

TREASURES OF ITALIAN VIOLIN MAKING | 3

The Carlo Bergonzi violins in Baron Johann Knoop's collection

with essays by
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ANDREA ZANRÈ

Beyond the Mountains. Carlo Bergonzi's reception from the eighteenth century to the present day

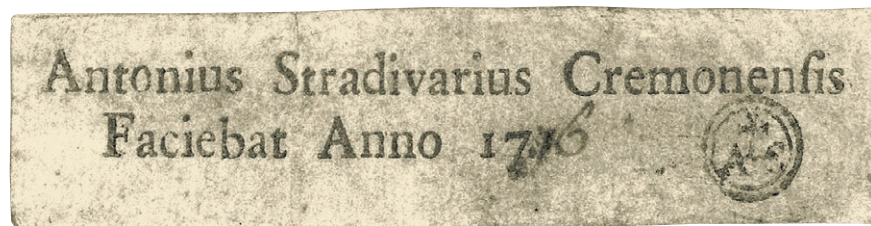
The two violins by Carlo Bergonzi now known as the “Kreisler, Perlman” and the “Earl of Wharnccliffe, Knoop, Landau” do not only have in common the fact that they both belonged to the collection of Baron Johann Knoop, who had acquired them as representative examples of the work of the last Cremonese violin maker of the classical period. They were also among the large number of instruments made in Cremona in the sixteenth to eighteenth centuries, which, having crossed the Alps, seem to have found a permanent home in northern Europe.

The current owner of the “Kreisler”, Dextra Musica, has brought together a remarkable selection of instruments by the best Italian masters, acquired over the course of a few decades with the aim of supporting Norwegian musicians. This philanthropic, institutional strategy, pursued by many modern foundations striving for similar goals, differs somewhat from the collecting passion of the baron from Bremen, who undoubtedly primarily followed his own personal taste, although the mere fact of being able to boast the title of “ex-Baron Knoop” is now a guarantee of quality for a violin.

Unlike the museums that house the Girolamo Amati viola and the “Tuscan” Stradivari, the subjects of volume one and two in this series, private collections are the result of specific personal interests, which influence both the composition of the collection and their use. The dukes and grand princes of the old Italian states saw the precious Cremonese instruments as must-have items for their personal “museums”, to be placed alongside paintings, sculptures, decorative art works and various other objects, which they may have held in higher esteem. This role sometimes led to the instruments falling into oblivion, and if they managed to escape being purloined, they were left in an undisturbed slumber, before eventually being absorbed into state ownership in more recent times.

The two violins by Carlo Bergonzi featured in this book, on the other hand, have spent most of their history in the hands of collectors, who had a specific interest in stringed instruments; the constant care and, in some cases, tampering have thus made them different from those rare examples we have dealt with in the past, whose preserved integrity was mainly due to their state of neglect. The “Kreisler” and the “Baron Knoop” are the result of a different kind of historical stratification. Physically it takes the form of their “patina”: “a more or less thin layer of a substance deposited on a surface, concealing or altering its appearance”.¹ While a scientific approach would see this as a loss of information about the original state of an artefact, the very term “patina” also contains a positive sense of accumulated interest in the instrument: additions, subtractions and alterations that bear witness to often inadequate “caregivers”.

As far as the “Kreisler” is concerned, the first of the private collectors lived south of the Alps, albeit only just: the Piedmont



The apocryphal Antonio Stradivari interior label in Carlo Bergonzi's “Kreisler” violin. The last two digits have been identified as being in Count Cozio di Salabue's handwriting as found on the title page of his *Carteggio*, illustrated on the opposite page (BIBLIOTECA STATALE, Cremona).



The original label of the “Baron Knoop”, dated 1735. Cozio di Salabue owned a violin by Carlo Bergonzi from the same year.

noble, Ignazio Alessandro Cozio, Count of Salabue (1755-1840). A key figure in the subsequent history of violin making, Cozio's many merits include that of having quickly grasped the historical importance of Carlo Bergonzi: “a student of the famous Antonio Stradivari and of his no less famous son...² after their deaths he worked alone until his own death... He was the student who most imitated Antonio Stradivari, except for the latter's son Francesco, especially in the varnish, and the arching and refinement of the work, and in the strength and good sonority that he successfully gave many [instruments], although he resorted to narrower forms in the middle to make them easier to play, and longer F-holes, positioned further apart to keep the same bridge width... and [his instruments] were taken to be Stradivaris beyond the mountains [the Alps], especially in France and England, and held to be such by celebrated personalities.”

In this paragraph of his *Storiografia* (Historiography), it is striking how over the years Cozio's passion for Cremonese violin making led him to gradually build up a wealth of technical expertise that was anything but superficial. In a few phrases the count begins to distinguish Bergonzi's work from that of Stradivari: the slenderer form of his instruments and the longer and more widely spaced F-holes are explained in terms of the possible function for which these innovations were introduced. At the end of this passage Cozio, however, fails to say why it was easy to pass off Bergonzi as Stradivari “beyond the mountains”. His comment might be unwitting revelation, if we accept Christopher Reuning's suggestion that the Stradivari label may have been affixed on the interior of the “Kreisler” by the count himself, whose handwriting would appear to be recognisable in the last two digits of the fictitious date 1716.³

The possible duplicity in the attitude of the count, who was an admirer of Bergonzi (“the renowned construction of bowed

¹ *Treccani Dizionario della lingua italiana*.

² The reference is to Francesco Stradivari, whom Cozio admired. See COZIO DI SALABUE, *Carteggio*, edited by R. Bacchetta and G. Iviglia, Cordini, Milan 1950, p. 32-33.

³ C. REUNING (ed.), *Carlo Bergonzi, A Cremonese Master Unveiled*, Fondazione A. Stradivari, Consorzio Liutai A. Stradivari, Cremona 2010, p. 126.



Mould MS 1060 superimposed to the ribs of the "Baron Knoop".
The model is similar, but the mould is noticeably larger than the instrument; additionally, the position and dimensions of the blocks do not entirely overlap.

ADRIANUS VAN KOLLENBURG, OSAMU SUGA

Baron Johann Gerhardt Ludwig Knoop

Although Baron Johann Knoop owned one of the most remarkable nineteenth-century collections of string instruments, we only have relatively scant information about the man and his life.

Born into a German family in Moscow in 1846, Johann Knoop was the second child and eldest son of six children. His father, Johann Ludwig Knoop, known as Ludwig, a successful textile merchant, made his fortune by setting up the cotton industry in Russia: he imported British machinery and know-how and built English-style cotton mills. He was eventually honoured with the title of Baron by Tsar Alexander II in 1877. At the age of thirteen, Johann moved to his father's home town of Bremen in northern Germany to be trained and educated as a merchant.

Little is known about Johann's Bremen years and by 1870 we find him living and working in London in the financial sector of the Knoop enterprises.

When he lived in London, most of his acquaintances were of German origin. Among them was Caspar Gottlieb Meier (usually called C.G. Meier), a merchant from Bremen. A collector of violins, Meier also did some dealing, travelling around Europe buying and selling instruments. And in all likelihood, it was Meier who inspired Johann to collect violins. Indeed, the early years of the Knoop collection show his influence.

In summer 1874, Johann married a young German woman, Henriette Louise Margarethe Kern, at the Knoop residence of Schloss Mühlenthal, near Bremen. A daughter, Louise, and a son, Ludwig, were born in London and baptised in the city's German church. But the family was doomed to have a short life together: Johann's wife and two children contracted tuberculosis. His wife died on 13 May 1882, and his daughter on exactly the same day eight years later; both are buried in the Knoop family grave in Bremen.

Despite this tragedy, the years 1880-1890 were of great importance for Johann's collection. As well as instruments acquired at the prompting of Meier, he purchased others through David Laurie, a Scottish violin dealer with good connections in France. As the Hills point out in their notes, Knoop usually bought poor-quality German instruments, ill-advised by Meier and Laurie. However he also acquired some absolutely outstanding violins, such as the "King" Guarneri del Gesù (1735), the "Alard, Baron Knoop" Stradivari (1715) and the "Sellière" Stradivari (1672).

From 1890 onwards, the Hills gradually exercised a greater influence in advising Johann Knoop as to which instruments to select for his collection, eventually becoming his sole consultants. This trust really paid off: Knoop built up one of the most remarkable collections of instruments in the world. As an amateur violinist, Johann played in his own quartet but he also had a keen interest in all aspects of violins, from the beauty of their workmanship to their enduring value.

It is not surprising that he turned to the Hills when acquiring instruments. The company's reputation was growing rapidly and their guarantees for instruments were recognised worldwide. One unfortunate experience that may have convinced Knoop to dispense with the services of Laurie in favour of only doing business with the Hills concerned a violin put together from various Stradivari



From the left, seated, Andreas Knoop, Ludwig Knoop and Johann Knoop, with Theodor Knoop standing behind them.

Courtesy of HEIMAT-UND VERSCHÖNERUNGSVEREIN BREMEN-LESUM E.V.

parts. The episode ended with Laurie being sued, hence the name the "Court Strad" for the composite instrument.

Over the years Knoop seems to have become a fairly close friend of the Hills. In 1895 William Henry Hill paid a visit to Schloss Mühlenthal and in 1898 Alfred Hill joined Johann on a trip to Moscow to see the collection of instruments that once belonged to Prince Nikolai Borisovich Yusupov.

After the death of his parents in 1894, Johann inherited Schloss Mühlenthal, while the Knoop industrial empire was divided up between the three sons, his two brothers taking care of the Russian business, while Johann was responsible for business in England. At the end of the century, there were more changes in Johann Knoop's private life. In summer 1899, he married Mabel Caroline (also called Maya) Stuart-King, twenty-nine years his junior and the former governess of his son Ludwig. The house in southeast London, called St Magnus after the village nearest to Schloss Mühlenthal, was sold in 1900. Johann had lived there since the early 1870s. He then bought South Park, a mansion in the town of Wadhurst, about sixty miles out of London, in 1903.

