

## RECONSTRUCTING LOST INSTRUMENTS PRAETORIUS'S *SYNTAGMA MUSICUM* AND THE VIOLIN FAMILY C. 1619

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**Izvleček:** Knjigi *De organographia in Theatrum instrumentorum Michaela Praetoriusa* vsebujeta dragocene namige, ki pomagajo pri poznavanju glasbil iz družine violin okoli leta 1619; številna preživela glasbila so manjša, kot so bili izvorniki v 16. in 17. stoletju. Podatki o preživelih glasbilih – predvsem izdelki družine Amati – skupaj z metrologijo, sekundarno dokumentacijo in ikonografskim gradivom kažejo na to, da je Michael Praetorius opisal veliko glasbilo, po velikosti izjemno podobno violončelu (basso da braccio), kar je odličen primer predstavitve glasbila iz družine violin in točne uglasitve, kot so jih poznali v času izida Praetoriusovega dela.

**Gljučne besede:** violina, viola, violončelo, družina Amati, metrologija

**Abstract:** Michael Praetorius's *De organographia in Theatrum instrumentorum* provide valuable clues that contribute to a new understanding of the violin family c. 1619, many surviving examples of which are reduced in size from their sixteenth- and seventeenth-century dimensions. The record of surviving instruments – especially those of the Amati family – alongside metrologic, documentary and iconographic evidence shows that Michael Praetorius describes a large instrument conforming remarkably well to the original dimensions of the basso da braccio (violoncello), as well as furnishing an excellent scale representation of the violin family as it was at the time of these works' publication and an accurate tuning scheme.

**Keywords:** violin, viola, cello, Amati family, metrology

Four hundred years ago, in 1619, Michael Praetorius (c. 1571–1621) wrote in his *De organographia*, the second book of *Syntagma musicum* (1614–1620), “Since everyone knows about the violin family, it is unnecessary to indicate or write anything further about it”.<sup>1</sup> To which we must admit, David Boyden's pithy response still holds some truth, “What everyone knew then, nobody knows now”.<sup>2</sup> The field has progressed considerably since Boyden's work in the 1960s, but Praetorius's omission still frustrates the scholar. Nevertheless, he provides a wealth of information: as the saying goes, a picture is worth a thousand words.

<sup>1</sup> Praetorius, *Syntagma musicum II* (1619), 48, translated in Boyden, *History of Violin Playing*, 1.

<sup>2</sup> Boyden, *History of Violin Playing*, 2.

*Theatrum instrumentorum*, the appendix to the second book, consists of forty-two woodcut drawings by an unknown artist. What makes these images so important is that, rather than being purely artistic renderings, they are technical drawings “showing [the instruments’] dimensions exactly to scale”, as Praetorius puts it.<sup>3</sup> The unnumbered plate adjoined at their front shows six inches of the Brunswick *Fuß* (See Figure 1). The inscription below the ruler reads: “This is the correct length and measure of a half *Schuh* or foot according to the ruler, which is a quarter of a Brunswick *Ell*; and according to this, all of the drawings of the instruments that follow have been adjusted to the little ruler always set with them”.<sup>4</sup> Historical metrology often offers more questions than it does answers, but in the case of the violin family depicted on *Theatrum instrumentorum*’s Plate XXI, the Brunswick foot provides valuable clues that can contribute to a new understanding of the violin family c. 1619. In addition to showing *pochettes* (*Klein Poschen/Geigen em Octav höher*, nos. 1–2), a violino piccolo (*Discant-Geig em Quart höher*, no. 3), a tromba marina (*Trumscheidt*, no. 7) and a type of drone zither (*Scheidtholtt*, no. 8), Plate XXI illustrates the three principal members of the violin family as they were at the time: the (*Rechte*) *Discant*-, *Tenor*- and *Bas-Geig de braccio* – that is, the violin, viola and what we now call the cello (nos. 4–6, respectively; see Figure 2).

