The 19th century German Tradition: Ancient Recipes and Experimental Reconstitutions

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Since the end of the 17th century a fair amount of writings –both manuscript and printed- pertaining to the art of lute- and violin-making in the German-speaking countries have been handed down to us. Among these written documents aspects of surface treatment form a substantial part. The early information on this matter is mostly of an anonymous nature, whereas the one from approximately 1770 on and during the following century often comes from practicing instrument-makers, thus being extra suited to cast some relatively reliable light on varnish making and varnishing-processes among violin-makers. In combination with analyses of original varnish samples attempts have been made at reconstructing historical instrument varnishes for the benefit of restorers and musical instrument-makers.

In the second half of the 18th century a development began in European violin—making during the course of which craftsmen, interested amateurs and scientists strove to investigate the varnishes of the classical Italian violin-makers or tried to imitate them. In this way the interest in surface treatment as it existed in other countries decreased, although by that time this one had already been well established and could look back on a long tradition, too. Only in recent years it has been appreciated that varnishes and varnishing processes of non-Italian origin should also be held in esteem, in the interest of a general historical survey and as an expression of an independent aesthetic stile and national craftsmanship.

Of course, the tradition of varnishing bowed and plucked string-instruments in Germany like everywhere else manifests itself in the instruments themselves. However, the knowledge of the old varnishes and the methods of applying them has for a long time been confined only to vague traditions handed down by word of mouth and very little documentary evidence. This situation appears to be somewhat unusual, for in the past reference to making and varnishing musical instruments has been made in several written sources. The early information on this matter from the 17th and 18th centuries is mostly of an anonymous nature, whereas the documentary evidence from approximately 1770 on and during the following century often comes from practicing instrument-makers. In the following paper only information from these sources has been taken into account.

Prior to the19th century violin-making in Markneukirchen, a small Saxon town near the Bohemian border, had already had a tradition of nearly 150 years. Yet, there exists only one reliable report worth mentioning from the early days of the craft in this town which allows an insight into the preparation of a violin-varnish.

The archive of the town tells about a tragic accident on February 8th, 1706[1] during which a violin-maker and the wife of a colleague died. Hans Caspar Reichelt was cooking his violin varnish on a stove. When he put the pot with the boiling varnish on the cold floor, the cow bladder with which the pot was tied up burst, the varnish caught fire and burnt the people who were watching the preparation of the varnish. In historical varnish-making animal bladders were often used to prevent highly volatile solvents like spirits of wine to evaporate. If one takes this into consideration, it is quite justified to assume that Reichelt's varnish was basically a spirit varnish.

The fact that spirits of wine played an essential role as a varnish solvent in the manufacture of musical instruments in Markneukirchen can be gathered from a correspondence between the violin-makers of this town, the neighbouring Klingenthal and the court of Dresden. The use of spirit varnish in instrument making was obviously so important in these small Saxon towns that no instrument could be finished and sold without it. When in 1771 crop failure caused the government in Dresden to put a ban on producing alcohol from grain, the violin-makers asked for permission to carry on distilling "de[n] gewisse[n° liquor, genannt spiritus" [the certain liquor, called spiritus]. They explained that they needed 24 Scheffel (measure of capacity, holding 104 litres) wheat and 2½ Scheffel barley in Markneukirchen and 18 and 2 Scheffel respectively in Klingenthal as a minimum, claiming that 63 violin-makers and the same number of violin dealers would be out of work without these raw materials. Dresden refused to issue a special authorization but advised them to obtain spirits from abroad[2]. The situation obviously soon returned to normal, for in the year 1777, 121 Scheffel wheat were used to distil spirits in Markneukirchen [3]. Since the demand for grain to produce alcohol for varnish making was certainly reduced in times of famine, the last mentioned figures was probably the amount of wheat that was normally used for this special purpose in years of prosperity.