The poor health of Johann's son Ludwig, who was still suffering from tuberculosis, led to regular trips to Egypt. It was hoped that a warmer climate would help him towards a complete recovery. This and the feeling that he himself was growing older might have persuaded Johann to spend the future winters at Helwan near Cairo. The modern town of Helwan, a health resort for the wealthy, was founded in 1874 after the discovery of springs of healing water and since then had experienced a sharp rise in the

JOHN DILWORTH

Cremonese masterpieces in the Dextra Foundation

The Dextra Foundation has over recent years accumulated one of the greatest musical instrument collections in the world, under the guidance of the London connoisseur Peter Biddulph. The foundation has several important aims, but one crucial principle is to provide instruments with the best playing qualities to musicians and orchestras of Norway. To that end, it has focused on the functional, that is the tonal aspect, as much as the aesthetic and collectable value of instruments, which in this particular and curious area of the arts and antiquities, do not always overlap. Many of the instruments in the collection, the Cremonese being the best-known and most highly-regarded, reflect a particular point in the development of the violin. The founding father of this craft now over four and a half centuries old was Andrea Amati. The beautifully sophisticated design and construction of his very first known instruments made in Cremona from the 1560s set the pattern and standard for all to follow.

Music and the terms of performance were changing dramatically in this period and the acoustic function of the instrument also developed. After Andrea, three generations of Amati luthiers were to come, each almost over-stepping the other in craftsmanship, ambition and each reacting to that development.

By the time Antonio Stradivari came to maturity as an artist, violins were being asked to provide more depth and power, over and above the delicacy of tone for which Cremonese-made instruments were known throughout Europe. Stradivari experimented constantly over many decades, but the instruments which modern players now treasure for their ability to fill a large concert hall with a subtle, distinct and flexible voice generally come from the later period of his work, the so-called Golden Period (around 1700 to 1720), and further into his very last years before his death in 1737. These instruments had a revolutionary effect in terms of violin making and design. The irony is that Stradivari's last years were also the last years of the great classical Cremonese era, a fascinating period to examine as represented in the Dextra Collection.

The earliest Cremonese instrument in the collection is in fact the 1670 Francesco Rugeri violin. Rugeri already marks an important change in the tradition, which had previously belonged exclusively to the Amati family. There may have been "secrets" to Andrea's technique, which he handed on to his sons and they to theirs, but they would not have been beyond the means of anyone within the skilled workforce of a similar late-Renaissance city with a profound knowledge of natural materials and working skills. But to share accumulated experience would also have been a threat to the family livelihood, and many trades were already controlled for this reason by sophisticated guild systems. In 1630 the region was devastated by plague. The luthiers of Brescia, the only serious rival to Cremona at this time, were wiped out. Nicolò Amati, Andrea's grandson, survived, but alone. To continue, he had to take on assistance from outside his family, and a new period of violin making ensued. The demand for Cremonese work was clearly increasing all the while, yet there were few makers, really only Nicolò, able to meet it. In around 1640 he took on his first apprentice, Andrea Guarneri, who was to provide the city with



Detail of the scroll from a c.1670 violin by FRANCESCO RUGERI. Top and back are illustrated on pp. 24-25. Oslo, Dextra Musica Foundation.

another three generations of great makers. But in the city at around the same time, Francesco Rugeri also emerged. A close contemporary of Guarneri (Andrea was born in 1623, Rugeri in 1620), he was to become a celebrated and influential maker in his own right. Whilst most early violin historians assumed that Rugeri was also Amati's pupil, due to their very close style and level of workmanship (somewhat more controlled and consistent than Guarneri's, it might be said), archival research has failed to find any conclusive evidence of a formal relationship between the workshops of Amati and Rugeri. How he learned his trade is still unclear, but it is entirely possible that an adept woodworker at the time, with access to the same materials and the opportunity to make a fairly close examination of Amati's work, would not have had great difficulty in reproducing it. The vast majority of Rugeri's work was made following the "Grand Amati" model. This particular design was introduced by Nicolò Amati while still working with his father Girolamo, and was a significant step in developing the present form of the instrument. The new model was broader than the previous patterns drawn up by his grandfather Andrea (one of full length and the other slightly shorter than the modern standard), and although nowadays the Amati Grand Pattern is generally preferred for its greater tonal range, Nicolò continued to make the narrower form throughout his career. Rugeri was wise to take the larger "Grand" model as his template, but it is clear from his other work that it was not simply a case of tracing an existing form. He developed his own models for viola and cello, and he must have been familiar with the geometrical principles required to draw out newly proportioned instruments that remained within the Amati style. The geometry of Rugeri's scrolls is also subtly different, and seems to be a

CARLO CHIESA

A social network. Carlo Bergonzi's ties with his contemporaries

The city of Cremona is indelibly associated with the lives and works of great violin makers of the past. Stradivari's celebrated violins, Guarneri del Gesù's inspired instruments and the refined works of the Amati family all saw the light of day in this city. Today Cremona still boasts a large number of workshops that make it a world-famous centre for lutherie.

If we adopt a correct historical perspective, however, the vocation of Cremona for stringed-instrument making should be considered a contemporary myth rather than a real fact of the past. As far as we know, in the sixteenth century and until the mid-seventeenth century, there were only a couple of luthiers' workshops in Cremona, perhaps three. From around 1660 their number increased, with the simultaneous presence of several families of extraordinary makers, and in the period from 1680 to 1700 a visitor passing through the city could meet Stradivari, Girolamo Amati, Giuseppe Guarneri and the Rugeris in the space of a few minutes. These are truly great names, the very best in violin making. But we are talking about only four families in all. In the first half of the eighteenth century, another family was added, which would see out the greatest season of Cremonese violin. The founder of this last dynasty was a refined, sensitive luthier, an intelligent experimenter and an artist, bent on the pursuit of beauty: Carlo Bergonzi.

Reconstructing the history of Bergonzi is a difficult task because of the scarcity of precise information about him, but also, and especially, because of the gaps in our knowledge about the relations within the closed world of violin makers, and particularly those that developed between the various families and their workshops. Carlo trained and worked in the Cremona area where the best violin makers in history were active, and he undoubtedly collaborated with some of them. The available sources do not allow us to clarify precisely with whom he had relations and in what way, revealing just how little information we have and perhaps always will have about the history of Cremonese violin making.

Carlo Bergonzi was born in late December 1683. His father, Michele, had had a far from fortunate married life and was no longer a young man at forty-eight years old, while Carlo's mother, Giulia Gusberti, some fifteen years younger, was his third wife. Michele had a large number of children: Carlo was the fourth child to be born from his marriage to Giulia, and more were to come. The infant's baptism was celebrated on 21 December 1683 in the parish church of Sant'Agata, near his home. For most of his life Carlo Bergonzi remained attached to this area, the north-western part of the centre of Cremona, gravitating to the main thoroughfare of Strada Maestra, today known as Corso Garibaldi. On this same street, just beyond the church of Sant'Agata, stood the house and workshop where Stradivari had lived and worked until a few years earlier.

Before Carlo, the Bergonzi family does not seem to have had any connections with the world of violin making. Michele was an artisan, a member of the guild of *farinaroli* (flour merchants). At the time of Carlo's birth, he occupied a house with an oven, which shows that at least at that time he was a baker. Michele was not a wealthy man, but thanks to his job he had no financial problems, and his children probably received the typical rudimentary middle-class schooling of the time.

We have no details of Carlo's childhood and youth. We do, however,



A view of the facade of the church of San Luca in Cremona. Carlo Bergonzi lived in this parish from c. 1719 to 1745 and was a very active member of its community.

have a little information providing some insight into his story. In 1697, at the age of fourteen, a traumatic event deeply changed his life: the death of his father. Widowed and with a large family to support, his mother Giulia set about looking for a job and began to run an inn. Giulia is documented as an innkeeper for at least the years 1704 to 1708, but we can assume that she had the job for several years before and after that period. Just as it is easy to imagine that some of Michele's children worked in the bakery, while others were also employed in the inn. On the other hand, they clearly strove to be independent and eventually went their separate ways. Carlo's elder brother became a priest, while another son joined forces with his mother and was duly enrolled in the guild of innkeepers. Unfortunately, we do not know what trade the young Carlo wished to pursue, whether he was trained in a woodcarver's workshop or otherwise. What is certain, however, is that during his formative years the Bergonzi family developed an important, close relationship with a successful luthier: Vincenzo Rugeri.

Rugeri was twenty years older than Carlo Bergonzi and had trained in his father's workshop, situated in the outskirts beyond the city walls, on the road to Brescia. Around 1688, perhaps coinciding with his legal coming of age at twenty-five, Vincenzo separated from his father and opened his own workshop in the city, moving to reside and work in the district where the Bergonzi family lived. Archive documents tell of various situations showing how Rugeri and the Bergonzi family soon formed a relationship of friendship and trust, which over time was consolidated into a close bond. One episode giving us a good idea of the strength of that bond occurred a few years later, in 1708. The Bergonzi family found themselves in difficulty due to a problem arising from the liquidation of Michele's estate, which still had to be handed on to his children. Rugeri intervened by personally proposing to act as guarantor for those who had to put up some money for payments which they were not sure would eventually be covered. Thanks to his helping hand, Carlo's younger brother, Pietro Bergonzi,



CARLO BERGONZI, the “Kreisler, Perlman”
Dextra Musica collection, Oslo











CARLO BERGONZI, the “Earl of Wharnccliffe, Knoop, Landau”





MICHELE ANGELO BERGONZI, violin (1744), Oslo, Dextra Musica collection.