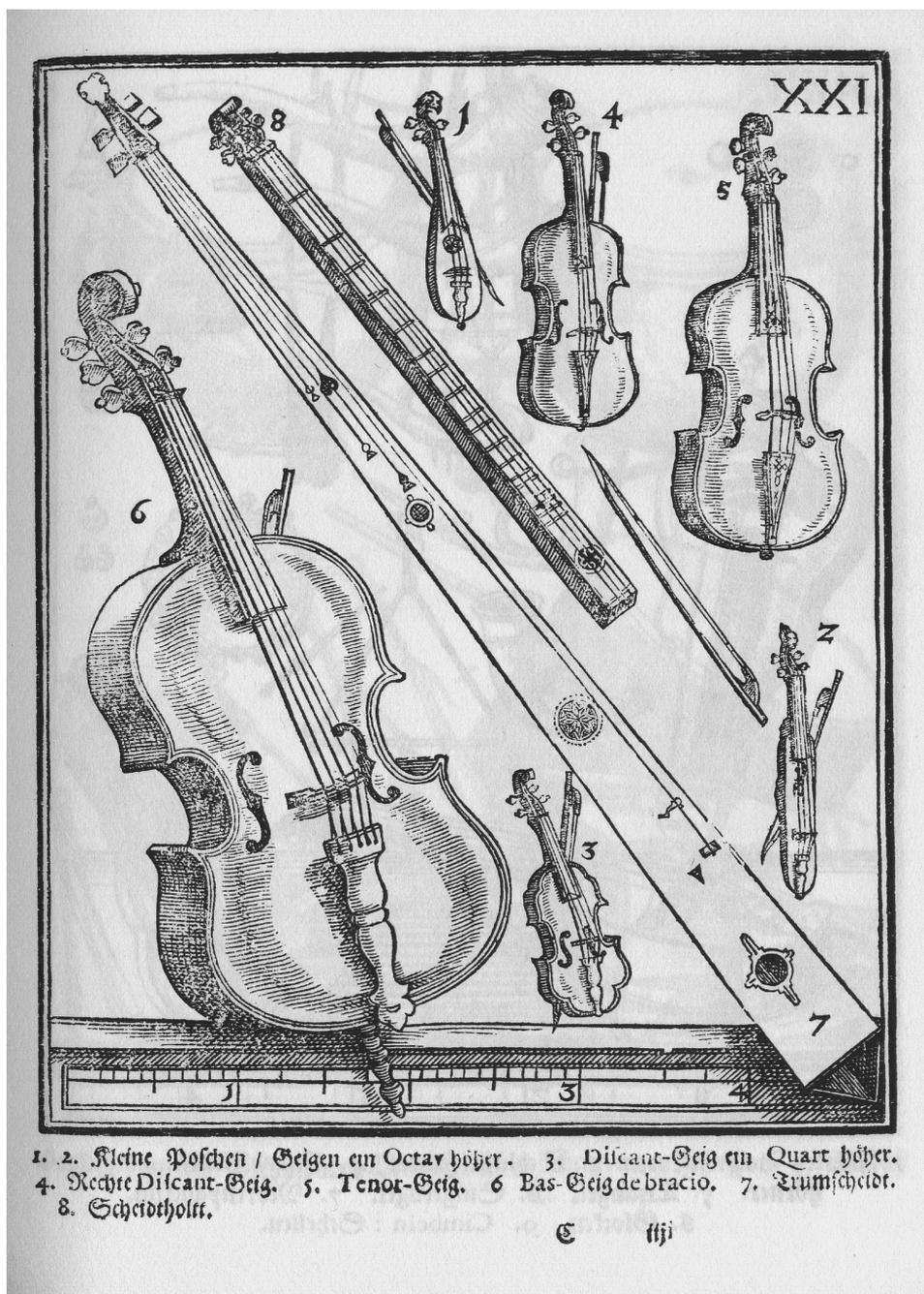


**Figure 1**  
*Syntagma musicum*’s scale: the Brunswick foot. (Public domain.)

The instruments and tunings of the early violin family have long been the object of scholarly debate. In addition to the cornucopia of tuning systems promulgated by the various documentary sources, the profusion of iconographic sources does little to lessen the confusion. The problem is further compounded by an uncoded lexicon running across multiple languages and multiple centuries. There is even confusion about what the instruments of the violin family were and are, much of which is due to the fact that the larger instruments – violas and cellos – have nearly all been reduced in size from their sixteenth- and seventeenth-century dimensions. Reconstructing these lost instruments sheds light on the internal relationships of the violin family as well as on their role in musical practice.

<sup>3</sup> Praetorius, *Syntagma musicum II* (1986), 14.

<sup>4</sup> “Dieses ist die rechte Lenge und Maß eines halben Schuhs oder Fusses nach dem Masstabe/ welches ein viertel von einer Braunschweigischen Ellen: Und nach diesem sind alle Abrisse nachgesezter Instrumenten/vffen kleinen Masstab/so alzeit mit darbei gesezet/gerichtet.” (Translation mine.) Praetorius, *Theatrum instrumentorum seu Sciagraphia*.



**Figure 2**  
*Syntagma musicum II, Plate XXI.* (Public domain.)

In his influential articles, including “From Violone to Violoncello: A Question of Strings?” and “Terminology for the Bass Violin in Seventeenth-Century Italy”, Stephen Bonta argues: “Organological evidence poses problems because of the continuing practice of altering string instruments, right down to the present day”.<sup>5</sup> For him, that meant the “converting [of] a violone into a violoncello”.<sup>6</sup> He cautions his readers: “One should be warned at the outset that this quest will be difficult. For one thing, we lack trustworthy physical evidence – that is, either early instruments that are known not to have been altered, or maker’s templates, such as those used by Antonio Stradivari for the alto and tenor viola, and that survive”.<sup>7</sup> For Bonta, the measurements of the original *basso da braccio* were unknown, and according to him, “[would] probably remain unknowable”.<sup>8</sup> Fortunately, we can now apply significant advances in the state of the art to evaluate altered instruments and unveil the knowledge that remained hidden decades ago. One should again be warned that the task at hand is painstakingly tedious, but now trustworthy physical evidence is at hand.

