BRIEF STUDIES AND REPORTS

Discovery of a Previously Unrecorded Trumpet by Johann Carl Kodisch

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Introduction

It is not often that a trumpet from one of the early Nuremberg trumpet makers comes on the market, so it was quite a rare acquisition opportunity when a previously undocumented trumpet by Johann Carl Kodisch (Nuremberg, 15 April 1654; † 8 May 1721), dated 1719, appeared on eBay in 2014, which led to its purchase by one of the authors (Clements). Prior to being listed online, the trumpet had been obtained by the eBay seller from a local estate auction by Christy's of Indianapolis. The history of the instrument, including how it came to the United States prior to this, is still unknown. The condition of the instrument will be described in a further section of this article, so the details of its place in the *oeuvre* of the Nuremberg makers will be discussed first.

Figure 1: Original Kodisch trumpet of 1719, after conservation. Photo by Scott Clements.

Of the Nuremberg brass making dynasties, the Kodisch family, which was closely associated with the Hainlein and Haas families, had the shortest duration.[1] There are also fewer extant Kodisch instruments than from the better-known Ehe and Haas dynasties. The discovery of this instrument brings the current known number of surviving Kodisch trumpets to eight. The other instruments are found in the following collections: dated 1689, Ann Arbor, Michigan, Stearns Collection (0824); dated 1693, St. Petersburg, Hermitage Museum (423.202.21); in D, dated 1693, Brussels Musical Instruments Museum (1176); pair in D, undated, Nuremberg, Germanisches Nationalmuseum (MI 162 and MI 163); in F, dated 1701, Paris,

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Cité de la Musique, (E.980.2.283); in E♭, undated, Vermillion, South Dakota, National Music Museum (NMM 10782). The example described here is closest to the undated one in the National Music Museum, showing nearly identical decoration on the bell garland and similar proportions (Figures1, 2).

Figure 2: Detail of the Kodisch trumpet bell engraving, showing the maker's mark, date, and foliate decoration. Photo by Scott Clements.

Finding new examples of early musical instruments increases our understanding of design, development, and manufacturing in earlier times. In turn it opens up possibilities for further study of the playing characteristics and musical properties, and the limitations faced by players in the past. Any instrument that shows unusual characteristics can be of value in expanding this knowledge and may open new opportunities for players who are seeking to understand how their musical forebears went about making the music of their time.

Particular interest

This instrument is of particular interest as it is currently the latest known dated trumpet by Johann Carl Kodisch, the year indicated, just below the maker's mark, as 1719. The next-latest dated Kodisch trumpet is from 1701, with the other dated examples being earlier. A trombone dated 1727 also survives,[2] but this may actually be by his son, Daniel,

or possibly the date was modified or added later, since Kodisch died in 1721. This gap in surviving instruments also presents an interesting comparison of the design progression in Kodisch instruments. Arnold Myers has measured several other Kodisch trumpets and has noted what appears to be a progression in the bell flare (Figure 3).[3] There are indications of an intentional expansion of the flare over time, chiefly between 1693 and 1701, but also between the 1701 and 1719 instruments. Although it is known that the Kodisch workshop burned in 1685,[4] this does not seem to account for the change in bell design as the instrument dated 1689 in the Stearns Collection still shows the more conservative, shallower, bell flare. This indicates a fairly continual change in bell mandrels, which (if intentional) is different from earlier assumptions about the practice in the Nuremberg workshops. Is this experimentation unique to the Kodisch workshop or are there indications that other makers may have also experimented with the design of their instruments? Further study is needed to determine if there is evidence of such experimentation. It has been previously observed that Kodisch's instruments, including his trombones, have the most extreme flare of any seventeenth- or eighteenth-century examples.[5]