CHRISTOPHER REUNING

From father to son: the “Kreisler” and the 1744 Michele Angelo Bergonzi violin in the Dextra Musica

Introduction

Carlo Bergonzi has long been recognised as one of the pillars of classical Cremonese violin making, alongside Antonio Stradivari and the younger Giuseppe Guarneri, but his work has been shrouded in a certain mystery until recent decades. With an output of less than 50 violins, compared with more than 140 from Giuseppe Guarneri and over 600 instruments from the Stradivari workshop, direct knowledge of his work has been elusive. The two masterpieces by Carlo Bergonzi featured in this monograph, the circa 1733-35 “Kreisler” and the 1735 “Baron Knoop” violins were entirely made by the master during his most productive period, by which time he had fully developed his mature style and model.

Seven years later, we start to recognise the work of another hand in violins with his label. The contributions from this craftsman rapidly become more abundant, and it is soon obvious that Carlo’s eldest son, Michele Angelo (b. 1721), is hard at work by his father’s side.

The 1744 violin by Michele Angelo is possibly unique in classical-period Cremonese violin making because it bears the original label of the son while he was still working under the auspices of his father’s workshop. Cremonese tradition from the time of the Amati family decreed that works of an assistant bore the label of the master of the shop. Perhaps the only accommodation in this regard would be how the Stradivari and the Giuseppe “Filius Andreae” workshops differentiated violins with significant contributions from the sons by inserting a label indicating it was made under the “discipline” of the master: “Sotto la disciplina”.

This Michele Angelo Bergonzi violin, when compared and contrasted to the “Kreisler”, provides useful guidance revealing the individual characteristics of Michele Angelo’s work while helping us better understand the transitional and collaborative Bergonzi violins made from 1740 onwards. In this way, we hope to inspire readers to explore the intriguing work of these last two makers from the golden age of Cremonese violin making.

Bergonzi’s patterns

We are fortunate that two old walnut violin moulds attributed to the Bergonzi family have been preserved in the collection of the Museo del Violino in Cremona. Each of these moulds (MS 1060 and MS 1065) are signed “Cosimo Bergonzi”, “Zosimo Bergonzi”, or simply “Bergonzi” in the same handwriting, which resembles that of Nicola Bergonzi, a grandson of Carlo.

The Michele Angelo violin has measurements close to the “Kreisler” but has notably shorter C-bouts and narrower upper bouts (TABLE 1). While we do not have a CT scan of the Michele Angelo violin, a tracing of the back outline provides some information that suggests it may have been made on Stradivari “S”, MS 2 mould (which appears to have been used more often than the MS 39). Significantly, the Bergonzi family moved into the Stradivari home and workshop the year after this violin was made,

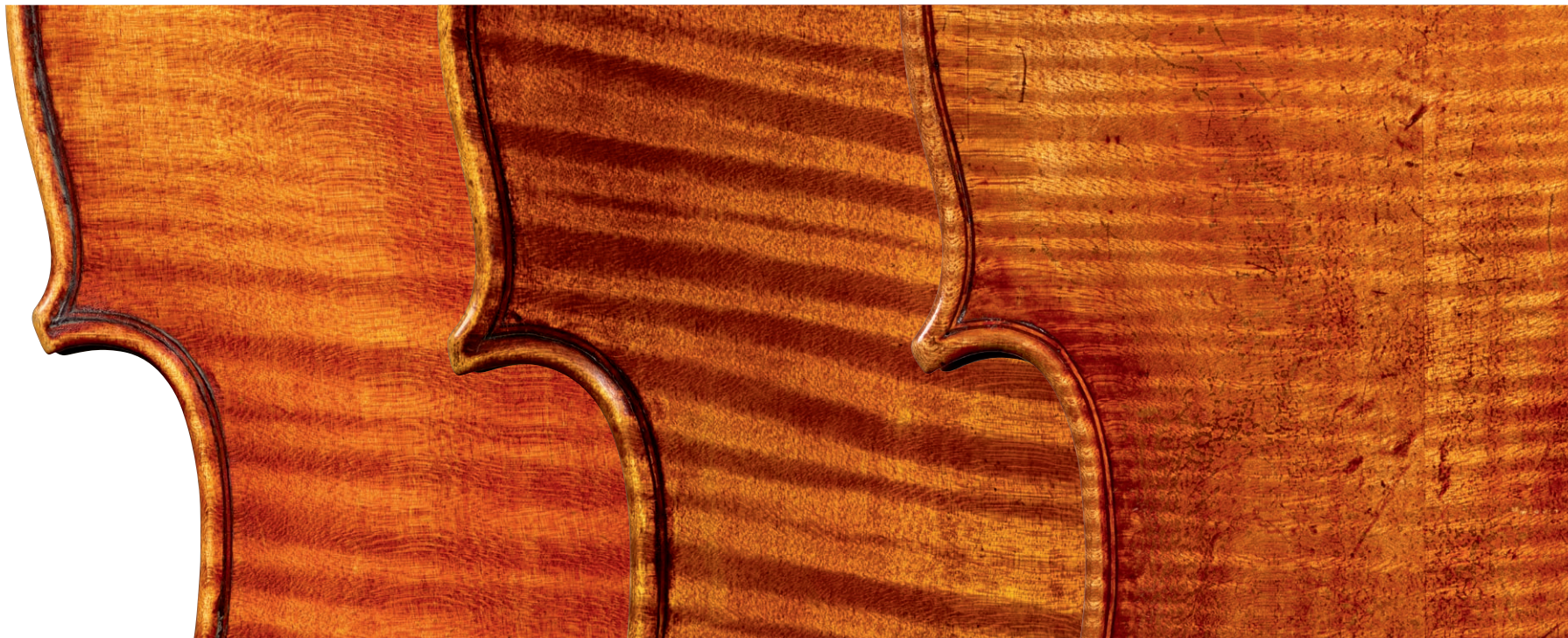
so evidence of collaboration between the two families would be corroborated by Michele Angelo’s use of a Stradivari mould.



The Bergonzi mould MS 1060 in the Museo del Violino, Cremona, with the detail of the signature of Cosimo Bergonzi.

	“Kreisler” Carlo Bergonzi	1744 Michele Angelo Bergonzi
Length of back	351.2 mm	354 mm
Upper bouts	164.7 mm	161 mm
C-bouts	105.7 mm	104,2 mm
Lower bouts	203.5 mm	202 mm

TABLE 1: Comparison of the four principal measurements of the 1744 Michele Angelo Bergonzi and the “Kreisler”.



Upper treble corner details of the c. 1733 “Kreisler”, the 1735 “Baron Knoop” and the 1744 Michele Angelo violin backs.

Edgework and purfling

A comparison of the corners and purfling of the Michele Angelo violin and the “Kreisler” reveals significant differences between the workmanship of father and son. The Michele Angelo violin has purfling with very little curve as it approaches the mitres at the corners. The purfling mitres are quite short with no extensions and are centred on the corners. The corners are noticeably tapered and extend considerably beyond the purfling mitres.

The father’s work shows a more skilled hand and greater attention to the architecture of the corners. The purfling is rather straight as it approaches the mitres in the corners but, nevertheless, has more curve than the son’s work. Although the purfling mitre extensions are modest, the corners have a more graceful appearance due to the finer craftsmanship. The corners of the “Kreisler”, like several other violins by Carlo, appear to have been shortened after the violin was made. If we compare the corners of the “Baron Knoop” (see p. 53), the “Kreisler” and the Michele Angelo violin, we notice the fine proportion of the “Baron Knoop” compared to the shortened corner of the “Kreisler” and the exaggerated length of the Michele Angelo violin.

Thanks to Duane Rosengard’s analysis of Count Cozio’s *Carteggio*,¹ we can presume that one of the five Bergonzi violins in his collection, dated 1733, was the “Kreisler”. According to his notes, this violin had a one-piece back of wide grain, an original neck

notably longer than those on Stradivari’s instruments, four corners that were too acute, and some worm-infested linings, later removed. The work on the linings is consistent with minor repairs observed in the “Kreisler” in recent years. Cozio further states that one of his 1733 Bergonzi violins had its label removed and later he refers to his new and intact Bergonzi as having a Stradivari label when he left it to his nephew in 1808. In 1816 Cozio writes about his largest and most beautiful Bergonzi violin as having the four corners blunted on his instructions.

The purfling of the “Kreisler” has quite broad centre strips in line with the style of the Stradivari workshop at that time. Nevertheless, the purfling is set rather close to the edge, considering its width. The edgework is finely sculpted with a shallow but nicely finished channel and a rather well-defined crest, set quite close to the edge.

Michele Angelo used purfling set rather close to the edge with a narrow centre strip, emulating the work of the leading Cremonese violin maker of the day, Giuseppe Guarneri. The channel is not as well formed as that of the “Kreisler” and the edgework is less precisely done.

Interestingly, the original neck on the “Kreisler” has been adapted to a modern setting and has an exposed nail hole in the heel. The tall button is unaltered and has undisturbed notches on each side.

Nail hole in the heel and button of the “Kreisler”.



¹ D. ROSENGARD, “An unlikely succession”, in C. REUNING (ed.), *Carlo Bergonzi, A Cremonese Master Unveiled*, Fondazione A. Stradivari, Consorzio Liutai A. Stradivari, Cremona 2010, pp. 47-48.