The violin family, as we know it and as Praetorius knew it, matured in Cremona in the mid-sixteenth century with Andrea Amati (c. 1505–1577), the patriarch of four generations of violin makers in his family and the founding father of the Cremonese school of violin making. Recent scholarship has clarified the convoluted history of the early violin so often mired in controversy.<sup>9</sup> While we know the names of many bowed-string instrument makers active before Andrea Amati, there are none from which more than a handful of instruments survive. Some notable examples of early instruments include: an anonymous *viola da braccio* made around 1500 (C.70) and a *lira da braccio* made in 1511 by Giovanni d’Andrea da Verona (SAM 379), both in the Kunsthistorisches Museum in Vienna; a *lira da braccio* by Giovanni Maria da Brescia (WA1939.28) in the Ashmolean Museum in Oxford; and a *viola da gamba*, later converted into a cello, by Zanetto de Micheli da Montichiario (NMM 3376) in the collection of the National Music Museum in Vermillion, South Dakota.<sup>10</sup>

In contrast, over twenty violin-family instruments of Andrea Amati survive – a huge number in comparison with other sixteenth-century makers. Dating from only one generation later, the surviving instruments of the Brothers Amati – Andrea’s sons Antonio (c. 1540–1607) and Girolamo (c. 1550/60–1630) – number in the hundreds, clearly implying that by the first quarter of the seventeenth century there was a meteoric explosion in the numbers of instruments produced. Additionally, the Brescian school, exemplified by the work of Gasparo Bertolotti da Salò (1540–1609) and Giovanni Paolo Maggini (1580–c. 1630), flourished contemporaneously with the Brothers Amati. It was during the time of these second and third generations of makers that the Amati style spread

<sup>5</sup> Bonta, “Terminology for the Bass Violin”, 23.

<sup>6</sup> Ibid.

<sup>7</sup> Bonta, “From Violone to Violoncello”, 65.

<sup>8</sup> Ibid., 85.

<sup>9</sup> See discussions in Meucci, *Un corpo alla ricerca dell’anima*, and Chiesa, “Brescian Violin Making”, 29–44.

<sup>10</sup> The anonymous *viola da braccio* (C.70) is catalogued in Schlosser, *Kunsthistorisches Museum in Wien*, 63 (description) and Tafel xvi (picture).

throughout Europe to become the dominant form of violin-family instrument.

Allowing for minor local differences, the “Amati style” refers to the general working methods of constructing the instrument using a mould, internal blocks and linings, ribs separate from the back and belly as well as the general proportions established by Andrea that have remained unchanged through the centuries. Conversely, the “Amati method” refers to the constructional techniques peculiar to the Amati family and their apprentices in Cremona, such as the specific type of internal mould, setting out the instrument in a particular manner with compass and rule and the specific proportions of the instruments. The Amati method remained a closely guarded Cremonese secret, whereas the Amati style was adopted with local variations by virtually every school of violin making since its inception. And while no actual inventor of the violin can be identified, Andrea Amati is responsible for the unified violin family with its recognizable form and characteristics.

Even though the Amati style soon became ubiquitous throughout Europe, other schools of violin making persisted in some localities. For comparison, consider Guido Reni’s *Saint Cecilia* (1606) and the *Boy Playing the Flute* (c. 1630) by Judith Leyster (Figures 3 and 4). Reni depicts a typical Amati-style instrument, correctly proportioned, with upright *f*-holes and other customary violin features. Leyster, in contrast, illustrates an instrument from a different milieu. Her example cannot be said to be any less detailed or deficient in realistic portrayal. The recorder on the wall and the transverse flute played by the boy are faithfully rendered. In fact, the details Leyster shows – the chamfered



**Figure 3**  
Guido Reni, *Saint Cecilia*, 1606, oil on canvas, The Norton Simon Museum, F.1973.23.P. (Reproduced with permission of The Norton Simon Museum.)



**Figure 4**  
Judith Leyster, *Boy Playing the Flute*, c. 1630, oil on canvas, Nationalmuseum (Stockholm), NM 1120. (Public domain.)

pegbox, elongated and slanted *f*-holes, protruding corners and bottom-heavy proportions – are appropriate to a contrasting school of violin making. Comparing Reni’s and Leyster’s depictions against the instruments shown in Plate XXI, it is evident that Praetorius’s renderings closely correspond to the style Reni depicts.

