*) and a light synthetic copper blue are also offered (*Caerulei factitii vulgaris, lichte Lasur*). The term 'Fein' and 'Gemein Oelblaw' with its German and missing Latin entry, as well as the fact that both are offered in pounds only, may indicate that this pigment is smalt. Later on, smalt is also sold as 'Smalta(e)' and 'Schmalzblaw'. These three entries for smalt and the

	℔	hell.
Cerusa alba Bleiweis	—	6
citrina vulgaris gemein Bleigelb	—	6
Anglica Englisch Bleigelb	1	6
Lübeckisch Bleigelb	1	6
Cinabaris nativæ Berg Einober	2	— *
facticia gemacht Einober	2	— *
Diphyrgis crudi Schiefer grün/berggrüne	—	9
mediani Mesan/gemein berggr.	—	8
Eysenfarb/ ein Pfund	4	—
Glasti Weidblaw/ WeidBlumen	2	—
Indigii optimi des besten Indichs	3	—
vulgaris gemein Indich	2	—
Lacc. pictor. vulg. gemein Kugellack	1	—
finæ fein Kugellack	1	6
Florentina Florentiner Lack	30	—
Legmos Legmos	1	—
Ligni brasillii rubei roth Dresfigen Holz	—	3
violacei Veickbraun Dresfil. Holz	—	3
Minii, Menig oder Kubricken # j.	3	—
Ochra vulgaris gemein Egergelb	—	12
optimæ des besten Egergelbs	—	2
Sandar. Græc. Sulph. rub. Real. Rauchgel	—	4 1/2
Schiefer weis # j.	—	9
Schüttgelb/ ein Pfund	—	7
Smalca Schmalzblaw	—	9
Silberweis # j.	—	3
Succj de baccis Spinae cervinae Saftgrün	1	—
Tornæ solis Tornesoll	—	9
Viridis æris crudi Ungerleben Grünspan	1	—
triti gerieben Grünspan	1	6
destillati geflossen Grünspan	1	6 *

B Ultra-

FIGURE 9. A page from the *Colores* chapter of the Liegnitz *Taxa* of 1614. Niedersächsische Staats- und Universitätsbibliothek Göttingen.

	℔	hell.
Ultramarini cerulei Ultramarin Blaw	—	2
Umbræ Schattenfarb.	—	2

Caput VII.
DE MARINIS SIVE IIS, QUÆ MARI
ET AQUIS INNASCUNTUR, CRUDIS
ET PRÆPARATIS.

Von rohen vnd zugerichten Arzneyen/ so aus
dem Meer vnd Wasser kommen/ sol j. Lotz ges
geben werden.

	℔	hell.
Ambaris seu suc. nig. schwarz Dörnstein	1	—
Asphaltic. bitum. Judaici Judisch Pech	6	—
Blatae bizantinae Indisch Meer Muscheln	1	6
Coralli albi crudi vnderreit Corallen	2	—
præparati gerieben weis Corallen	4	—
Magist. weis aufgelöst Coral. scr. j.	6	—
Coralli rubei crudi vnderreit roth Corallen	1	—
præparati zubereitet roth Corallen	2	—
Magist. aufgelöste rot Coral. scr. j.	6	—
Corallina Meerros	1	—
Dentaliorum Zahnschnecken stein	1	—
Entaliorum. Purpur Schnecken stein	1	—
Margar. præpar. klein gerieben Perlen # j.	36	— *
Magisterii aufgelöst Perl. scr. j.	30	— *
Matris perlar. præp. zugericht Perlmutter	3	—
Spermatis Ceti Walrad	4	—
Succ. albi in frust. stückl. Weiss Dörnstein	1	6
citrini stüchtl. gelb Dörnstein	—	6
ramentorum abgedrehter Dörnstein	—	4
præparati klein gerieben Dörnstein	—	6

CLAS-

FIGURE 10. A page from the *Colores* chapter of the Liegnitz *Taxa* of 1614. Niedersächsische Staats- und Universitätsbibliothek Göttingen.