ANDREW FAIRFAX

A seamless transition. Carlo Bergonzi's varnish

Although Carlo Bergonzi's earliest working relationship in Cremona appears to have been with Vincenzo Rugeri, some of his finest instruments coincide with a period described as the most artistically fruitful of Giuseppe Guarneri del Gesù and the last few years in the life of Antonio Stradivari. Both the "Kreisler" and the "Baron Knoop" violins were made when unmistakable mutual influences suggest a brief period of remarkable creativity in the city, underlining the extent that all three makers would have been intimately familiar with each other's work. Bergonzi's collaboration is also apparent in some of Stradivari's later instruments but his own work retains a strong individuality, as does his varnish. Until Stradivari began adding pigment to an additional layer in the mid-1680s, Cremonese varnish could be described as a single coat system composed of one or more layers of the same varnish over the pre-treated wood. By the time Bergonzi made the "Baron Knoop" and the "Kreisler", the principal of a multi-layered varnish system with a final pigmented layer was accepted practice in Cremona. Bergonzi and his contemporaries in the city were, therefore, all employing similar varnishes and techniques, albeit with distinct differences in application and probably in pigmentation. This is consistent with other centres of violin making in Italy, where purchasing from the local apothecary would have been standard practice. Slight variations might be expected, dependent on the quality of ingredients, as well as the skill of the varnish manufacturer or minor adaptations made by the maker, but it is this consistency that often indicates the location where an instrument was made. The wood of Bergonzi's violins can sometimes look a little darker than those of Stradivari and del Gesù, although a distinguishing feature of all classical Cremonese instruments is how the surface of the wood appears so resistant to dirt. Even where the varnish gives the impression of being completely worn away, the fibres of

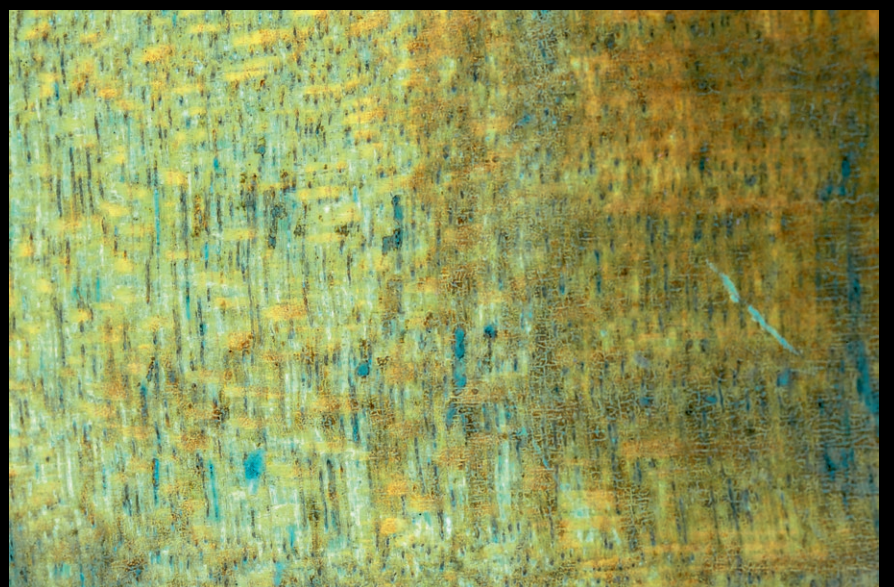
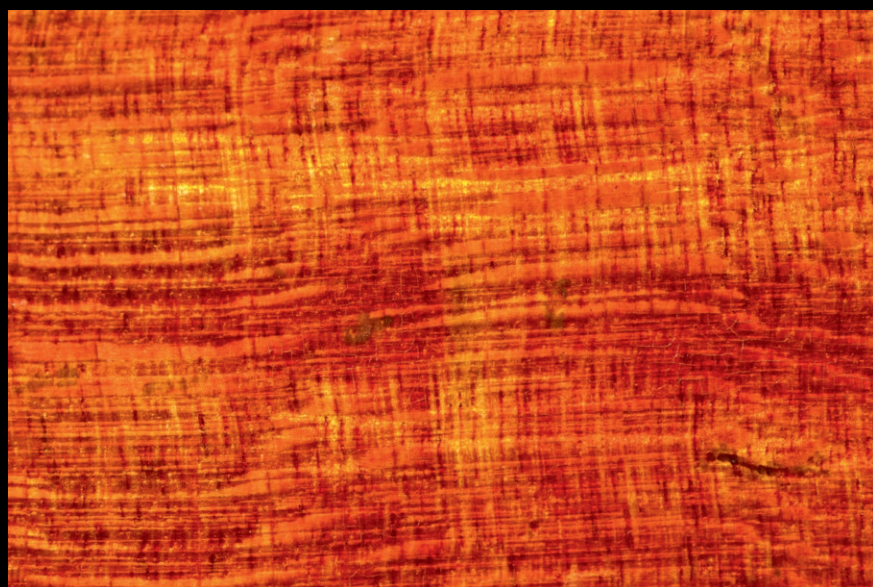
the wood remain clean and the brilliance of the surface intact. Only with more extreme wear do the pores of the wood fill with dirt, suggesting some form of pre-treatment of the wood prior to varnishing. Research by Brigitte Brandmair¹ has identified this pre-treatment that protects and partially seals the surface so successfully on instruments by Stradivari as a proteinaceous layer, often with some form of colouring material that produces a light staining or quenching of the wood. This quenching may be responsible for reducing the contrast between the early and late growth in the maple that is so characteristic of Cremonese instruments. Above this proteinaceous layer is the first layer of uncoloured varnish that often slightly penetrates the upper surface of the wood and fluoresces a milky yellow-white colour under ultraviolet light. These layers homogenise the surface and have the ability to smooth over the various tool marks commonplace on Cremonese instruments like a "blanket of snow", as the late Koen Padding once described it.² Bergonzi's varnish, however, regularly appears to lie much closer to the surface of the wood than his contemporaries so the distinct lack of any proteinaceous layer in the laboratory analysis would explain this appearance perfectly. A small amount of varnish absorption into the pores of the wood is not particularly unusual and is for instance present on the "Messie" of 1716, but is very much a characteristic of Bergonzi's work, particularly during the 1730s (FIG. 1). This suggests he may have deliberately reduced, or omitted completely, the proteinaceous layer for a specific reason.

The sculptural form of the violin gives rise to many cut fibres over the surface of the wood and the angle of these cuts affects the amount of absorption of any medium applied to the surface. However, if the pre-treatment produces a very homogeneous layer, it becomes harder for the clear varnish to anchor itself to the surface, causing it to wear or flake off, taking the subsequent

¹ B. BRANDMAIR, S. P. GREINER, *Stradivari Varnish. Scientific Analysis of his Finishing Technique on Selected Instruments*, Eigenverlag, London, München 2010.

² K. PADDING (ed. H. MICHETSCHLAGER), *Violin Varnish - Notes and Articles from the Workshop*, Doratura Publications, London 2015.

Figure 1. Varnish penetration on the back of the c. 1733 "Kreisler" violin by Carlo Bergonzi.



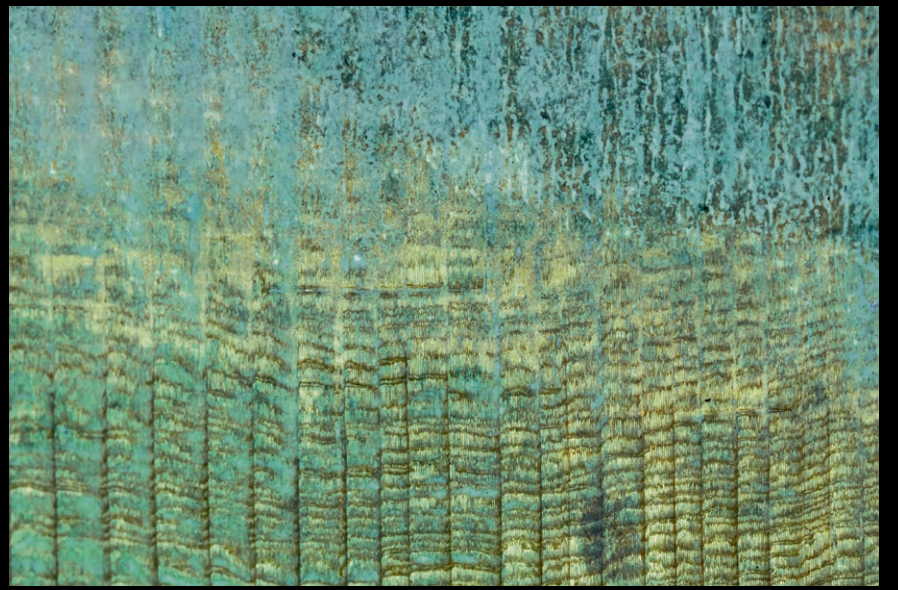
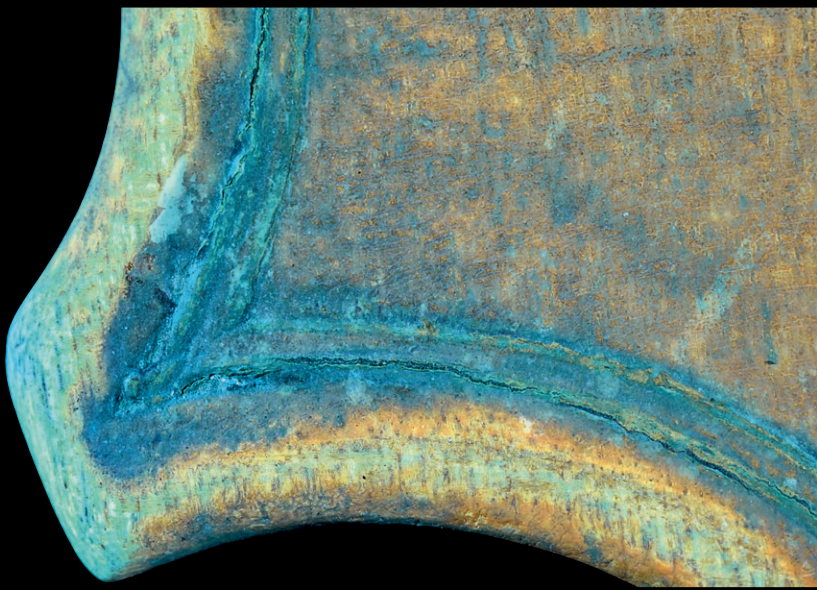


Figure 4: on abraded areas of the corners and edges, only a thin area of pre-treatment and clear varnish is exposed on the “Kreisler” (left). On equally abraded areas of the top (right), remains of the varnish and polish are visible within the spruce structure.

formed. Premature fissures, such as net fissures and branch structured fissures that only reach the clear varnish generally have soft edges and are commonly found in the most protected areas on an instrument. These can result from one layer of varnish being applied before the previous coat had completely dried, the type and quantity of oil or drying agents used in the varnish, or affected by humidity. It is also more likely to occur within the thickest layers of varnish. Ageing cracks, including net cracks and grid cracks tend to have sharper edges and reach deeper towards the wood. It is not unusual to find this type of craquelure develop above the premature fissures as a result of later interventions such as polishing or over-varnishing. Polishing is occasionally less

obvious under natural light but is clearly detectable fluorescing blue-grey under UV (FIG. 3, right). This can not only produce a garish shine but will permanently destroy the delicate texture and patina of the varnish surface, especially over the larger and flatter areas, such as the centre of the back, while leaving the least accessible parts relatively untouched. Polishing also drives any remaining dirt and rosin from the surface into the open pores of the wood. This appears to have happened in some areas on both violins, judging from where the varnish fluorescing dark brown has impregnated the pores and been covered by a build-up of a more superficial substance fluorescing blue-grey. It is sometimes possible to remove polish, but this is usually a very



Figure 5: crequelure and surface texture are still visible on the back of the “Kreisler” (above). Craquelure can also develop as a result of polishing (detail of the C-bout rib on the “Kreisler”, bottom left), a process that drove dirt and rosin to impregnate the open pores of maple “Baron Knoop” (bottom right).