The spread of Italian violins to European capitals is strongly established by the end of the sixteenth century, and sources such as Jambe de Fer’s *Epitome musical* (1556) illustrate that the violin had spread from its northern Italian roots even earlier. Peter Holman shows that Cremonese violinists, together with their Italian instruments, were active in England beginning in the mid-sixteenth century.<sup>11</sup> In closer proximity to Praetorius, Bonta demonstrates that “Italian performers on the members of the violin family are identifiable as early as 1563” at the Bavarian court, and that in 1568 six-voice motets by Cipriano de Rore were performed by six *viole de braccio* in Munich.<sup>12</sup>

The spread of Amati-style instruments started at least by the 1560s–70s, with the famous and important set of Andrea Amati instruments amassed for Charles IX of France (1550–1574) and decorated with his heraldic achievement. Ten instruments from the set survive: five violins (three small and two large), one viola and four cello-types, all four of which are reduced. The exodus of Italian violinists to France, and with them their instruments, was probably closely related to the influence of Catherine de’ Medici (1519–1589), who became Queen of France when her husband, Henry II, ascended the throne in 1547. Upon Henry’s death in 1559 she became the Queen Mother, occasionally acting as regent for three of her sons who ruled France in the following years: Francis II (r. 1559–1560), Charles IX (r. 1560–1574) and Henry III (r. 1574–1589). The well-documented connections between Catherine de’ Medici’s court and Cremona began in 1560, when the Cremonese violinist Girolamo Magarini was sent back from Paris to his home town to recruit more violinists.<sup>13</sup> By 1564 Magarini was back in Paris, collecting his regular salary as a *suonatore di violin del Re* (King’s violinist), and by 1581 his son Carlo was listed as a *viollon ordinaire du Roy*.<sup>14</sup> Further strengthening the connection, “[I]n 1572 the violinist, Nicolas Delinet, received fifty *lire* from Charles IX to buy a violin in Cremona for the service of the King”.<sup>15</sup> During the period when the connection between Paris and Cremona was being fostered, 1560–1572, no known violin makers were working in Cremona other than Andrea Amati and his sons. Even later, when Cremonese violins are mentioned in archival records, Amati violins can usually be inferred. For example, Holman points out that at least by 1637/1638 Cremonese violins were being purchased by English court musicians.<sup>16</sup> Until Andrea’s grandson Nicolò (1596–1684) took apprentices from outside the family – most notably, Andrea Guarneri (1626–1698) and Francesco Rugeri (c. 1630–1698) – violins produced in Cremona were made by the Amati family

<sup>11</sup> Holman, *Four and Twenty Fiddlers*, 32–143.

<sup>12</sup> Bonta, “Use of Instruments in Sacred Music”, 521, 525.

<sup>13</sup> Chiesa, “Introduction to the Life and Works of Andrea Amati”, 16.

<sup>14</sup> *Ibid.*

<sup>15</sup> *Ibid.*

<sup>16</sup> Holman, *Four and Twenty Fiddlers*, 214.

dynasty.<sup>17</sup> In other words, the English court must have imported Amati instruments when they purchased Cremonese violins in the 1630s.

Perhaps the most important connection between Praetorius, France and Cremona is Pierre Francisque Caroubel (fl. 1576–1611), a violinist at the French court, composer and native of Cremona who collaborated with Praetorius on the *Terpsichore* of 1612. It is generally assumed that Caroubel met Praetorius in Wolfenbüttel; however, Holman suggests that Caroubel's works were acquired by a third party and somehow transmitted to Praetorius.<sup>18</sup> Evidence to sway opinion in either direction is lacking. Whether or not the two men discussed Cremonese violins or even had them available is not known. But Caroubel certainly had access to Amati instruments by virtue of his position at the French court and may even have played one of the Charles IX set. As Holman points out, Praetorius generally adopts Caroubel's fashion of writing five-part pieces for a single soprano, three inner parts and a bass, showing his familiarity with French and Italian violin ensemble practice of the time.<sup>19</sup>

Another route the dissemination of Amati-style violins to central Germany could have taken is via Poland. Praetorius notes that town-musicians distinguish *violas da gamba* from *violas da braccio* by calling the former *Violen* and the latter *Geigen* or *Polnische Geigen*.<sup>20</sup> In 1573 Catherine de Medici received Polish ambassadors at the French court when they offered the Polish crown to France, and a dance was performed in their honour. Figure 5 shows *Magnificences*, an anonymous woodcut print from the 1573 *fête*, where the violin band is shown in the lower left. As Boyden points out, quoting Pierre de Bourdeille de Brantôme, “The music was the ‘most melodious one had ever seen’ (*‘la plus melodieuse qu'on eust sceu voir’*) and the ballet was accompanied by some thirty (*trentaine*) violins ‘playing very pleasantly a somewhat warlike tune’ (*‘sonnans quasy un air de geurre fort plaisant’*)”.<sup>21</sup> Praetorius's association of the violin with Poland is interesting in light of the events of 1573. A speculative but intriguing notion is that perhaps, upon encountering Amati violins at the French court, the Polish ambassadors brought instruments, or at least knowledge of them, back to their homeland; this could explain Praetorius's term *Polnische Geigen* – however, the hypothesis requires dedicated research.