term ‘Oelblaw’ may indicate its use in oil- or water-based media.¹⁶

The next entries (Fig. 9) deal with lead white (usually extended with chalk) and lead yellow, both offered in their common form. Two indications of where lead yellow was traded or produced are listed: England (*Anglicae*) and Lübeck (*Lübeckisch*), a Hanse town in northern Germany. It is three times more expensive than common lead yellow. As for copper-based blues, cinnabar is offered in its natural (*Berg*) and synthetic (*gemacht*) form. A little star at the right of the entry, however, marks those materials as not being available all the time or as fluctuating in price. The Latin name ‘Diphyrgis’ for copper-based mountain green (*Berggrün*) might refer to texts of Dioscorides or directly to the Frankfurt fair catalogue of 1582¹⁷ or the Worms 1582 *Taxa* (published in Frankfurt in 1609), where ‘Diphyrgis’ is translated as ‘Schiefergrün’. As described elsewhere, *Schiefergrün* is another quality of mountain green (*Berggrün*).¹⁸ The exact nature of ‘Eysenfarb’, which was sold in pounds, needs further investigation. As a rare mention in the *Taxae*, the Liegnitz *Taxa* records woad (*Glast, Weidblaw/Weid Blumen*), a cheap substitute for indigo. While the German term for yellow ochre, ‘Egergelb’, seems rather to reflect the local idiom, the word ‘Indich’ for indigo is fairly common. The entry relating to an ordinary quality of red lake (*Lacc. pictor. vulg., gemein Kugellack*) refers explicitly to its use by painters and to it being supplied in the form of a small ball. The price of Florentine lake, 20 times more expensive than good quality *Kugellack*, may indicate its production from

scale insects. Both litmus (*Legmos*) and tournesol (*Tornæ solis, Tornesoll*) are listed, although a clear differentiation between the two is sometimes missing in the seventeenth century. From which plant the rather cheap yellow lake *Schüttgelb* is produced is not explained.

A purer quality of lead white (*Schiefer weis*) and bismuth white (*Silberweis*) are both offered in pounds. To our knowledge, this is the earliest occurrence for the term *Silberweis*. From other *Taxae* we can conclude that the term was used originally for bismuth, although it has later been transferred to lead white. Here, the comparatively low price per pound might indicate a cheap quality of lead white. In the case of sap green (*Succj de baccis Spinae cervinae, Saftgrün*) a production from the ripe berries of buckthorn (*Spina cervina*) is described. The three varieties of verdigris (*Viridis æris, Grünspan*) refer to the preparation after production: they are offered either as crude (*crudi, ungerieben*), ground (*triti, gerieben*) or as distilled in vinegar (*destillati, geflossen*). While umber (*Umbræ, Schattenfarb*) (Fig. 10) is frequently offered as a colour for shading the mention of ultramarine (*Ultramarini, Ultramarin Blaw*) is rare. Its exorbitant price, its probable scarcity at the fairs as well as the fact that it was unlikely to have been in demand by local painters at that time may explain why no price is given for this pigment. Supporting our interpretation of the 1583 *Taxa*, *Aurum musicum* and *Argentum musicum*, as well as red lead (*Rubricke*) have been shifted into other chapters of the Liegnitz 1614 *Taxa*. The chapter following that on *Colores* contains different types of amber (Fig. 10, bottom).

Materials such as glue, oils and resins, waxes, turpentine, gums, gallnuts, vitriols, gold, silver and *Zwischgold* (part gold) leaf, all polishing materials, borax etc. are to be found in various other chapters of the Liegnitz 1614 *Taxa*.

THE LIEGNITZ TAXA OF 1662

After the Thirty Years' War a further, totally revised *Taxa* was published, entitled *Neu Revidirte Apothecker=Ordnung und TAXA Im Furstenthumb Lignitz*.¹⁹ It was printed in Liegnitz by another Schneider (Zacharias Schneider), which was possibly the one printing house mentioned by Matthäus Merian in 1650.²⁰ The *Ordnung* (legal regulations), which are followed by the 1662 *Taxa*, clearly indicate that there is only one pharmacy in Liegnitz that additionally holds a

privilege – 'Alß haben wir Unsere Apothecken bey der Stadt Lignitz and welcher bey seiner Apothecken alleine bleiben sol'. Following the development of other *Taxae* of the time and to bring the items into a better order ('zur erhaltung besserer Ordnung'), the *Taxa* is structured into different major parts, the first part (*Pars Prima*) being headed *De Rebus Crudis, Von Rohen und Unbereiteten Sachen* (about all raw and unprepared materials). Its first [*sic!*] chapter deals with *De Metallis, Mineralibus, Bitumine & Pigmentis. Von Metallen/Mineralien/Erd=Pech und Farben*, which includes pigments and colours besides metals or their compounds, minerals and bituminous materials. Obviously, the former concept of a chapter solely dedicated to pigments is abandoned. To provide detailed information about the Liegnitz 1662 *Taxa*, materials of possible or known interest in artists' studios and craftsmen workshops are listed in Table 1.