[1] In the 19th century the municipal archives were for the most part destroyed during a fire. Crasselt's quotation from the original death register is the only source informing about this incident.[1]

[2] Correspondence between the violin-makers of [Mark]-Neukirchen and Klingenthal and the court of Dresden.[2]

Figure 1 : Production of grain alcohol 1772. Letter from the Court of Dresden to the violin-makers in [Mark]-Neukirchen and Klingenthal. 25.2.1772. Sächsisches Hauptstaatsarchiv Dresden, Kreishauptmannschaft Zwickau 152

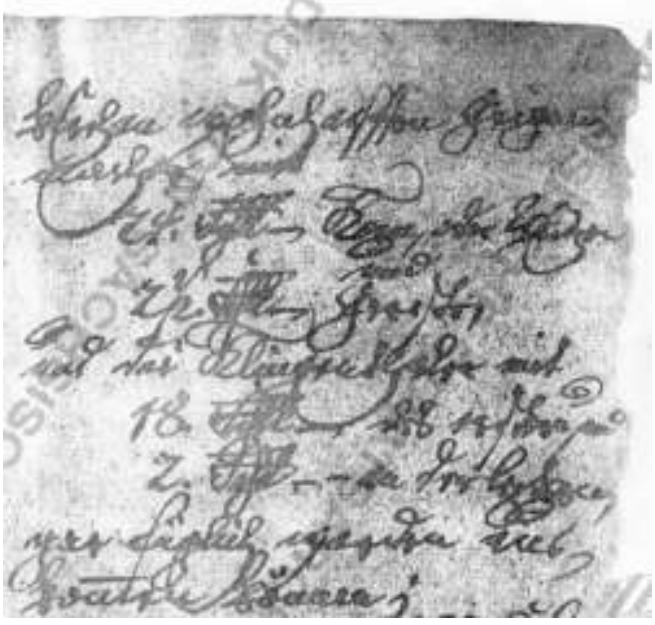

Figure 2 : Production of grain alcohol 1772. Petition by the violin-makers of [Mark]-Neukirchen and Klingenthal to the Court of Dresden indicating the quantity of wheat and barley needed for producing spirits of wine. 18.1.1772. Sächsisches Hauptstaatsarchiv Dresden, Kreishauptmannschaft Zwickau 152

Clear information about the amount of alcohol that was used for violin making purposes can be found in a governmental inquiry from 1830 [4] about the distilleries which were run in the Voigtland district. In this document the mayor of Markneukirchen, Carl Friedrich Eschenbach, states that the local violin-makers consumed 39 to 48 litres of «Spiritus» [spirits of wine] per week to varnish their violins and basses. He also mentions 40 distilleries which then (1829) existed in his town. In the next larger town (Oelsnitz) without a violin making industry there were only 9 distilleries. Although, according to the local bow-maker Gustav Adolph Wettengel a few violins were still varnished with an amber-oil varnish around 1828, the preference for the traditional violin coating on the basis of high-proof alcohol seems to have lasted on during the whole century. As late as in the 1890s the violin-makers petitioned the government to be exempted from tax on pure (non-denatured) alcohol. They asserted that denatured one would impart the gloss of their varnish.

Violin making in Markneukirchen and the surrounding towns and villages was still rooted in its own tradition in the beginning of the 19th century. Jacob August Otto, a violin-maker appointed to the court of Weimar, on the other hand, represented the kind of instrument maker, who increasingly focused his interest on the works from the period of classical Italian violin making. Therefore, one can assume that his remarks on varnishing stringed instruments was influenced by efforts to imitate the old Italian violin varnishes which became more and more important now. We owe to him the knowledge of a complete varnishing process (1828), employed while varnishing a violin [5].

One proceeds as follows:

1. Smooth the white instrument with horsetail.
2. Stain it with a yellow or red colour.
3. When the colour is dry, gently repeat smoothing with horsetail.
4. Apply varnish with a brush. Amber oil varnish is the best one. It prevents the moisture from getting into the wood. This is detrimental to the tone. There are also good spirit varnishes.
5. Polish amber varnish with pumice stone and water, then polish with Tripoli-powder and water
   For spirit varnish use linseed oil instead of water.

Contrary to Otto's instruction the writings by Gustav Adolph Wettengel (1828) [6] and Otto Bachmann (1835) [7] inform comprehensively about varnishes, polishes, stains and the necessary raw materials to make them. The first writer, in particular, hands down to us many instructions and recipes which were in use in his home town. Wettengel, who lived in Markneukirchen, was a bow-maker by trade and his colleague Bachmann from Halberstadt, a town in east Germany, called himself a "praktischer Geigenmacher" |[practicing violin-maker]. For this reason, their advice and recipes are apt to mirror the actual practice of varnish making and varnishing common in contemporary violin making in some parts of Germany during the first half of the 19th century. For both authors, improving the outer appearance of the instruments of the violin family, of guitars and of bows was the most important aspect of varnishing. We learn that it was common practice in Markneukirchen to polish the different parts of the instruments with wet chalk after they had been smoothed with a shaver,