Whether Amati-style violins arrived in the vicinity of Brunswick via France, Poland or Munich, it is evident that they spread rapidly throughout Europe. By the late 1610s, when Praetorius was writing *De organographia*, they were well established; indeed, *Theatrum instrumentorum* features Amati-style violins in Plate XXI, correct not only in form, but also in dimensions.

The violin family settled in to the comfortable sizes we know today during the eighteenth century. Since the family's creation the general trend has been for violins to get

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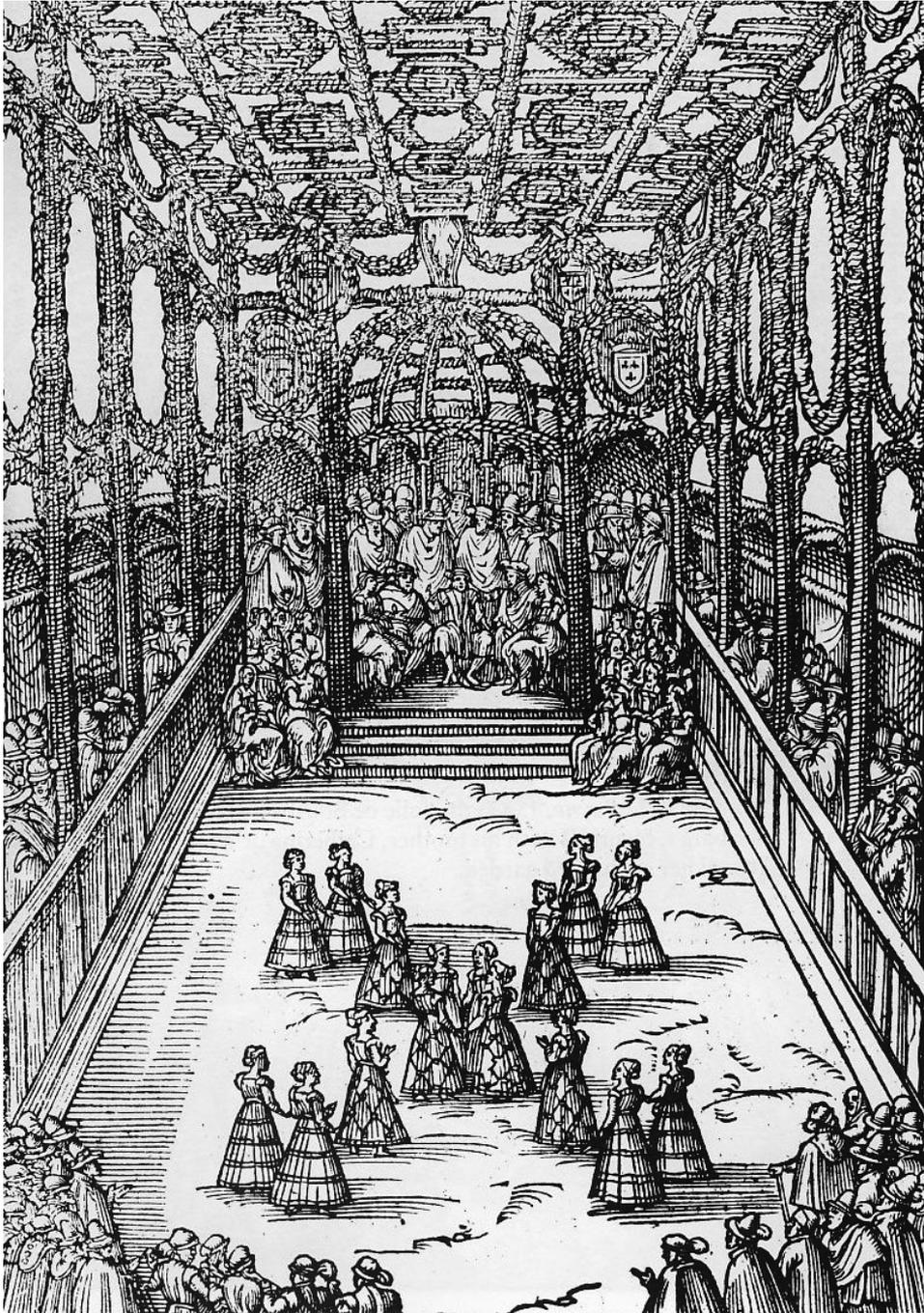
<sup>17</sup> Antonio Stradivari (1644–1737) is sometimes claimed to have been an apprentice of Nicolò Amati. However, that assertion is not borne out by the evidence: in fact, Stradivari's specific methods of violin making belie this claim.

<sup>18</sup> Holman, “Terpsichore at 400”, 42.

<sup>19</sup> *Ibid.*, 45.

<sup>20</sup> Praetorius, *Syntagma musicum II* (1986), 52.

<sup>21</sup> Brantôme, *Oeuvres complètes*, 74–75, quoted in Boyden, *History of Violin Playing*, 55.