TABLE 1. Artists' materials in the Liegnitz *Taxa* of 1662.

Latin description (first entry)	German description (second entry)	Price per <i>Loth</i> *, currency given as <i>Heller</i> **	English translation
Pars I, Caput I. De Metallis, Mineralibus, Bitumine & Pigmentis. / Von Metallen / Mineralien / Erd=Pech und Farben.			
Vitrioli Svecici	Schwedisch Kupfferwasser	48 per <i>Pfund</i> (1.6 per <i>Loth</i>)	Swedish vitriol
Antimonii	Spießglaß	72 per <i>Pfund</i> (2.4 per <i>Loth</i>)	antimonite
Lithargyri aur.	Goldglette	72 per <i>Pfund</i> (2.4 per <i>Loth</i>)	litharge
Minii	Rubrig oder Mennig	72 per <i>Pfund</i> (2.4 per <i>Loth</i>)	red lead
Ochrae vulgar.	Gemein Ogergelb	72 per <i>Pfund</i> (2.4 per <i>Loth</i>)	yellow ochre
Lithargyri argent.	Silberglette	108 per <i>Pfund</i> (3.6 per <i>Loth</i>)	lead oxide
Aluminis Rochae	Alaun	4.5	rock alum
Cadmiae fossilis ferrei coloris	Eisenfarb	4.5	iron colour
Aeris sqvamae	Kupferschlag	6	copper oxide
Albi foliati	Schieferweiß	6	lead white
Arsenici citrini	gelb Hüttenrauch oder auripigmenti	6***	orpiment
Cerussae alb.	Bleyweiß	6	lead white
Cerussae Citr. vulg.	Bleygelb	6	lead yellow
Ochrae fin	des besten Ogergelbs	9	best yellow ochre
Succini citrini	Gelb Börnstein	9	yellow amber
Umbrae	Umber	9	umber
Viridis Montani	Berggrün	9	mountain green
Vitrioli albi	weiß Vitrioll	9	white vitriol
	Schietgelb	12	yellow lake
Aeris ust	Gebrand Kupfer	12	burnt copper
Sandaracae Graec.	Rauschgelb	12	realgar
Succini ras. alb.	Weiß Börnstein	12	white amber
Vitrioli Ungaric	Ungrisch Kupfferwasser	12	Hungarian vitriol
Asphalti s. Bituminis Judaic.	Juden=Pech	18	asphalt
Cerussae Citr. Anglic.	Englisch Bleygelb	18	English lead yellow
Legmos	Legmos	18	litmus
Marcasitae officinarum	Wiefsmuth	18	bismuth
Tornae solis	Tornesoll	18	turnsole
Viridis aeris	Grünspan	18	verdigris
Indigo opt.	Indich	36	best indigo