glass-leather and horsetail. Then a colour stain was applied to the surface of the instrument. This stain also served the purpose of giving parts like fingerboards, pegs etc. made from native wood the look of an exotic one (e.g. ebony wood). The usual black stain was made by boiling logwood in water to which an iron-acid solution or a tin-acid solution was added later. For the red stain the violin-makers used pernambuco wood (bois de Fernambouc), water and alum and for the yellow one they needed logwood (bois de Campeche, bois d'Inde), water and alum. All parts that did not need a varnish coating (pegs, fingerboards, tailpieces, frogs of bows) were only polished with linseed oil, chalk, Tripoli-powder or pumice stone. Cheap bow sticks make of German wood received a gloss by rubbing wax onto them. So far the Markneukirchen violin-makers had employed spirit varnish, amber-oil varnish and a drying oil (huile gras) without resinous components to varnish their musical instruments. The latter one was used for cheap violins only. Concerning amber-oil varnish, Wettengel relates that at his time hardly any violins were coated with this kind of varnish any more. Also copal spirit varnishes –already known to contemporary varnish-makers- had not yet found their way into the workshops of the violin-makers. Guitars, the production of which had only began around 1800, exclusively got a spirit varnish coating. This tradition has lasted on until the first half of the 20th century. Quality bow sticks were treated with a spirit varnish, the so-called « englische Politur » [English polish] and linseed-oil.
The following varnish recipes were used among violin-makers of Markneukirchen when Wettengel wrote his book on violin making[3].

1. Drying oil:
   25 pounds (1 pound = 467 g)[4] linseed oil
   0,5 pound common hydrochloric acid
   Shake the mixture, then allow it to clear.

2. Common violin-maker's varnish:
   60 g sandarac
   60 g shellac
   7.5 g mastic
   2 g colophony
   ca 0.6 litre spirits of wine

3. White varnish for sounding boards of guitars:
   90 g sandarac
   90 g turpentine
   Melt together, allow to cool down and dissolve in 480 g spirits of wine
   Or
   90 g sandarac, dissolve in 360 g spirits of wine,
   then add 45 g turpentine

[3] Wettengel, Gustav Adolph, 1828, p. 390-393, 394-396 [6].

[4] Before the introduction of the metric system in 1871 the units of weights and measures in the German states were complex and could vary considerably in different regions and towns. In order to convert the old system of measures into the metric one the Dresden system of the « Handelsgewicht » in the first half of the 19th century was chosen as a basis: 1 Pfund (466,936g) = 32 Lot = 128 Quent (Quentchen).

4. English polish for bow sticks:
   (For light wood)
   60 g shellac
   15 g copal
   240 g spirits of wine
   For dark wood add 15 g dragon's blood.
   The English polish is put on with a cloth of cotton moistened with linseed oil.

5. Amber oil varnish:
   120 g amber
   Melt it over a coal fire, then dissolve it in oil of turpentine until it has the consistency of syrup. Add 60 g boiled linseed oil.

Finally, the dry varnishes are to be polished with chalk, powder of pumice stone, Tripoli powder and water or linseed oil.

«On donne au violon un vernis pour garantir le bois de l'humidité & de la poussière. Il seroit à souhaiter qu'on fit encore en France usage du vernis à l'huile, ainsi que les fameux facteurs de violons Boquet & Pierray l'ont fait jadis, & comme le font encore tous les habiles Luthiers d'Italie, au lieu du vernis à l'esprit de vin qu'on emploie aujourd'hui, parce qu'il est plus aisé à sécher. » [8] When in 1773 the French abbé Jaubert wrote these words, efforts had already set in to reintroduce or use more often fatty oil varnishes (varnishes with a drying oil as the main ingredient) in the violin-maker's craft. In the course of these endeavours amber varnishes seem to have played a certain role. In 1772 the English violin-maker William Forster II[5] asked a chemist to assist him to dissolve the resins amber and copal and at the end of the century Mathurin-François Remy [10], François-Louis Pique[6] and Nicolas Lupot [11] confirmed their use of oil varnish. Reports from early 19th century Austria and Germany give rise to the supposition that similar intentions were pursued also here. Still today a copper bottle of the Viennese violin-maker Martin Stoβ (1778-1838) is preserved in the technical museum of Vienna[7] in which the master used to make his amber varnish.