**Figure 5**  
*Magnificences*: an anonymous woodcut print depicting the 1573 *fête* and ballet at the French court for the Polish ambassadors. (Public domain.)

bigger, but for violas and cello-type instruments to get smaller. Violins typically have a back length of about 356 mm, slightly longer than in Praetorius's time. However, a violin can reasonably measure approximately ( $\approx$ ) 342–364 mm in back length and still remain a “normal” violin appropriate to the corresponding repertory. The viola has never become standardized in the same way, which has led to rampant confusion about the instrument. Typical contemporary viola sizes range from  $\approx$ 381 to 419.1 mm; however, larger instruments are not unusual. The smaller instruments are often called “contraltos”, while the original, larger ones, with a back length of about 470 mm, are so-called “tenors”. Unfortunately, instrument sizes are often conflated with part assignments in music. For example, Holman infers a second size of viola from the evidence of Giovanni Maria Lanfranco's tuning instructions in *Scintille di musica* (1533); Holman writes: “The consort consisted of a single violin, two violas of different sizes and a bass”.<sup>22</sup> However, after giving tunings for the *soprano*, *tenore* and *basso*, Lanfranco instructs: “But if we want to add to these the *Contralto* (which passes through the same strings as the *Tenore*), each of its strings is made to resonate in unison with the *Tenore*”.<sup>23</sup> Lanfranco's consort indeed consists of a single violin, two violas and a bass – but no instrument sizes are implied: only musical roles. Documentary evidence does not suggest the existence of violas in multiple sizes until Marin Mersenne's *Harmonie universelle* (1636) over a century later. The first known mention of multiple sizes of viola appears in his discussion of five-part string writing. Mersenne writes that the three inner parts, “the alto, the fifth part, and the contra-tenor are of different sizes, even though they are in unison”.<sup>24</sup>

The record of instruments indicates that there was not a smaller-size viola in sixteenth century; it only began to develop in the first quarter of the seventeenth century. Other than the marginally smaller viola of 1592 by the Brothers Amati in the Ashmolean Museum, Oxford (WA1939.26), the only known uncut instrument of its size measuring 452.5 mm, sixteenth-century violas are exemplified by the “Charles IX” viola by Andrea Amati, with a back length of 469.2 mm, also housed at the Ashmolean (WA1939.25). All known surviving violas from other sixteenth-century schools of violin making are likewise large instruments. The first Cremonese viola of significantly smaller size is the “Stauffer” made by the Brothers Amati in 1615, which has a back length of 411 mm. A second, similarly sized instrument from the Amati workshop dates from 1620, measuring 409 mm, currently held by the Galleria Estense in Modena. Around the same time Maggini made violas of about 420 mm in Brescia. The smaller-size viola was a relatively new invention when Mersenne wrote about it in 1636. The majority of violas produced during Praetorius's period were of the larger ( $\approx$ 470 mm) variety. And such instruments continued to be made throughout the whole of the seventeenth century: an example is the “Medici” viola of 1690 by Antonio Stradivari, which measures 478 mm.

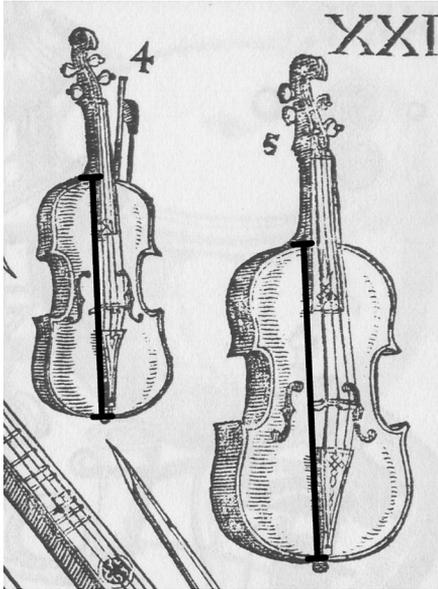
The back length of Praetorius's *Discant-Geig* is  $1 \frac{5}{24}$  Brunswick feet, which equates to 344.8 mm, using a Brunswick foot of 285.4 mm.<sup>25</sup> Andrea Amati made two sizes of

<sup>22</sup> Holman, *Four and Twenty Fiddlers*, 24.

<sup>23</sup> Lee, “Giovanni Maria Lanfranco's *Scintille di musica*”, 253.

<sup>24</sup> Mersenne, *Harmonie universelle*, 238.

<sup>25</sup> Doursther, *Dictionnaire universel*, 405.