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Carlo Bergonzi's materials: a case study

There is a vast scientific literature on diagnostic studies of the instruments of the great violin-making families such as the Stradivaris, Amatis and Guarneris, but very few studies have been conducted on the work of Carlo Bergonzi. The unique opportunity to closely investigate two of his instruments from around the same period, the "Kreisler" and the "Baron Knoop", among his best known and most valuable works, made it possible to lay the foundations for a scientific study of the instruments attributed to Bergonzi. In this study, therefore, identifying macroscopic and microscopic similarities and differences was of crucial importance, so that characteristic details of the production of Carlo Bergonzi and his workshop can be established.

Diagnostic method

The discussion of the results is based on consolidated analytical protocols involving the use of totally non-invasive and mutually complementary investigations. Through the preliminary observation of fluorescence induced by ultraviolet light (UVIFL), we identified restored areas, areas most subject to wear and those potentially best-preserved. This assessment was based on the study of fluorescence colours and their saturation and distribution on the surface of the instruments (FIG. 1).

On the basis of the results obtained from image analysis, investigations were carried out using spectroscopic methods, namely X-ray fluorescence (XRF) and reflection infrared spectroscopy (FTIR). These techniques allow us to identify the organic and inorganic substances which, stratified, constitute the finish on the instrument.

Lastly, in the case of the "Baron Knoop", we could further study the organic components with an innovative technique that uses proteomic and metabolomic analyses to identify molecules absorbed from the surface of objects through functionalised films. Nano-sampling of protein material (characteristic of glues and possible wood preparations), resins and fatty acids (characteristic of varnish) was carried out in the areas considered potentially interesting, which were then analysed using chromatographic and mass spectrometric methods.

Wood treatments

The study of the elements with XRF and of the molecules with FTIR made it possible to detect silicates signals in the most abraded areas and areas with a greater presence of varnish in both instruments. Silicates could be linked not only to the deliberate application of a ground but also to residues from the surface

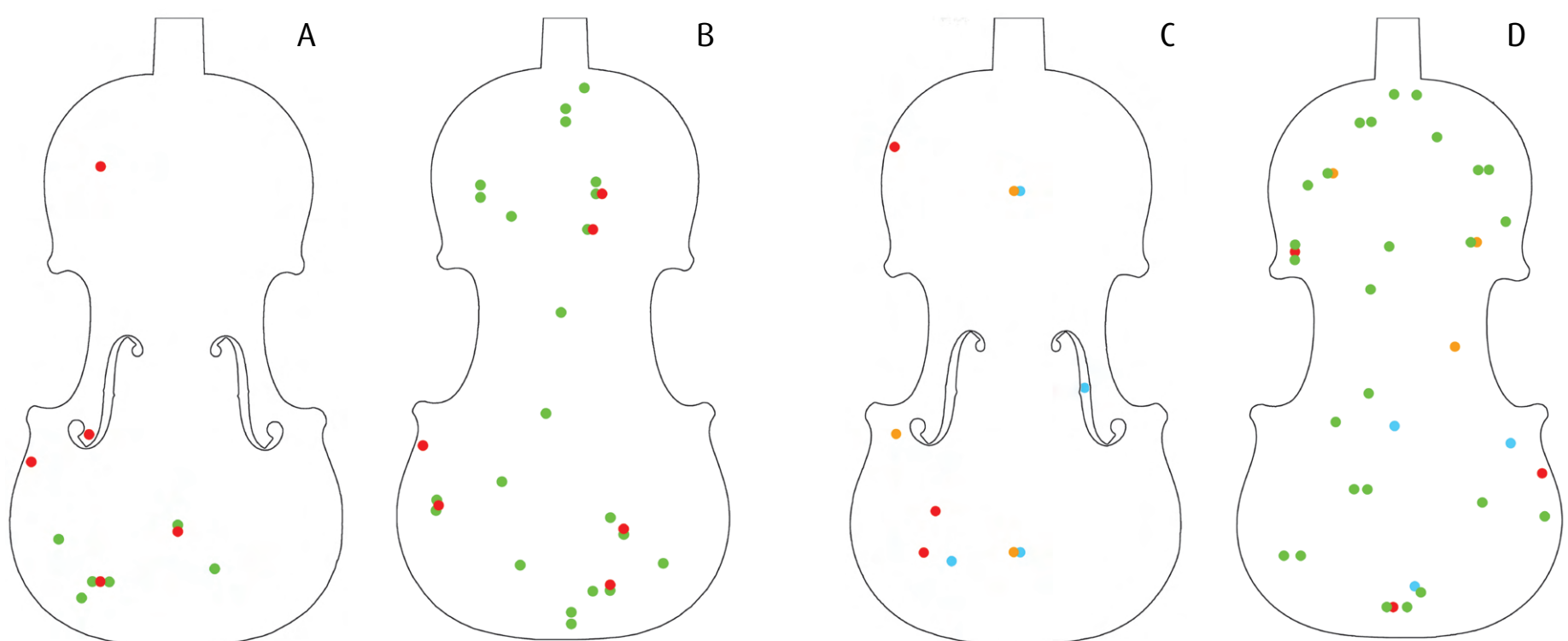
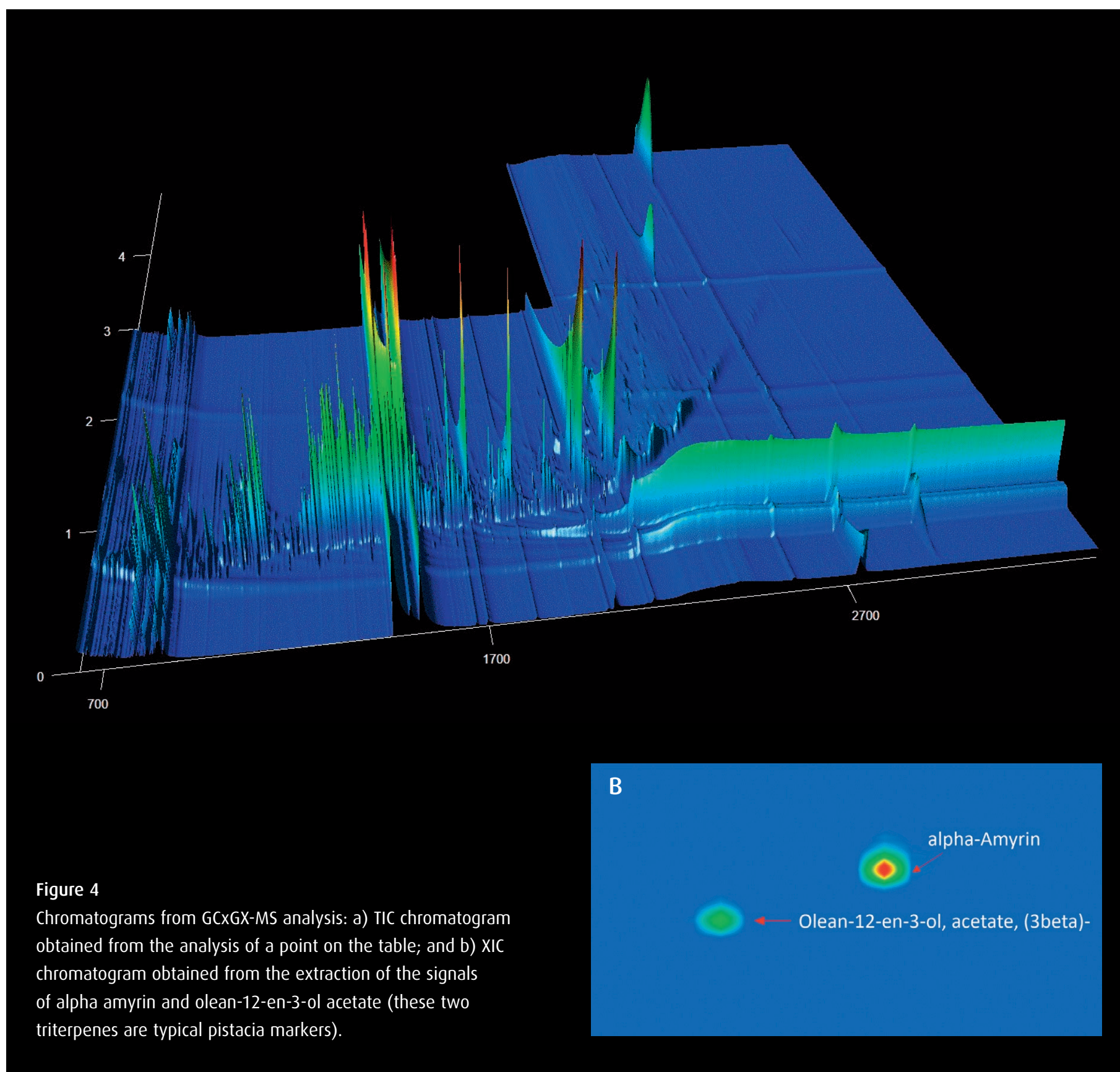


Figure 1
Diagram of the points analysed on the tables and backs of the "Kreisler" (A, B) and "Baron Knoop" (C, D) violins. The points were selected on the basis of UV light-induced fluorescence images. The different colours associated with the points indicate the different analytical techniques: XRF (red), reflection FTIR (green), proteomics (blue) and metabolomics (orange).



block), where the wood is exposed.⁸ The presence of organic salts, such as oxalates, in areas where the varnish is well preserved could be due to a natural degradation process of the oleic component of an historical varnish.⁹ The signs of the presence of shellac in some limited areas of the back (lower area, bass side) can be attributed to posthumous maintenance work.