cont'd

TABLE 1. Artists' materials in the Liegnitz *Taxa* of 1662 *cont'd.*

Latin description (first entry)	German description (second entry)	Price per <i>Loth</i> *, currency given as <i>Heller</i> **	English translation
Succini citrini in frustis	Gelb Börnstein	36	yellow amber
Vitrioli de Cypro	Cyprischer Vitril	36	Cyprian vitriol
Laccae pictor: fin.	fein Kugellack	54	good red lake for painters
Plumbi Metallici Sciptorii	Wasserbley geschnitten	54	graphite
Succini albi in frustis	Stücklein weiß Börnstein	54	white amber
Argenti alcolisati	Muschel Silber	54 per piece	shell silver
Argenti foliat.	fein geschlagen Silber	54 per <i>Büchlein</i>	silver leaf / booklet
Cinnabaris nativ.	Bergzinnober	72	mineral cinnabar
Auri foliati bicolor	Zwischgold	72 per <i>Büchlein</i>	part gold / booklet
Auri alcolisati	Muschel Gold	90 per piece	shell gold
Auri [foliati] fini	fein Gold	144 per <i>Büchlein</i>	gold leaf / booklet
Viridis [aeris] flores	Distulirt Grünspan	144	crystallised verdigris
Bezetto		216	clothlet
Coccinellae	Coschenill	216	cochineal
Laccae florentinae	Florentinerlack	216	Florentine lake
	Fein Oehl blaw	no price given	good "oil blue" (smalt)
	gemein Oehlblaw	no price given	common "oil blue" (smalt)
Coerulei factitii opt.	tunkel Lasur	no price given	best artificial blue
Coerulei factitii vulgaris	lichte Lasur	no price given	common artificial blue
Coerulei nativi fini	beste Bergblaw	no price given	best mountain blue
Coerulei Subalbidi	Liechtblaw	no price given	light blue
Ultramarini coerulei	Blaw Ultramarin	no price given	ultramarine
Pars I, Caput II. De Lapidibus Vulgaribus & Pretiosis. / Von Gemeinen und Edelgesteinen.			
Lap. Haematit	Blutstein	6	haematite
Lap. Smiridis	Schmirgel	6	emery
Lap. Tripolis Venet.	Venedischer Tripel	9	tripoli
Lap. Lazuli	Lazurstein	90	blue stone, probably a piece of a copper-containing blue mineral such as azurite
Pars I, Caput III. De Terris Medicinalibus. / Von Arzneischen Erden.			
Boli rub. vulg.	Gemein roth Bolus	3	common red bole
Boli albi vulg.	Gemein weiß Bolus	4.5	common white bole
Boli armen.	Armenisch Bolus	24	Armenian bole
Terrae Lemnia	Lemnische Erde	24	Lemnian earth
Terrae Sigillat. Strigens.	Gesigelt Strigische Erde	24	sealed earth
Terrae Turcicae	gesiegelt Türckische Erde	36	sealed Turkish earth
Terrae Turcicae alb. non Sigillatae	ungesiegelte Türckische Erde	36	unsealed white Turkish earth
Pars I, Caput IV. De Animalibus & eorum Partibus. / Von Thieren und deroselben Stücken.			
Percarum lapides	Perschkensteine	36	peach stones
Mumiae verae	wahre Mumie	54	mummy
Ichthyocollae	Hausen Blasen	no price given per <i>Pfund</i>	sturgeon bladders
Pars I, Caput VI. De iis, quae ab animalibus sumuntur. / Von Stücken / welche von Thieren genommen werden.			
Cerae citrin.	Gelb Wachs	4.5	yellow wax
Cerae Sigillaris citr.	Gelb Siegel Wachs	9	yellow sealing wax
Cerae Sigillaris nigrae	Schwartz Siegelwachs	9	black sealing wax
Cerae Sigillaris Viridis	Grün Siegelwachs	9	green sealing wax
Testarum ovorum exclusis pullis	Ausgebrittete Eyerschalen	9	eggshell
Cerae albae	Weiß Wachs	18	white wax