**Figure 6**  
*Syntagma musicum II*, Plate XXI. *Discant-Geig* (violin) and *Tenor-Geig* (viola) with added reference lines for measurement. (Public domain.)

violins: the smaller measuring about 342 mm and the larger about 352 mm; Plate XXI's violin is within 3 mm of the former and 7 mm of the latter. The corresponding measurement of Praetorius's *Tenor-Geig* is  $1\frac{15}{24}$  Brunswick feet, which converts to 463.7 mm, or only 5.5 mm less than the length of Amati violas. Figure 6 illustrates the measuring points. Considering the inherent imperfections of calculating measurements from a four-hundred-year-old woodcut print, the instruments depicted lie within a reasonable deviation from the actual dimensions.<sup>26</sup>

As music evolved over the centuries, many types of instrument became condemned to obsolescence. However, time has been more forgiving to string instruments, since they are so readily adaptable. Fortunately, many of the better-quality instruments were too valuable to be consigned to the trash heap or burnt for firewood. The humongous cellos and violas of the finest makers were often cut down in size and saved from such a disastrous fate. The result, as previously mentioned, is that

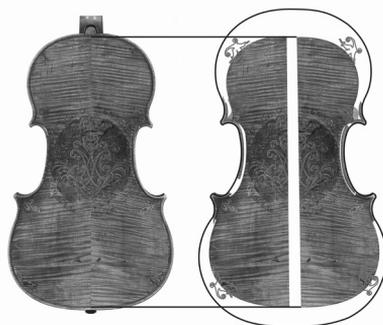
almost every surviving viola and cello from the sixteenth or seventeenth century exists in reduced form. Figure 7 illustrates the size difference between a reduced viola and its original dimensions. The chosen instrument is the “Propugnaculo” viola by Andrea Amati housed at the National Music Museum (NMM 3370); today it measures 411 mm, but its original length would have been 469.2 mm.

It should not be surprising to find historical musical instruments altered from their original state. Whether it was the eighteenth-century *ravalement* that harpsichords typically underwent or the ubiquitous modernization of violin family necks, fingerboards and set-ups, alterations to instruments have been commonplace throughout the centuries. An important early example is the organ in Cremona Cathedral. Originally built in 1482 by Pantaleone de Marchis and Lorenzo Antonio from Bologna, it was overhauled in 1542–1547

<sup>26</sup> Examples of problematic issues may include the inaccuracy or damage of carved blocks, unequal ink application to the block, unequal pressure applied during ink transfer and variation in drying characteristics, all of which can lead to inexact or inaccurate ink lines. Additionally, issues such as paper shrinkage or damage can be impactful. However, the greatest factor inducing uncertainty of measurements drawn from woodcut prints is the problem of line thickness and the choice of measuring point: for instance, whether a measurement is taken from one or other edge of an ink line or from its centre. Unless otherwise noted, all measurements are taken from the centre-point of the relevant ink line.

by Giovanni Battista Facchetti, who raised its pitch by a semitone.<sup>27</sup> In 1582 the chapel singers requested that Giovan Francesco Maineri, the organ builder tasked with regular maintenance of the instrument, lower its pitch by a semitone, thereby returning it to its original pitch. A heated debate lasting the better part of a year ensued. Opinions were solicited from leading organ builders and musicians of the day, including Marc'Antonio Ingegneri, Cremona's leading organist at the time, Giovanni Battista Morsolino, an organist and builder who had worked with Orlando di Lasso in Munich and Graziadio Antegnati, the most famous organ builder of his day and one of the most important in the instrument's history: all advised against lowering the pitch.<sup>28</sup> The matter was finally put to rest in 1583 without further alteration of the instrument. Unfortunately, the story came to a sad end four hundred years later, since the Cremona organ was twice replaced during the twentieth century.<sup>29</sup>

To discover documentary discussion of bowed-string instrument reductions we need to look forward nearly two hundred years from Praetorius to the time when the reductions were taking place. According to Stewart Pollens, the earliest records mentioning the alteration of instruments, specifically the regraduation of the belly and back plates, concern work carried out by Lorenzo and Tomaso Carcassi for the ducal court in Florence during the 1760s.<sup>30</sup> Antonio Bagatella's landmark treatise published in Padua in 1782 is the earliest description by a professional violin maker to provide detailed instructions for violin repair and design.<sup>31</sup> Bagatella, who was better known for repair and restoration than for making new instruments, does not directly discuss the reduction or enlargement of instruments in his treatise, but he provides two schemes for re-graduating the plates. He boasts: "I have adapted the proportions of many old violins [...] which were partly requested to have a human voice and partly to have a silvery voice. Mr. Giuseppe Tartini had one of these".<sup>32</sup> He goes on to list the owners of over fifty instruments that he altered during his career, making two additional mentions of Tartini.<sup>33</sup> Without further evidence



**Figure 7**  
Reduced viola by Andrea Amati, the "Propugnaculo" (NMM 3370), with the reconstruction to its original dimensions shown to scale. (Reproduced by permission of Matthew Zeller.)

<sup>27</sup> Rossi, "Music in the 16th Century in Cremona", 34.

<sup>28</sup> Accounts of the debate vary; it is detailed in Rossi, "Music in the 16th Century in Cremona", 34, and Haynes, *A History of Performing Pitch*, 62–64.

<sup>29</sup> Haynes, *History of Performing Pitch*, 104n28.