[5] S. A. Forster was William Forster's nephew and continued the family tradition as a violin-maker.[9]
[6] Pique asks Nicolas Lupot in a letter to Orléans to send him some of his oil varnish [«vernis à l'huile»] for he has no time to make some. In addition to this it would be difficult to find a yard or garden in Paris which is needed for this work. [11]
[7] Technisches Museum Wien, Inv.-Nr. 15671.

Figure 3 : Copper bottle for preparing varnish, having belonged to Martin Stoβ (1778-1838), Vienne, Technisches Museum Wien, Inv. – Nr.15671

Likewise, the recipe of the Mittenwald violin makers Joseph and Johann Hornsteiner from 1832[8] in which they tell how to concoct and prepare a red oil varnish is probably an indication that in the south of Germany experiments with oil varnish took place. Compared to the traditional local oil varnishes, the Hornsteiners'varnish is quite different in texture and outer appearance once it has been applied on a violin. The very same red varnish appears in a manuscript collection of varnish recipes from Mittenwald, written 1847 by a member of the violin making Kriner family[9]. Apart from several instructions how to prepare oil and spirit varnishes, the Ms. Informs also about staining the wood and saturating it with glue prior to varnishing. The recipe calls for [linseed] oil, sandarac, colophony and aloes. If one wants the varnish to be brown, asphalt has to be added. All spirit varnishes listed in the Ms. either consist of sandarac with the addition of a little amount of Venice turpentine or mastic, or of a mixture of sandarac and shellac to which again a little mastic or Venice turpentine is added.

[8] Copy of a 19th century manuscript, private collection.
[9] Peter Kriner, autograph manuscript, 1847, private collection.

Figure 4 : Kriner manuscript, 1847. Private collection.

Figure 5 : Violin varnish manuscript, 1896, Private collection.

Peter Kriner, the writer of the manuscript mentioned before, was a violin-maker who had specialized in varnishing musical instruments and who obviously had a reputation for finishing them in an antique manner, too. Contrary to him, Johann Baptist Reiter, one of the best known Mittenwald violin-makers of the 19th century carried on his trade in a more traditional way. An autograph recipe from 1864[10] with his signature, giving the formula for an amber oil varnish (« Agstein machen: Zu zwei Pfund Leinöhl gebraucht man 18 Lth Agstein…») has come down to us. The preparation of it is similar to that which Wettengel relates. However, components like bones of sheep, pumice stone, garlic and lead oxide, as well as the «feather test» show that it is still made in the tradition of the 18th century or earlier ones. This fact is remarkable, all the more considering that varnishing violins in the 19th century –or at least in the second half of it –is generally believed to have been strongly influenced by so-called « rediscoveries » of the old Italian violin varnish.

It was also Eugène Mailand's intention to pursue this aim when he published his book « Découverte des Anciens Vernis Italiens…» (1859) [12]. Soon his method of recreating the forgotten « secret » had its followers even out of France. Presumably, the first mention of essential oil varnishes following Mailand's discovery was made in Germany 1892 in the violin making manual by Apian-Bennewitz [13], a teacher at the musical instrument making school of Markneukirchen. He propagates these varnishes as the only ones that are suited to be used as a coating on violins and related instruments. Consequently, he disapproves of spirit varnishes as being detrimental to the tone of an instrument. Two recipes for making a copal oil varnish are mentioned in Apian-Bennewitz's work. Eight years before copal as an ingredient of a varnish had already found its way info Alexander Rebs's book on violin varnishes [14]. It is not yet known whether this indicates the introduction of a new raw material into violin making, for hardly any mention was made of copal in German writings on surface treatment of stringed instruments during the 19th century. It is true the Viennese violin- and guitar-makers Staufer and Soucup applied in 1832 [15] and 1834 [16] for a patent for a method to varnish violins and guitars [?] externally and internally with an alcoholic copal varnish but their invention does not seem to have been successful.

Apian-Bennewitz's remarks on a spirit varnish (Schmerlerscher Spirituslack), frequently used in former times and an old varnish from Mittenwald deserve to be taken into consideration.

Schmerlerscher spirit varnish for violins:

(first coating, ground varnish)

30 g shellac (seed lac)
30 g sandarac
4 g mastic
4 g turmeric
4 g Venice turpentine
8 g gamboges
4 g dragon's blood
60 g alcohol

[10] Johann Baptist Reiter, autograph manuscript, 1864, private collection.