Latin description (first entry)	German description (second entry)	Price per <i>Loth</i> *, currency given as <i>Heller</i> **	English translation
Cerae Sigillaris rubr.	Roth Siegelwachs	18	red sealing wax
Cerae Hispanicae nigr.	Schwartz Spanischwachs	36	black Spanish sealing wax
Cerae Hispanicae rubr.	Roth Spanisch Wachs	36	red Spanish sealing wax
Cerae Hispanicae inaurat:	Gülden Spanischwachs	48	golden Spanish sealing wax
Pars 1, Caput VII. De Radicibus. / Von den Wurtzeln.			
Rad. Curcumae	Gilbwurtz	9***	Curcuma root
Rad. Rubiae tinctorum	Färberröthe	9	madder root
Pars 1, Caput IX. De Floribus. / Von Blüten und Blumen.			
Flor Croci	Saffran	no price given	saffron
Pars 1, Caput XI. De Fructibus, Baccis & Nucleis. / Von Früchten, Beeren und Kernern.			
Gallarum Turcic.	Türkisch Gallus	6	Turkish gallnuts
Grana chermes	Scharlachbeeren	144	kermes
Pars 1, Caput XII. De Lignis, & quae iis adnascentur, / Von Hölzern und was an Ihnen wächst.			
Lig. Brasiliens: violac.	Braun Bresilgenholtz	6	brown brazilwood
Lig. Brasiliens: Citr.	Gelb Bresilgenholtz	9	yellow brazilwood
Lig. Brasiliens: rubr.	Roth Bresilgenholtz	9	red brazilwood
Lig. Santal. rubr.	Roth Sandel	18***	red sandalwood
Lig. Santal. alb.	Weiß Sandel	24***	white sandalwood
Lig. Santal. citr.	Gelb Sandel	36***	yellow sandalwood
Pars 1, Caput XIV. De Gummatibus, Lachrymis & Resinis. / Von Gummi, Threnen und Hartzen.			
Gummi Terebinthinae Venet.	Venedisch Terpentin	30 per <i>Quintlein</i> (120 per <i>Loth</i>)	Venice turpentine
Gummi Terebinthinae vulg.	Gemein Terpentin	90 per <i>Pfund</i> (3 per <i>Loth</i>)	common turpentine
Gummi Resinae abietis	Tannen Hartz	3	pine resin
Gummi Cerasorum	Kirschbaum Gummi	4	cherry gum
Gummi Colophoniae	Geigen Hartz	4.5	colophony
Gummi Arabici el.	arabisch Gummi	9	gum arabic
Gummi Juniperi s, Sandarachae Arab.	Trucken Firnis	18	sandarac
Gummi Ladani vulg.		18	common gum labdanum
Gummi Sangvinis draconis	Drachenblut vulg.	18	dragon's blood
Gummi Sarcocollae	Fleischleim	18	sarcocolla
Gummi Styracis liqid.	Flissender Styrax	18***	liquid styrax
Gummi Hederae	Ephew Gummi	24	ivy gum
Gummi Laccae Crudae		24	sticklac
Gummi Asae foetid.	Teuffelsdreck	36	gum asafoetida
Gummi Sangvinis draconis elect.	Auserlesen Drachenblut	36	selected dragon's blood
Gummi Laccae ablutae		48	shellac
Gummi Ammoniaci depurat.	Geleutert Ammoniac	54***	refined gum ammoniacum
Gummi Elemi	Wildt Ohlbaum Gummi	54	gum elemi
Gummi Sagapeni, Serapini		54	gum sagapen
Gummi Anime		72	gum anime
Gummi Opopanacis		72***	gum opopanax
Gummi Balsami Indici nigri		12 per <i>Scrupel</i> (144 per <i>Loth</i>) ***	black Indian balsam
Gummi Olibani	Weyrauch	12***	frankincense
Gummi Tragacanthi vulg.	Gemein Tragant	30***	common gum tragacanth
Gummi Ammoniaci cr[udum]	Ungeleutert / Ammoniac	36***	unrefined gum ammoniacum
Gummi Mastichis com.	Gemein Mastix	36***	mastic
Gummi Myrrhae vulg.	Gemein Myrrhen	36***	common myrrh
Gummi Tragacanthi elect.	Auserlesen Tragant	36***	selected gum tragacanth