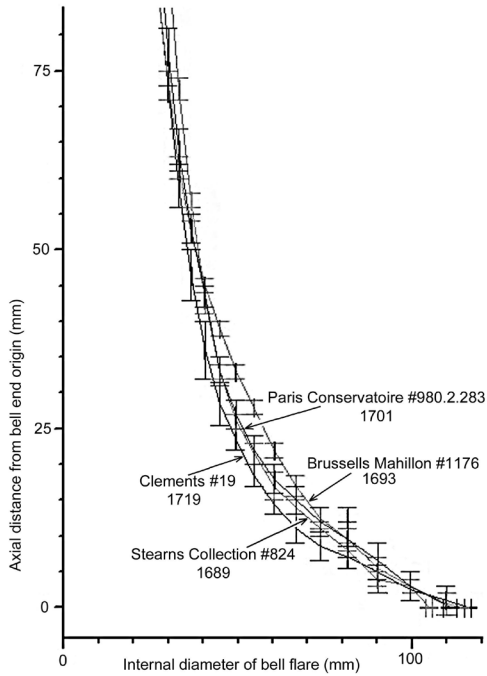

Figure 3: Comparison of Kodisch trumpet bell curvatures. Data by permission of Arnold Myers.

The extreme bell flare used in the Kodisch workshop leads to some interesting questions as to why he deviated so much from the more conservative approach of his contemporaries. Could it be that he was providing instruments that intentionally facilitated playing in the upper register? Of the known Kodisch trumpets (listed above), two are in F—this exemplar (SRC-19) and the Cité de la Musique instrument (E.980.2.283)—and one in E♭ (a^1 = 415 Hz, NMM), accounting for almost half of the extant examples. This is unusual compared to the ratios of surviving trumpets by other makers, which tend to be in D (a^1 ~ 415 Hz). Whether this indicates that Kodisch specialized in providing instruments to court and field trumpeters (who, per Altenburg, played instruments in these higher pitches)[6] or whether it is just a coincidence of what has survived, is impossible to determine with the extant information, but it does raise interesting questions about what kinds of instruments are best for the different types of early trumpet repertoire.

Playing characteristics

The playing characteristics of this trumpet differ slightly from the much-copied instruments made by Kodisch's contemporaries Ehe and Haas. It plays with a soft, bright, clear sound and is not capable of being "pushed" to a loud volume. The sound is crisper and brighter than that of close copies of original Haas and Ehe trumpets (no originals were available to use for comparison!) Of particular advantage is the response of the thirteenth partial (written a^2), which is far easier to obtain accurately and closer to correct pitch than on either Ehe- or Haas-type instruments. This ease of response is noticed also when the instrument is crooked into the lower keys of C and D. The response of the eleventh natural note (written f^2 or $f\sharp^2$) is similar to that on Haas and Ehe instruments, meaning it is possible to lip these notes close to correct pitch with practice. The instrument is noticeably less resonant for the lowest notes, notably written e^1 and c^1. With larger mouthpieces (such as a copy of the well-known mouthpiece by Bull) there is some improvement to these notes, but it indicates the instrument is not well-suited to *principale* parts. Indeed, as the more extreme bell flare would suggest, the instrument is best in the upper register, where it is especially nimble. The copy (see below) exhibits similar characteristics, demonstrating that these are inherent to the design of the instrument and not unique to the original.

The trumpet plays particularly well and seems best for concerto playing, especially the high pieces of the mid-eighteenth century and pre-Classical period (Michael Haydn, Johann Melchior Molter, Johann Wilhelm Hertel, etc.) rather than field pieces. Given the fabrication date of 1719, a few years before the assigned date for Bach's Second Brandenburg Concerto, it is also useable for that piece and may be a surviving example of the type of original high-pitch instrument that would have been used at the time. The fact that the instrument is such a good "player" might explain its long service life and multiple repairs over time. Had it not had desirable playing capabilities, it might not have been repaired and used over such a long period. One repair to the bell appears to date from the early nineteenth century, giving the trumpet a working life of at least one hundred years.

The above playing characteristics indicate an instrument designed for chamber and not field work (the poor response of the low notes and soft volume being the main reasons for this), yet the pitch is indicative of a field trumpet.[7] The yards of slightly narrower diameter (as detailed later in this article) suggest it may always have been a higher-pitched instrument (in E♭ or F), but due to the repairs on the first yard and between the ball and second bow it is impossible to know if was shortened from an original pitch of D. Lacking any information about previous ownership and use, we cannot tell if the instrument was used for field, concert, or church work. What it does show is a need to further study the playing characteristics of different extant instruments and their application to different types of music from the period.