In the case of the “Baron Knoop”, however, shellac was detected on the entire surface of the back. In the UV images it comes up in grey to orange fluorescence colours; this colour change could be due to variations in the thickness of the film and alterations through natural ageing. Given the extent of the surface involved, it is likely that the use of animal resin can be linked to French polishing of the instrument and that the spectral profile of the original varnish, where preserved, is concealed by shellac. Metabolomic analysis was used to selectively detect the organic molecules that identify the materials used by Bergonzi to make the varnish for the “Baron Knoop”. The investigation was

conducted on seven selected areas of the surface of the table, the back, and the throat of the scroll. The results enabled us to describe with certainty the composition of the original varnish as a mixture of resins and siccative oils. In fact, all the samples were found to contain the major components of monocarboxylic fatty acids with long hydrocarbon chains (up to 24 carbon atoms), characteristic of the presence of a natural siccative oil, probably linseed, as the main ingredient of the varnish. Dicarboxylic organic acids associated with natural oxidative processes in the original lipid component of the oil were also identified. These markers confirm the presence of an aged oil. Together with the molecules attributed to the lipid component, diterpenoid signals typical of coniferous resins and their oxidation products were found. This suggested that rosin, Venetian turpentine and sandrac were present in the varnish. In addition, specific triterpenoidic acid signals would also seem to indicate the presence of a mastic resin in the varnish.¹⁰

⁸ C. INVERNIZZI et al. “The elemental composition of Stradivari’s musical instruments: new results through non-invasive EDXRF analysis”, *X-Ray Spectrometry*, 2018.

⁹ V. OTERO et al., “A little key to oxalate formation in oil paints: protective patina or chemical reactor?”, *Photochemical & Photobiological Sciences*, vol. 17, 2018, pp. 266-270.

¹⁰ E. BARBERIS et al., “Leonardo’s Donna Nuda unveiled”, *Journal of Proteomics*, vol. 207, 15 September 2019.

PETER RATCLIFF

Dendrochronological analyses of Carlo Bergonzi's "Kreisler" and "Baron Knoop" violins

The c. 1733-35 Carlo Bergonzi "Kreisler" violin

The belly of the "Kreisler" was fashioned from two pieces of wood, as was all his production tested so far. The species of the wood is almost certainly spruce (*Picea abies*, L. Karsten).

In recent years, with the rapidly increasing quality and higher resolution of digital equipment, a growing number of dendrochronological tests on musical instruments have been based on tree-ring measurements gathered from digital photographic or scanned images. In most instances, these methods are equally as

accurate as collecting data microscopically. A digital image has the distinct advantage that it can be filed and stored for later use or further assessment if required.

For the present analysis, high-resolution digital images of the belly were supplied. The maximum number of rings available is situated at the widest part of the body. The tree-ring measurements were therefore collected along a horizontal axis across the lower bouts of the front.

Results of the statistical cross-dating tests

Two entire and separate sequences of tree-ring measurements across both halves of the belly were collected from digital images. The sequences were initially cross-dated independently and compared to each other to ensure that no mistakes or omissions had been made during measuring. The data were found to cross-date consistently at their relative dating position and were subsequently combined to form two complete sequences, or "curves", representing the two ring patterns of the bass and treble sides.

The resulting ring sequence across the bass side of 105 measured rings, the equivalent of 105 years of growth, cross-matched reference-instrument chronologies and individual series from instruments at the year 1719; and the sequence across the treble side of 98 rings more significantly cross-matched reference-instrument chronologies and individual series from instruments at the year 1717 (TABLE 1).

These dates correspond to the year of growth of the latest visible original annual tree rings measured on the belly of the instrument under investigation and refer to rings situated adjacent to the centre joint.

The first observation that can be made about the analysis is that the ring patterns of the two halves display many differences in the widths of their contemporaneous rings. This can be seen in the comparative graph of their plotted data shown below.

their ring data reveal a highly significant statistical correlation, represented by a *t-value* of $t=10.35$, together with a coefficient of parallel correspondence (*Gleichläufigkeit* or Glk) of 77.8%. In many cases, these combined levels of statistical relationship often refer to pieces from the same tree, especially when the sections are part of the same top. Whilst tree rings are never perfectly concentric within a log, the degree of variability seen in the graph cannot be said to support the same-tree hypothesis in this case. In view of the statistical results, this remains a vague possibility. Clearly, it could only be the case had the tree growth been particularly erratic around its circumference. The exceedingly high levels of cross-matching results obtained with ring patterns from other instruments, especially against data from the bass side, suggest a different tree origin however. In fact, data from over 35 separate instruments in our database cross-match the bass side and 18 the treble side, exceeding the *t-value* established between the two halves of the "Kreisler".

Nowadays, methods of felling, cutting and generally processing wood for the tops of instruments almost invariably dictate the way the plates end up being positioned on the bellies. The book-matched symmetrical pattern is now a pre-requisite and the result of a universally adopted practice. This was also the understanding by modern makers, who naturally believed that this situation had always been the norm. Indeed, why would you not follow a strict book-matching technique?

Comparisons of paired plates on countless eighteenth-century instruments have now proven that this was not the case at that time. Whilst the halves of some instruments appear to have been – and probably were – book-matched from a single wedge, many clearly were not. This was certainly the situation in some of the busier workshops in Italy during most of the eighteenth century, including those of Antonio Stradivari, Giuseppe Guarneri del Gesù, Carlo Bergonzi and Giovanni Battista Guadagnini.

When halves were not matched, it was probably due to wood processing and storing procedures. The many instances of same-tree associations identified among multiple instruments emanating from the same workshop, suggest that the wood

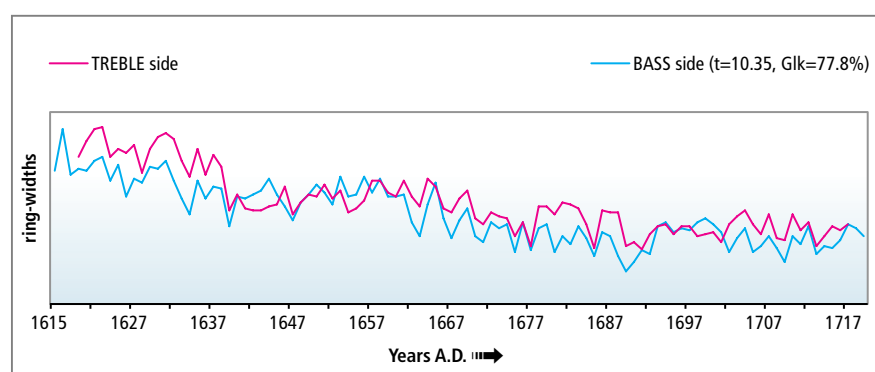


Figure 1. Ring patterns of the bass and treble sides of the "Kreisler".

We can see that the discrepancies appear to be present along the entire length of their overlap. The cross-matching tests between



Cross-matches to the BASS side at 1614-1719	T-value	Overlap	GIk%
A. Stradivari violin, c. 1732	21.56	103	85.8
A. Stradivari violin, 1732	19.74	105	83.7
G. Guarneri del Gesù, composite violin	18.03	105	82.7
C. Bergonzi violin "Sandler" (incomplete data), 1742-44	17.13	80	87.1
A. Stradivari violin "Schneeberger", 1731	16.86	90	87.1
C. Bergonzi "Emiliani, Parsons" violin, 1734	16.28	80	85.4
G. Guarneri del Gesù violin	14.57	89	83.5
A. Stradivari "Lady Jeanne" violin, 1731	14.56	105	83.7
C. Bergonzi "Heath, Cramer" violin, 1732	14.48	83	86.0
G. Guarneri del Gesù "Baron Heath" violin, 1729	14.02	97	79.7
C. Bergonzi "Segelman, Marwood" violin, c. 1736	13.9	77	84.2
G. Guarneri del Gesù, "Zimmerman" violin, 1726-28	13.87	84	86.1
Possibly C. Bergonzi on A. Stradivari back	13.82	102	85.1
C. Bergonzi "Ex Mischa Piastro" violin, c. 1739-42	13.74	97	77.6
A. Stradivari "Habeneck" violin, 1734	13.69	86	84.7
A. Stradivari "Laub Petshnikoff" violin, c. 1727	13.44	95	75.5
N. Gagliano violin	12.72	100	79.8
G. Guarneri del Gesù "ex-Ricci" violin, 1734	12.62	71	86.4
C. Carlo Bergonzi "Baron Eichthal, Heath" violin, c. 1743-47	12.38	77	86.2
A. Stradivari, table possibly C. Bergonzi	12.18	86	83.5
O. Stradivari or C. Bergonzi, 1730s	11.94	95	79.3
G. Guarneri del Gesù "Armingaud" violin	11.61	105	70.7
A. Stradivari "Laub Petshnikoff" violin, c. 1727	11.59	78	77.9
C. Bergonzi "Gilfillan, Hoffmann" violin, c. 1744	11.42	88	81.0
N. Gagliano violin	11.4	98	78.4
G. Guarneri del Gesù "Enescu" violin, c. 1728-30	11.33	84	78.9
P. Guarneri of Venice belly on Goffriller violin	11.32	94	79.0