cont'd

TABLE 1. Artists' materials in the Liegnitz *Taxa* of 1662 *cont'd.*

Latin description (first entry)	German description (second entry)	Price per <i>Loth</i> *, currency given as <i>Heller</i> **	English translation
Gummi Asae dulc. s. Benzoes	Wolrichend Asand	72***	gum benzoin
Gummi Mastichis elect.	Auserlesen Mastix	72***	selected mastic
Gummi Myrrhae elect.	Auserlesen Myrrhen	72***	selected myrrh
Gummi Styracis calamit.	Truckner Styrax	72***	styrax
Gummi Guttae	Ghitta, Jemou	108***	gum gamboge
Pars 2, Caput I. De Pulveribus, Farinis & Speciebus ita dictis. / Von Pulvern.			
Farin. Amyli	Krafftmehl	no price given	starch (flour)
Pars 2, Caput II. De Praeparatis. / Von abgeriebenen Sachen.			
Haematitae	Bluttstein	4.5 per <i>Quintlein</i> (18 per <i>Loth</i>)	prepared haematite
Lazuli Lap.	Lasurstein	36 per <i>Quintlein</i> (144 per <i>Loth</i>)	prepared ultramarine
Percarum Lapidum	Perschkenstein	18 per <i>Quintlein</i> (72 per <i>Loth</i>)	prepared stones of peaches
Smiridis lap.	Schmirgel	3 per <i>Quintlein</i> (12 per <i>Loth</i>)	prepared emery
Spodii	Gebrand Elffenbein	18 per <i>Quintlein</i> (72 per <i>Loth</i>)	prepared burnt ivory
Succini albi	Weißer Agtstein	6 per <i>Quintlein</i> (24 per <i>Loth</i>)	prepared white amber
Terrae Lemniae	Lemnische Erde	9 per <i>Quintlein</i> (36 per <i>Loth</i>)	prepared Lemnian earth
Terrae Sigill. Strigens.	Strigisch gesiegelte Erde	9 per <i>Quintlein</i> (36 per <i>Loth</i>)	prepared sealed earth
Cretae	praeparirte Kreiden	4.5	prepared chalk
Cinnabaris	Cinnober	9***	prepared cinnabar
Boli Armen.	Armenien Bolus	36	prepared Armenian bole
Pars 2, Caput III. De Calcinatis & Cineribus. / Von Gebrandten Sachen und Aschen.			
Vitrioli caput mortuum	Todtenkopff	2	caput mortuum
Alabastru usti s. Gypsi	Gipß	6	burnt gypsum
Plumbi Cineris	Bley Asche	6	lead ash
Plumbi usti	Gebrandt Bley	12	burnt lead
Aluminis ust.	Gebrant Alaun	18	burnt alum
Stanni Cineris	Zien Asche	18	tin ash
Eboris ust. s. spodii	Gebrandt Elffenbein	24	burnt ivory
Pars 2, Caput VI. De Spiritibus. Von Destillirten Geistern.			
Ol. Terebinthinae	Terpentinöl	9 per <i>Quintlein</i> (36 per <i>Loth</i>)	spirits of turpentine
Pars 2, Caput X. De Acetis. / Von Eßig.			
Acet. Vini	Weineßig	54 per <i>Pfund</i> (1.8 per <i>Loth</i>)	vinegar
Pars 2, Caput XII. De Salibus. / Von Saltzen.			
Sal. Armoniaci	Salmiar	9 per <i>Quintlein</i> (36 per <i>Loth</i>)	ammonium chloride
Sal. Borraris Venet.	Borras	18 per <i>Quintlein</i> (72 per <i>Loth</i>) ***	borax
Pars 2, Caput XVIII. De Oleis expressis. / Von ausgepresseten Oehlen.			
Ol. Lini	Leinöhl	3	linseed oil
Ol. Cannabis	Hanffkörneröhl	4.5	hempseed oil
Ol. Nucis Juglandis	Welschnuß öhl	18	walnut oil
Ol. Papaveris alb.	Weißmagsamen öhl	24	poppy-seed oil
Pars 2, Caput XXII. De Sublimatis. / Von denen Sachen / so durch sublimiren bereitet werden.			
Flor. Cinnabaris factit.		27***	vermilion

* Most weights are given in *Loth*, a few in *Pfund*, others in *Quintlein*. It is assumed that 1 (*Krämer*) *Pfund* = 450 g = (24 + 6) *Loth*, 1 *Loth* = 15 g = 4 *Quintlein*, 1 *Quintlein* = 3.75 g = 3 *Scrupel*, 1 *Scrupel* = 1.25 g. If offered in *Pfund/Quintlein/Scrupel*, the first price is the price as given for a *Pfund/Quintlein/Scrupel*, whereas the second calculated one refers always to 1 *Loth*. If listed as *Büchlein* (book) or *Stück* (piece), no figure in *Loth* can be given.

** The currency is given in *Groschen* (*Gl.*) and *Heller* (*hel.*). It is assumed that 1 *Groschen* = 12 *Heller*.

*** Materials, which may have fluctuating prices, are listed again in *Pars 2, Caput XXIX. Von steigenden und fallenden Wahren.*

The selection follows the chapters as given in the *Taxa* and is sorted according to the price per *Loth* for each chapter. As explained in the *Ordnung*, the medical pound (*Medicinale Pondus*) is equivalent to the well-known Nuremberg medical pound, whereas all materials (*Materialien*) were prescribed as being sold in *Krahmerpfund*, which is described in the *Ordnung* as being one-quarter heavier than the medical pound (*ein Viertel deß Pfundes wichtiger*). This defines the Liegnitz 1662 pound as having 30 *Loth*, which is 2 *Loth* less than usual. It is mentioned that the pharmacist is allowed to adapt the prices of certain products to those of the Leipzig fairs taking place at Easter and on Michaelmas Day on 29 September (*Leiptzigischen Oster= oder Michaelis=Marckte*). This indicates that at least most of the products offered were bought from the Leipzig fair(s). The quality control (*visitationes*) of the products bought by the pharmacy was carried out by the local *Physicus* (doctor) and the *Leib=Medicus* (non-medical practitioner) immediately after the fairs. They had to report any problem straight away to the local authorities. Obviously, the release of this *Taxa* carefully set up in 1662 had been delayed until 1665, because the duke – Fürst Ludwig, Herzog in Schlesien zur Lignitz/Brig und Goldberg – died shortly before publication.