We know that some of the most highly regarded eighteenth-century players, such as Johann Georg Hoese, were field trumpeters as well as "concerto players,"[8] but Altenburg allows for some degree of specialization when he mentions that his father was not proficient playing low parts and was better suited to the *clarino* register.[9] We also know that players of the time did use more than one trumpet. Gottfried Reiche had more than one in his possession at his death[10] and Altenburg mentions that a trumpeter can get by with "only three trumpets (or at most four)."[11] It appears from this somewhat scant written evidence, when combined with the differences in surviving instruments, that trumpeters of the eighteenth century, like their counterparts today, used different trumpets for different types of pieces, using whichever one was best suited to the music they needed to perform, assuming they possessed or had access to multiple instruments.

Conservation treatment

It was decided that conservation procedures would be minimal in view of the fragility and condition of the instrument, and with plans in mind to make a copy (see below). There is always a desire to polish the metal, remove dents and creases, and minimize other unsightly accretions, but it is rarely possible to do this without risk. Brass that has been stressed during working often has incipient weaknesses at its grain boundaries, which can be accelerated by heat treatment and further manipulation. Also, polishing instruments that are dented and distorted often accentuates the damages, making them easier to see and spoiling the overall appearance.

The trumpet had a greasy, black film over its entire surface, an appearance typically seen on objects hung over smoky fireplaces. The brass had a brown patina, with small spots of active corrosion visible in discrete areas. As a general rule, the more active the corrosion, the lighter the color. These spots showed a light green central portion (probably copper chloride) surrounded by a darker green halo of malachite (copper carbonate). Elsewhere the surface had an even, stable passivating layer of cupric oxide.

A crack at the front end of the lower yard was evidence of stress corrosion. The thin edge of the bell was crumpled around approximately half of its diameter, with one small crack at the peak of a fold, perhaps also due to failure of the metal at its grain boundaries. There were small sections missing around the edge of the bell, and soft solder had been

used to attach it to the garland. A red number "934" was painted on the inside of the bell: apparently an old inventory mark for either a collection or auction. The bell had an old reinforcing patch and a tapered sleeve in front of the ball. This sleeve, together with sleeves on the mouthpipe and middle yard, had been added as repairs, and perhaps intentionally to alter the pitch after original fabrication, but it was not possible to determine the original pitch from this evidence alone.

Conservation procedures included cleaning of residues over the whole surface, removal of spots of active corrosion, and general stabilization. The black film was removed by swabbing with mineral spirits, a mild hydrocarbon solvent that dissolves grease. The spots of active corrosion were removed mechanically by picking and scraping with hardwood points. The lighter areas resulting from corrosion removal were patinated to match the surrounding surface by applying selenium disulphide on a cotton swab. The cleaned surface was coated with microcrystalline wax buffed to a shine.

The crack at the front end of the lower yard was filled with cyanoacrylate adhesive, both to stabilize it and to provide air-tightness for testing. The brass wire connecting the bell rim to the front bow was preserved. A wood block was bound with linen tape between the bellpipe and mouthpipe, prior to binding with cord, to stabilize the instrument.

Copying

The Kodisch trumpet was relatively fragile, especially where the crack at the front end of the lower yard indicated stress corrosion, so it was decided to make a copy (Figure 4) for purposes of performance. It goes without saying that all features of the original instrument that had a bearing on its playing qualities would be as faithfully reproduced as possible. In order to facilitate direct comparison, it was decided to make the copy in the same pitch, but to exclude the sleeves and repair patches as extraneous.

Measurement

A copy being made for purposes of direct comparison requires a degree of closeness that drawings and dimensions taken by a third party cannot supply. In this case a direct relationship between the instrument and the copyist is essential. The accuracy of measurement depends upon the tools used and skill of the measurer. Calipers, rulers, and micrometers were used, although there appears to be no general consensus on the degree of accuracy. In general, length and diameter measurements of the larger components to a tolerance of 0.5mm are sufficient, but wall thickness of historic instruments needs an accuracy an order of magnitude greater. In this case, a thickness error of 0.01mm was considered acceptable. With all early brass instruments, there are complications due to the original choice of material. Modern brass is available in accurately controlled thicknesses, but the craftsman of centuries ago relied upon the skill of his supplier and his own judgment. Before the era of rolling mills, sheet brass was hammered to an approximate thickness then scraped to achieve consistency.[12] Measurements of wall thickness taken today are only as good as the consistency of the original. The sheet brass used in seventeenth and eighteenth century