Cross-matches to the TREBLE side at 1619-1717	T-value	Overlap	GIk%
A. Stradivari violin "Hercules", 1734	15.19	93	76.6
M. A. Bergonzi workshop cello	13.03	98	75.8
A. Stradivari, table possibly C. Bergonzi	12.49	76	74.0
A. Stradivari violin, 1710	12.44	80	75.3
A. Stradivari violin, 1732	12.43	77	83.6
A. Stradivari "Artot" violin, 1709	12.41	80	74.1
T. Eberle violin	12.08	73	82.6
M. Goffriller viola	11.91	66	70.8
M. Deconet violin	11.75	86	76.5
A. Mezzadri violin (attrib.)	11.73	98	75.3
C. Camilli violin, 1752	11.71	67	74.2
A. Stradivari "Le Président" violin, c. 1732	11.71	98	76.8
A. Zanotti violin	11.7	75	71.6
A. Stradivari "Artot" violin, 1709	11.69	80	72.8
D. Busan cello, c. 1760-70	11.66	98	75.8
L. Carcassi cello, 1763	11.65	98	78.4
G. Guarneri del Gesù "Posselt" violin, 1732	11.61	98	77.8
N. Gagliano violin	11.52	98	76.8
A. Stradivari "Titian" violin, 1715	11.32	57	75.9
D. Montagnana violin	11.27	98	70.1
G.B. Rogeri cello	11.22	71	73.6
A. Stradivari violin, 1732	11.22	98	80.9
G.B. Guadagnini viola	11.16	98	77.3
G.B. Guadagnini violin, 1740s	11.16	98	78.9
C. Camilli violin labelled Zanotti	11.08	98	78.9
C. Bergonzi "Bercic, Raymondi" violin, 1735	11	63	79.8
A. Stradivari "Habeneck" violin, 1734	10.99	84	77.7

Table 1. Results of the statistical cross-dating tests: cross-matches to the bass side at 1614-1719 and to the treble side at 1619-1717 (earliest-latest ring dates).

RUDOLF HOPFNER

Carlo Bergonzi's "Kreisler" and "Baron Knoop" violins: a CT examination

Introduction

As in the previous volumes in this series,¹ the two Bergonzi violins have been scanned with high-resolution CT scanners. This non-invasive procedure is the basis for various visualisations in the 2D and 3D domains used to cast light on typical design features of Bergonzi's instruments as well as on alterations and repair work carried out over the years.

The resolution of the scan is defined by the size of the voxels, the equivalent of pixels in the 3D domain. The two instruments have been scanned using different scanners with a maximum resolution of 100 µm ("Kreisler") and 130 µm ("Baron Knoop"), respectively. The head of the "Baron Knoop" has been scanned with a resolution of 106 µm.

Visualisations of CT scans are based on slices representing the complete volume of the item under investigation. These slices can be viewed in one of the three main sectional planes but also at oblique angles. Starting from these slices, our software enables us to create volumes and surfaces. Volumes are virtual representations of the whole item or of any desired section. This option primarily provides the opportunity to inspect otherwise inaccessible areas. Furthermore, the opacity of volumes can be adjusted. If the so-called α -value is maximised, only the surface of a volume is visible. If this value is reduced or set to zero the volume seems to become translucent. Details of the interior of certain parts can thus be visualised.

Unlike volume renderings, surface models offer additional options. A surface represents the boundary between pre-defined grey tones – in our case, those between air and wood. Surface models can be imagined as very thin layers completely covering a volume. They are the starting point for measurements in the 3D domain, and even allow measurements to be taken for otherwise inaccessible areas. The very precise data can be supplemented by so-called mappings. A special option in our software allows us to calculate the distances of surfaces. The measuring data is assigned to colour maps which render, for instance, the thickness of a belly or back. X-ray scans are saved as black and white images in 16-bit format. To enhance vividness, we use false-colours, ranging from black (surrounding air) to reddish-brown, orange and yellow (wood of different densities) and white (very dense materials, such as glue). As in photography, the exposure latitude of X-ray images is limited. Objects with an exceptionally high attenuation factor (such as the remains of nails in the neck of the "Kreisler" Bergonzi) may, therefore, cause unwanted artefacts. By adjusting certain parameters these artefacts can be reduced, but unfortunately not eliminated.

In addition to the printed visualisations included here, the DVD includes digital images and animated sequences of slices and volumes. In some cases, the images have been scaled to actual size and can therefore be used to create arching templates or moulds.

¹ A. ZANRÈ (ed.), *The Girolamo Amati Viola in the Galleria Estense*, Scrollavezza & Zanrè, Jan Röhrmann, Parma 2014; A. ZANRÈ (ed.), *The 1690 Tuscan Stradivari Violin in the Accademia di Santa Cecilia*, Scrollavezza & Zanrè, Jan Röhrmann, Parma 2017.

Upper blocks: The "Kreisler"

The CT scan reveals that the neck construction of the "Kreisler" underwent several modifications. FIGURES 1 and 2 show details of the present situation:

1. original neck with nail holes
2. neck foot extension with a dovetail joint
3. neck heel between button and neck
4. small insert to reduce the mortise in the upper block
5. new part of the upper block
6. old part of the upper block