CONCLUSION

The sole Liegnitz pharmacy stocked and provided all the materials required by local artists or craftsmen. The whole range of materials available is mirrored in pharmacy price lists, the so-called *Taxae*. A thorough investigation of four *Taxae* from 1568, 1583, 1614 and 1662, especially their chapters on *Pigmenta et Colores*, if extant, reveals the development of the *Taxae* themselves. Whereas the two Liegnitz *Taxae* of 1568 and 1583 are still deeply rooted in the tradition of an early sixteenth-century pharmacy, the third *Taxa* of 1614 is a typical seventeenth-century *Taxa*. It is characterised by its verbosity and the broad range of materials included. Written 14 years after the Thirty Years' War and possibly precipitated by the economic situation, the *Taxa* of 1662 records, in some ways, a reduced spectrum of materials. Expensive pigments such as copper blues are not priced. As can be concluded from the prices in Table 1, materials that we find most often on art works of the time can be seen to be primarily those listed in the lower price range. This underlines our observations made elsewhere, for the time of Dürer, and for other periods, that more expensive materials rarely found their way onto the artist's palette.²¹ To summarise, the price defines the artist's palette. Obviously, the match between the wide canon of materials usually identified by modern chemical analysis and the materials listed in the *Taxae* is not always perfect.²² It is intended that this problem will be dealt with in the future. Nevertheless, the presence of *Pigmenta* and *Colores* chapters testifies to the central role of the pharmacy in the trade in artists' and craftsmen's materials in the period covered by the Liegnitz *Taxae*.

NOTES

1. Krekel, C. and Burmester, A. (2000) 'Pharmacy price-lists as a new type of documentary source for research into historical artists' materials: The Münchner Taxenprojekt', *Dyes in History and Archaeology*, 19, pp. 32–6; Krekel, C. and Burmester, A. (2001) 'Das Münchner Taxenprojekt. Apothekentaxen als neuer Quellentyp für die Erforschung historischer Künstlermaterialien', *Restaurio*, 107, pp. 450–55.
2. The authors of this contribution intend to publish the recovered information concerning approximately 170 artists' materials in the coming years. Up to now, most of the 300 *Taxae* discovered have been processed into an ACCESS database, which now has more than 27,000 material-related entries. However, about 180 more *Taxae* are known that have still not yet been evaluated. More information about the Munich *Taxae* Project including all the publications about the *Taxae* or specific artists' materials is available on the website: www.taxenprojekt.de.
3. Burmester, A., Haller, U. and Krekel, C. (2005) 'The Munich Taxae Project: the Kolberg inventory list of 1589', in M. Clarke, J.H. Townsend and A. Stijnman (eds) *Art of the Past: Sources and Reconstructions*, London: Archetype Publications, pp. 44–8.
4. Pharmacy price list and legal rules for all pharmaceuticals which are available at the court pharmacy in Liegnitz as released by the *Collegium Pharmaceuticum*, ie pharmaceutical control committee in 1567 (authors' translation).
5. Sammter, A. (1861) *Chronik von Liegnitz*, Liegnitz: Pffingsten, p. 344; <http://books.google.de/books?id=FsoAAAAcAAJ&pg=PA344&dq=liegnitz+apotheke#PPR6,M1> (accessed 8 April 2009).
6. Rötter, C., Grundmann, G., Richter, M., van Loon, A, Keune, K, Boersma, A. and Rapp, K. (2007) *Auripigment/Orpiment: Studien zu dem Mineral und den künstlichen Produkten/Studies on the Mineral and the Artificial Products*, Munich: Siegl.
7. Burmester, A. and Resenberg, L. (2003) 'Von Berggrün, Schiefergrün und Steingrün aus Ungarn', *Restaurio*, 109, pp. 180–87; Heydenreich, G. (2003) 'A note on Schiefergrün', *Studies in Conservation*, 48, pp. 227–36.
8. 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*, Munich: Braus, pp. 54–101.
9. Resenberg, L. (2005) *Zinnober – zurück zu den Quellen*, Munich: Siegl.
10. Haller, U. (2005) *Das Einnahmen- und Ausgabenbuch des Wolfgang Pronner. Die Aufzeichnungen des "Verwalters der Malerei" Herzog Wilhelms V. von Bayern als Quelle zu Herkunft, Handel und Verwendung von Künstlermaterialien im ausgehenden 16. Jahrhundert*, Munich: Siegl.
11. The full title is: 'Apotecken Tax und ordnung aller Artznyen der Apotecken der Fürstlichen Stadt Lignitz/im Jar nach Christi unsers lieben Herrn geburt 1583 (... Durch die verordnte Visitsatorn der billigkeit nachgestellt/und auff befehl eines Ehrundtfesten Erbarn Wohlweisen Raths der Stadt Liegnitz/von den Ehrundtfesten hochgelarten Herrn Doctore IOACHIMO BAUDISS: jetzigerzeit allda Fürstlichen unnd der Stadt Liegnitz so wol deß Fürstlichen gestiftt Leubiß bestalten PPhysico in das Werck gebracht und in Druck verfertiget.)'.
12. Only recently (April 2009), we found another *Taxa* published in 1604, which was the first printed by Nicolaus Schneider in Liegnitz. Surprisingly, this *Taxa* has no separate *Pigmenta et Colores* chapter. As for many other *Taxae*, most of the pigments are included in the chapter *De Mineralibus et Metallis et Terris. Von Mineris/Metallen und Erden* (About minerals, metals and earths). The reason for this change in format is not clear.
13. 'Pharmacy legal rules and price list of the court town Lignitz, as revised, expanded and improved by the visitation held in July 1614' (authors' translation).