Figure 4: Copy by Robert Barclay of the 1719 Kodisch trumpet. Photo by Robert Barclay.

instruments undoubtedly showed a certain degree of variability. This is one area where the modern copyist makes a compromise; averaging a number of measurements results in the choice of one modern, consistent thickness.

The steel mandrels upon which tubes and bells are formed must conform exactly to the inside diameter, so wall thickness of the metal must be taken into account. This is a simple calculation for cylindrical tubing: deducting twice the thickness of the material from the overall diameter of the tube. Again, averaging of several measurements taken in different places is necessary. The bell is thinner at its extremity due to hammering on the anvil and burnishing on the mandrel. Often it is impossible to measure the thickness of the metal at the bell's extremity because of the reinforcing garland covering it. Thus, estimating the dimensions of the flat pattern used in laying out the bell is a trial-and-error process, and there appears to be no calculation that makes it easier. Measurements were taken from the tubes and bell of the original trumpet, accounting for the approximated wall thickness. Mandrels, in particular, were costly and time-consuming to make centuries ago, leading one of the authors (Barclay) to assume that changes in form within a maker's *oeuvre* would be comparatively rare. In fact, a mandrel that had been used for making a copy of the undated Johann Carl Kodisch trumpet in the Germanisches Nationalmuseum (MI 163) proved to be subtly different from the one required for this instrument. The tubes of the

1719 trumpet were also found to be slightly narrower. It was interesting to encounter these variations because they tend to suggest a much less conservative approach to workshop tooling than was previously assumed.

Choice of Materials

Newly made "Nuremberg brasses" have been used by instrument makers in which lead, which is found as a trace impurity in the original material, has been reintroduced into the modern copper/zinc alloy. The assumption here is that there will be a different musical result. Much analysis of historic brasses and speculation on their acoustic properties has been carried out in the last few decades. There are many subjective and circumstantial opinions, but conclusions upon the resultant playing qualities that withstand scientific rigor are hard to find. In a recent study, the authors concluded that "In spite of intensive research and considerable progress in this field, one of the most persistent questions still remains: what is the significance for historically informed performance of the use of a historically correct alloy in reproductions of brasswind musical instruments?"[13] This question will probably remain unanswered because the influence of the metal is an order of magnitude less significant than the idiosyncrasies of individual players and their embouchures. Nevertheless, if all other features of the copied instrument are approached with strict attention to authenticity, then use of "Nuremberg brass" will lend a certain cachet to the finished product.

With the above in mind, and therefore assuming that the perceptible difference between the original brass and new material is insignificant, a 0.40mm (0.016") brass sheet of 70% copper and 30% zinc was used for the copy. The ball situated midway along the bell was made from two discs of 0.032" brass sheet, pressed into a die, trimmed and then soldered edge to edge. The bell rim wire is a half-round section with the original pattern embossed, and the rings on the insides of the bows are 0.095" brass.

Thirty percent of zinc is at the high end of what was possible by the early process of cementation, where zinc vapor was allowed to diffuse into molten copper. Few brass founders achieved this high level, but Nuremberg makers certainly selected material from mines that were known for the purity of their ores, and from foundries and hammer mills that had high control of the quality of their sheet metal. The brasses used by the Nuremberg craftsmen are of remarkable consistency and purity.

Following original practices, a silver solder (40% Ag/60% brass) was used for joining the seams of all main components. All assembly of components is done with friction-fitted joints. The only parts attached with soft, lead/tin solder (40% Pb/60% Sn) were the bell-rim wire and the cord loops on the bows.