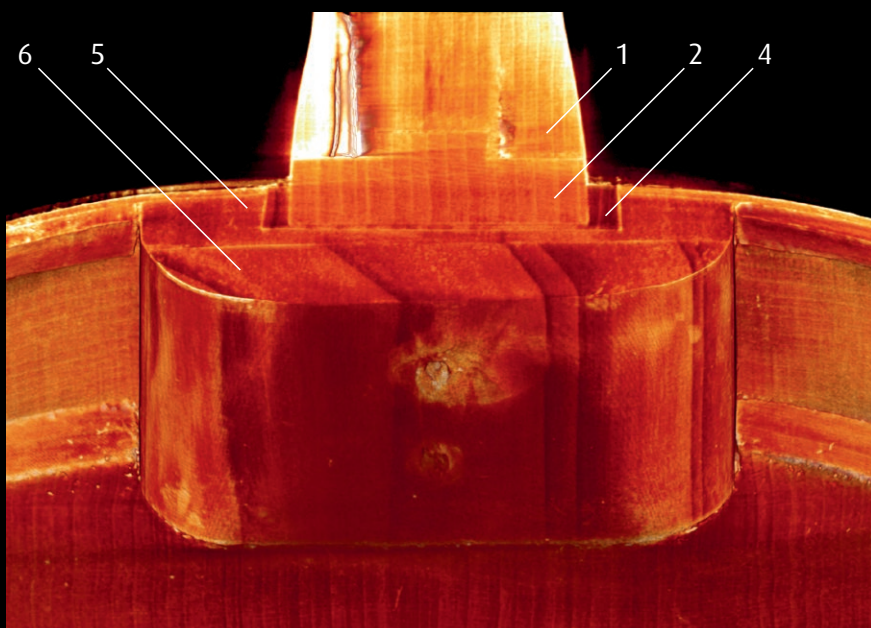


Figure 1

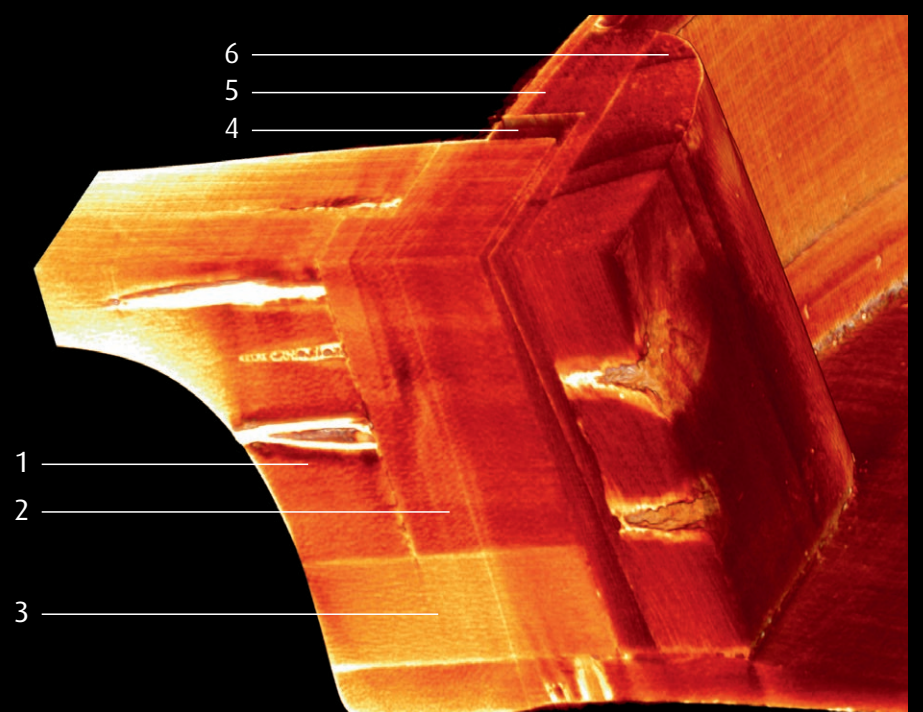


Figure 2

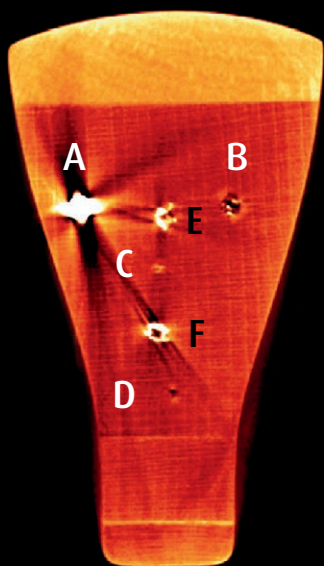


Figure 3

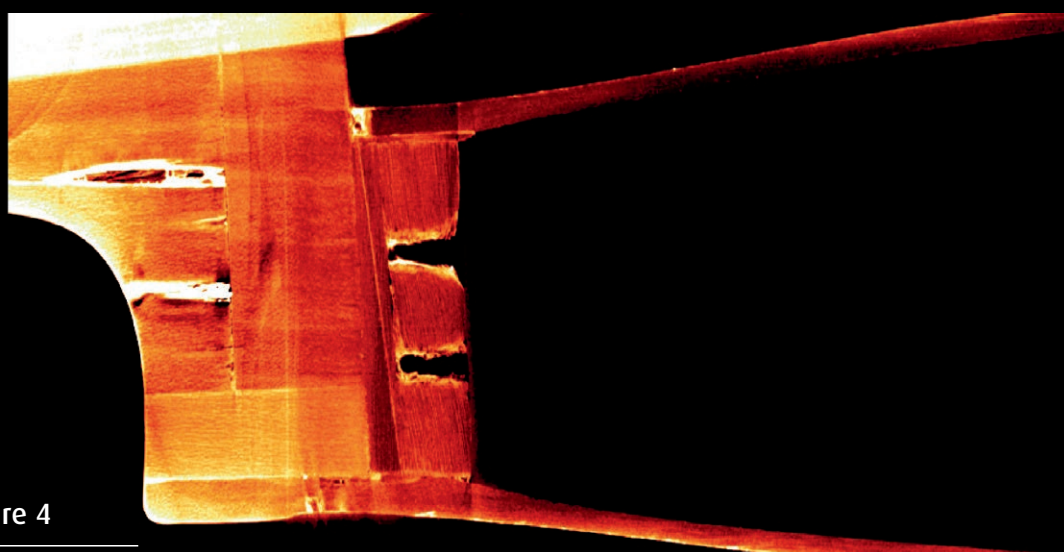


Figure 4

The fact that the original neck has six nail holes while we find only two in the exterior part of the upper block requires explanation. Two of the nail holes in the neck align perfectly with the two holes in the upper block, while four holes have no equivalent. We can thus assume that the neck construction of the violin underwent four phases:

Phase 1: when the instrument left Bergonzi's workshop, the neck was attached to an upper block (now lost) with four nails (FIG. 3, holes A-D).

Phase 2: a new block was made and the neck reset at a more sharply inclined angle. The neck was secured with two nails (FIG. 3, holes E and F)

Phase 3: the neck was lengthened (the extension has a dovetail joint) and inserted in an upper block consisting of new material and the remains of the phase 2 block (FIG. 1, no. 5 and 6).

Phase 4: the neck plus the extension were set higher by inserting wood at the neck heel (FIG. 2, no. 3). This caused a small gap between the conically shaped flanks of the neck foot and the mortise in the upper block. This gap had to be filled with wood (FIG. 2, no. 4).

As mentioned above, ours is only a conjectural approach based on evidence revealed by the CT scan (an animated series of slices of the upper block can be viewed on the DVD). The vast majority of instruments from the classical period have been modernised by replacing the original upper block and inserting a new neck, grafted to the pegbox with, of course, a loss of original material. The neck of the "Baron Knoop" has been modernised in this way. The "Kreisler" was modernised, on the other hand, with the aim of preserving as much original material as possible. We should be grateful to the violin makers who chose this method and preserved the reshaped original neck and parts of an old upper block.

The "Baron Knoop"

The "Baron Knoop" neck and upper block are replacements.

The slice in sagittal direction (FIG. 5) shows that the new neck was subsequently reset by inserting a thin wedge at the neck heel.

On the back, the purfling and the nearby remains of the original pin are visible below the button.

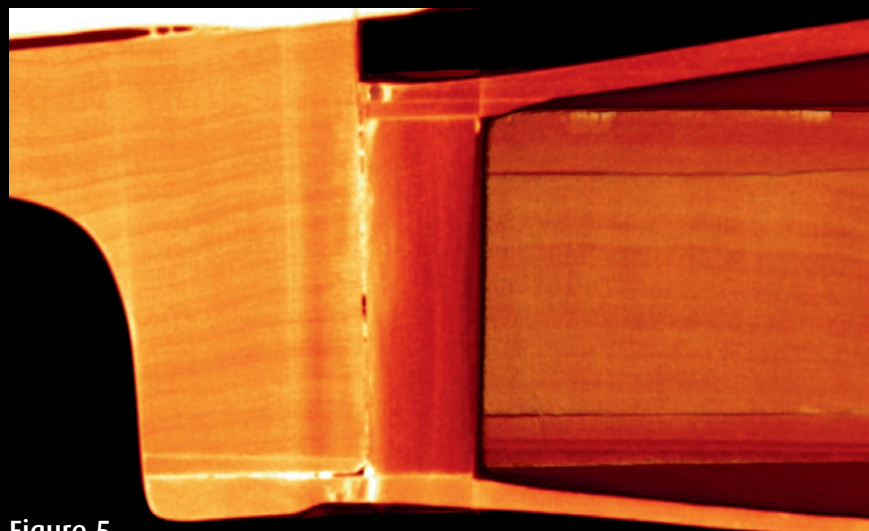


Figure 5

Lower blocks: the "Kreisler"

Although CT images do not permit the identification of wood species, we know through physical observation that Bergonzi used soft deciduous wood, probably willow, for the interior construction of the two violins. In the present stage the lower block of the "Kreisler" consists of two layers. The lower original part, close to the ribs, consists of a small strip around 3 mm thick. The rest of the block is a later replacement. FIG. 7 shows that the original pin in the back is still present. At the belly (FIG. 6), traces of the pin and a tiny mark, indicating the centre line, are visible.

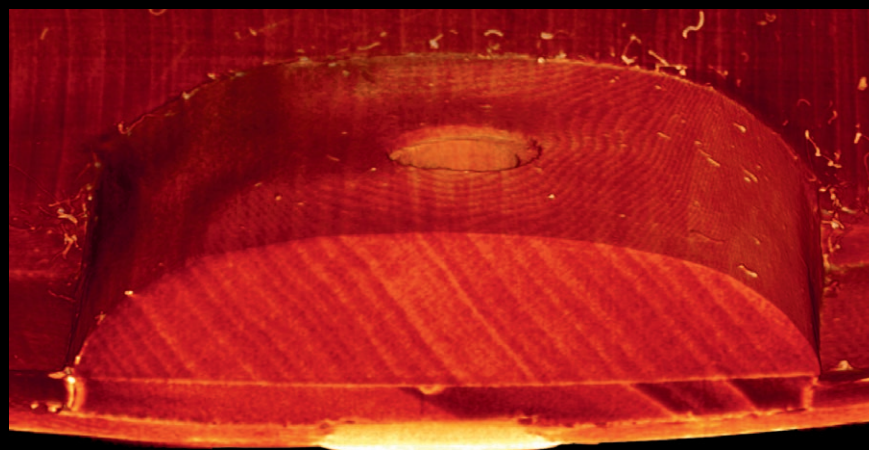


Figure 6

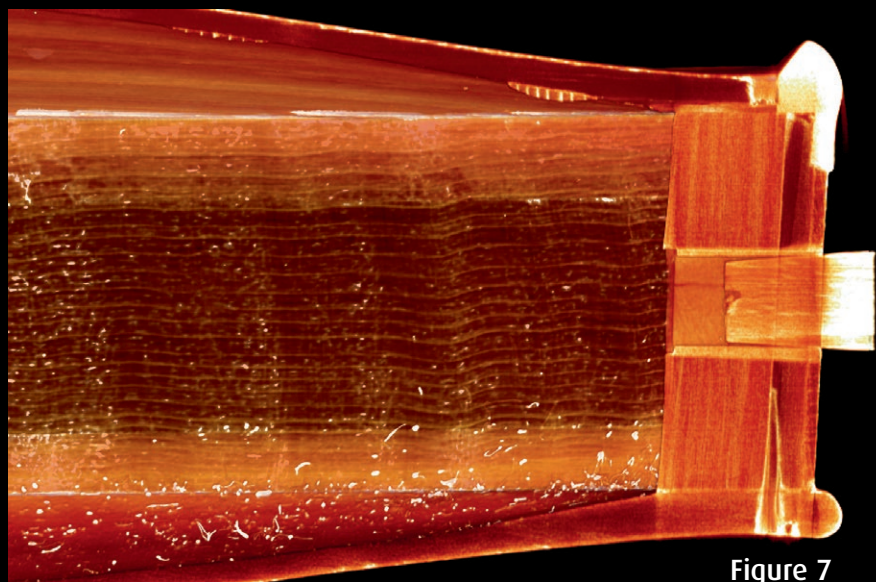


Figure 7

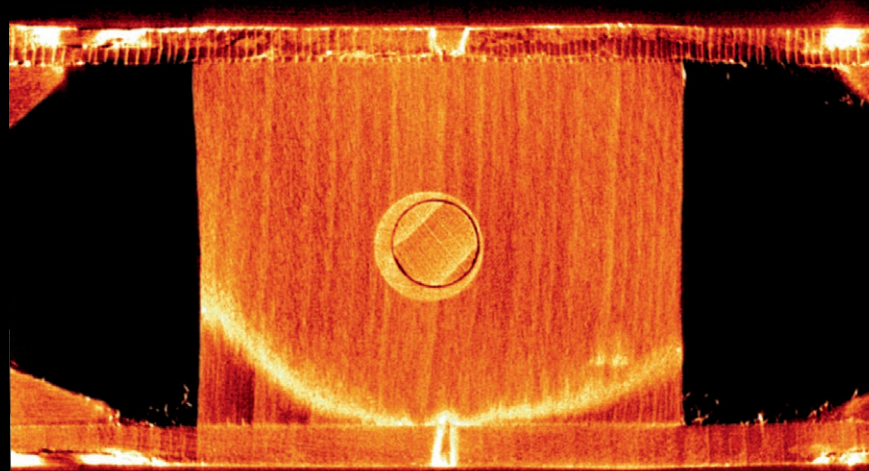


Figure 8