14. 'About raw and prepared pigments and colours for the painter's use/About raw and prepared painters' colours' (authors' translation).
15. Dehn, E. (2005) 'Über Armenischen Bolus', diploma thesis, Technical University, Munich.
16. Haller 2005 (cited in note 10), p. 118 ff.
17. *Catalogus Oder Register/aller Apoteckischen Simplicien vnd Compositen/so in den beyden Messen zu Franckfurt am Mayn/ durch die Materialisten/Kauffleut/Würtzelträger vnd Kräutler/ auch durch die Apotecker daselbst verkaufft werden*, Frankfurt 1582.
18. Burmester and Resenberg 2003 (cited in note 7).
19. New revised pharmacy legal rules and price list for the Principality Liegnitz (authors' translation).
20. Alongside a complimentary description of the Liegnitz area, Matthäus Merian mentions the printing house in his *Topographia Bohemiae Moraviae et Silesiae*, Frankfurt 1650, on p. 158: '[Liegnitz] ist ziemlich groß, und liget im Mitten deß Landes Nider=Schlesien, auff einem ebenen /schönen und flachen Felde. Hat herrlichen köstlichen Boden/und gute Lufft, neben welcher der Katzbach hinrinnet ... Es hat zugleichen in der Stadt ein feines Rathhauß, und einen großen Markt, schöne steinerne Häuser, und ein Druckerey': [Liegnitz] is a pretty big town in the centre of lower Silesia, situated in a flat and beautiful area. It has a very good earth, and fresh air, and the town is passed by river ... In the city there is a nice city hall, a large market place, beautiful houses made from stone and a printing house (authors' translation).
21. Burmester and Krekel 1998 (cited in note 8); Burmester, A. and Denk, C. (1999) 'Blue, yellow and green on the Barbizon palette', *Zeitschrift für Kunsttechnologie und Konservierung*, 13, pp. 79–87; Burmester, A. and Denk, C. (1999) 'Comment ils inventaient ces verts chatoyants? Blau, Gelb, Grün und die Landschaftsmalerei von Barbizon', in A. Burmester, C. Heilmann and M.F. Zimmermann (eds) *Malerei der Natur - Natur der Malerei*, Munich: Klinkhardt & Biermann, pp. 295–329.
22. Krekel, C., Haller, U. and Burmester, A. (2006) 'Artists' pigments reconsidered: does modern science match the historic context?', in D. Saunders, J.H. Townsend and S. Woodcock, *The Object in Context: Crossing Conservation Boundaries, Contributions to the Munich IIC Congress, 28 August–1 September 2006*, London: IIC, pp. 244–8.