(second coating)

For ca. 0,7 litre of varnish:
45 g white shellac
30. g sandarac
2 g mastic
2 g Venice turpentine

Violin varnish from Mittenwald:
30 g shellac (seed lac)
15 g elemi
8 g annotto (rocou)
8 g dragon's blood
(8 g sandarac, to give gloss to the varnish)
ca. 0.55 litre alcohol.

The white violin is coloured with saffron.

Appian-Bennewitz's varnishes and stains still consist of non-modified, natural raw materials. Other sources, on the other hand, include chemical products, indicating that these substances had fournd their way into the craft by now. For example, the violin-maker Joseph Kriner mentions aniline dyes as a colouring in his manuscript collection of varnish recipes (1904)[11]. The same goes for other authors. Alexander Rebs, especially, recommends chemicals and modified raw materials like collodion, water-glass, chromate or bichromate of potash, sulphuric acid and aniline dyes to be used in varnish making (1884). Often these components served the purpose of being employend in the process of giving the varnished surface an antique finish (imitation).

One aspect of varnish making for musical instruments must not be left unmentioned. From the end of the 19th century on chemist's shops, varnish factories and large violin making firms had to a certain degree taken on the production of these special varnishes in some parts of Germany. Firms like Fritz Setzer in Markneukirchen, Peter Tumback in Oelsnitz or Wilhelm Gottstein in Schönbach now made and sold violin varnish on a larger scale. Names to be mentioned outside of Germany are the Fabrique de couleurs et vernis Lefranc & Cie in Paris (1894) and the firms J. Rea & Co. (1884) or The Stainer Manufacturing Co. (1890) in London, for example. So far, there is no written evidence known informing us on how long this practice had existed in Germany before. The idea itself was not new. Already in 1772 a ready mixed «Vernis à l'Esprit-de-vin… pour les violins & autres instruments» was offered for sale by the Parisian varnisher and colour vendor Jean-Félix Watin [17].

Wettengel, Kriner and Appian-Bennewitz agree in a remarkable way on the types and concoction of the varnishes which are to be used in violin making. Fundamentally, two types of varnish with a limited selection and combination of raw materials are suggested: oil varnishes with and without resinous components and spirit varnishes on the basis of a) shellac-sandarac mixture b) sandarac (Wettengel: a sandarac-turpentine mixture) c) shellac. The last three resin variants can further be modified by adding small amounts of other varnish

[11] Joseph Kriner, autograph manuscript, 1904. The Ms. comprises a collection of recipes for spirit varnishes. Private collection.

components. When one compares these basic recipes with the results of chemical analyses of original varnish material from the 18th and 19th centuries a relatively high correspondence can be noticed. Most of the German instruments (20 out of 25) built between 1743 and 1880 were coated with a varnish which had a highly volatile liquid as a solvent (alcohol). In these instances no or very little drying oil was present. Only few of the instruments were treated with an oil varnish. These ones were built between 1775 and ca. 1840 and come mainly from Mittenwald. With all Mittenwald instruments manufactured after 1800 this coating, known as « Aksteinlack » [amber varnish), is red, thick and badly cracked. Taking its chemical composition and tendency to crack into consideration it seems quite likely that the oil varnish as described in the Hornsteiner and Kriner sources stands for this kind of varnish.

As far as spirit varnishes are concerned the chemical analyses have often revealed the presence of a mixture of shellac and sandarac in approximately equal proportions. This concoction was obviously a widespread standard recipe which was not only confined to Germany but was employed in many countries and over a period of more than 200 years. One of the earliest musical instruments that has been found to be varnished with this concoction was a Stradivarius violin of 1726. Varnishes consisting nearly completely of sandarac were only applied on instruments from Markneukrichen and the surrounding region. On account of their brittle nature they have been traditionally called « Kolophonlacke » [colophony varnishes], quite mistakenly as it seems. So far there are no indications that alcoholic copal varnishes were employed in the 19th century.

Using the results of the chemical analyses and the information from historical sources attempts have been made at reconstructing some of the varnish types under consideration. In general it was not difficult to make the different spirit varnishes. The preparation of oil varnishes and copal spirit varnishes, however, proved to be rather problematic. Only after a long time of experimenting, including many failures, satisfying results could be attained.

Figure 6 : Varnishing department of violin factory John F. Stratton in Gohlis near Leipzig. Illustrierte Zeitung Leipzig 1873, No. 1556

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Credits

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