Techniques

In making copies that might be described as "historically informed," it is necessary that the techniques of manufacture follow earlier practice. The processes used in brass instrument making of earlier times have been described and illustrated in detail elsewhere, and need not be expanded upon here.[14] There are acceptable modern compromises in workshop technique:

- The use of a gas torch in soldering and annealing, as opposed to a bed of charcoal and a blowpipe, is one highly desirable improvement.
- The embossed pattern on the ferrules of the Kodisch trumpet was originally produced by a supplier using a rolling mill. In the absence of this equipment, dies were laser-cut to reproduce the pattern, and the sheet metal was pressed into them to form an exact facsimile. [15]
- The bows were bent by first filling the tubes with Cerrobend, an alloy with a very low melting point, instead of lead, which is the traditional material.

While these processes do not follow original practice, the resultant parts are indistinguishable from those made using the earlier techniques.

The decoration on the garland was reproduced accurately by engraving in the original manner, but the current copyist's name and date were added to those of Johann Carl Kodisch. It is highly unlikely the copy could be confused with an original in the future, but this provides an added insurance.

As on the original instrument, a wood block was bound with linen tape between the bellpipe and mouthpipe, prior to binding with decorative cord. A thin brass wire was passed around the front bow, through a hole drilled in the bell rim at the seam, and twisted to secure the components in place.

The bell rim of the original instrument lacked the crimped garland edge that is typical of Nuremberg instruments. This was not followed on the copy where the more typical crimped edge was used instead. Interestingly, the bell rim of the Kodisch instrument in the National Music Museum also lacks the crimped garland edge,[16] which raises the question of whether both trumpets were similarly modified after original fabrication or if Kodisch was further experimenting with the design late in his career.

Conclusions

As contemporary historically informed players, in an effort to regain historic playing techniques, are beginning to take more steps toward playing close copies of early trumpets—without the aid of anachronistic features—the need to understand the playing characteristics, including both the advantages and limitations, of the extant originals becomes more necessary. While the many good copies commonly available are based on instruments with exceptional playing qualities, there are doubtless numerous instruments in collections and museums that are worthy of further study and copying. The differences in playing characteristics between these early trumpets may show a greater variety of specialized use than currently understood, and may provide some insight into the world and art of the trumpet player during the Golden Age of the natural trumpet.

Scott R. Clements received a Bachelor of Science in Landscape Architecture from Purdue University (1991) and a Master of Landscape Architecture in Urban Design from Harvard University (1995). He is currently a practicing landscape designer with projects in the United States and Asia. Prior to his current career, he studied trumpet under James Stamp and developed an interest in historic brass performance and instruments. He is an avid private collector and player of historic musical instruments.

Robert Barclay received a Certificate in Science Laboratory Technology from the City and Guilds of London Institute. After graduating from the University of Toronto with a Bachelor's Degree in Fine Arts, he went on to earn an interdisciplinary Ph.D. at the Open University in England. He worked as a museum object conservator/restorer and trumpet maker. He assists with the International Trumpet-making Workshop in Europe and the United States. His publications include The Care of Historic Musical Instruments *(editor) (1997),* The Preservation and Use of Historic Musical Instruments: Display Case and Concert Hall *(2004), and* The Art of the Trumpet-maker *(1992).*

Notes

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[2] Sabine K. Klaus, "Outstanding Trumpets, Trombones, and Horns in the Musical Instrument Collection of the Historical Museum, Basel," *Historic Brass Society Journal* 12 (2000):1–22, here 2.
[3] The authors thank Arnold Myers of the Edinburgh University Collection of Historic Musical Instruments for providing the measurement data and graph of bell flare comparisons, and for permission to use them in this paper.
[4] Wörthmüller, "Die Nürnberger Trompeten- und Posaunenmacher," 246.
[5] Stewart Carter, "Early Trombones in America's Shrine to Music Museum," *Historic Brass Society Journal* 10 (1998): 92–115, here 92.
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[14] Michael Münkwitz, Richard Seraphinoff, and Robert Barclay, *Making a Natural Trumpet: Herstellung einer Naturtrompete* (Ottawa: Loose Cannon Press, 2014); and Barclay, *The Art of the Trumpet-maker.*
[15] The authors give credit to craftsman Ron Daley of Essex, Massachusetts, for developing this technique.
[16] Sabine K. Klaus, *Trumpets and Other High Brass,* vol. 1 (Vermillion: National Music Museum, 2012), 109.