<sup>30</sup> Pollens, *Stradivari*, 128.

<sup>31</sup> Bagatella, *Regole per la costruzione*.

<sup>32</sup> *Ibid.*, 58.

<sup>33</sup> *Ibid.*, 59–60.

it is impossible to know whether Bagatella mainly confined his alterations to plate thicknesses or if he also reduced and enlarged instruments.

The first published description of altering the size of an instrument comes from Paris in 1806: Abbé Sébastien-André Sibire's *La Chélonomie, ou le parfait luthier*.<sup>34</sup> This book is the result of many discussions and collaborations between Abbé Sibire (1757–1827), a well-travelled and educated cleric and violin enthusiast, and Nicolas Lupot (1758–1824), the premier French violin maker and restorer of his time. Before discussing alterations in size, Sibire writes about plate regradautions to two violins by members of the Guarneri family: Bartolomeo Giuseppe Guarneri “del Gesù” (1698–1744) and Pietro Guarneri of Mantua (1655–1720). Confronted by this pair of instruments, Sibire exclaims: “Then without taking the trouble to try out the instruments, as if one needed to play them in order to know how they sound, I would immediately remove both of their bellies, submitting them to a treatment as different as their respective constitutions are”.<sup>35</sup> Of the Guarneri “del Gesù” he writes: “The two central parts of the belly and the back, being correct in thickness, would be meticulously respected, but in compensation I would attack without mercy the eight flanks in order to reduce them all to the precise thickness of the centre of the belly. [...] Under the name of Guarneri I would have a Stradivari, and in my opinion the follower identified in this manner with his master would gain by one hundred percent”.<sup>36</sup> As for the instrument by Pietro Guarneri of Mantua, he writes that after rebarring it with a stronger bass bar he would “shrink the inside of the body by adding a second rib, stuck over the first, stretching from the end button to the neck on the side of the E-string, and at least as far as the C-bout on the side of the bass bar”.<sup>37</sup>

This notion of attacking a Guarneri “del Gesù” without mercy may seem startlingly irresponsible today, but to Sibire and Lupot it was a logical application of their theories; and it was standard workshop practice at the time. Typically, the interior surfaces were not considered so important to preserve as the varnished exterior surfaces. But in contrast to the seeming reckless abandon with which plate thickness alterations were undertaken, altering the size of the instrument was considered with a sober volition. According to Sibire:

Here is a different kind of commission that comes your way: it resembles repairing a new house. We have a one-hundred-year-old violin in a reputed style and so well preserved

<sup>34</sup> Sibire, *La Chélonomie ou le parfait luthier*.

<sup>35</sup> “Puis sans prendre la peine inutile d’essayer les instruments, comme s’il était besoin de les faire sonner pour savoir ce qu’ils sont je détablerais à l’instant l’un et l’autre, et les soumettrais à un traitement aussi opposé que le sont entr’elles leurs constitutions.” (Translation mine, with the assistance of Michael Talbot.) *Ibid.*, 137.

<sup>36</sup> “Les deux parties centrales de la table et du fond étant juste au vrai point, seraient scrupuleusement respectées, mais en revanche, j’attaquerais sans pitié les huit flancs, pour les réduire tous à l’épaisseur exacte du centre de la table. [...] Sous le nom de Gouarnère, j’aurais un Stradivare, et, selon moi, le disciple identifié de la sorte avec son maître, gagnerait cent pour cent.” (Translation mine, with the assistance of Michael Talbot.) *Ibid.*, 137–138.

<sup>37</sup> “En rétrécissant l’intérieur du coffre au moyen d’une seconde éclisse collée sur la première, depuis le bouton jusqu’au manche, du côté appartenant à la chanterelle; et au moins sur la partie du croissant du côté de la barre.” (Translation mine, with the assistance of Michael Talbot.) *Ibid.*, 138–139.

that one would swear, looking at it, that it has just emerged from the workshop. The model is merely average in size, but it must be made larger without it appearing in the least, however, that the addition of the new to the old is anything more than a continuation of the intention, indeed an extension, of the original: as for the sound, it will infallibly gain in strength and volume; for the instrument in its present state has too much wood and needs to be given the right thickness, but the problem is to prevent the eye from noticing anything out of place. It would be an act of murder if, not having even the slightest scratch, it came to pieces in your hands or, as one puts it in common parlance, belonged ‘to several parishes’. How will you manage to lengthen and enlarge it without damaging it in any way? Will you reuse the edges, blocks and purfling? To be sure, this is something agreed with the owner, and you have undertaken to do it. So you must busy yourself seriously with carrying out his wishes; with choosing among a thousand possibilities the materials that are suitable; to use wood that is the same as the original; to follow scrupulously the grain and figure; to maintain diligently the given forms and even the exact shade of colour; to insert, facing the original purfling, a second purfling that is specifically and indiscernibly the same; to round off everything in one go; in a word, to amalgamate, to melt, to identify your manner with that of the maker: for, once again, it is him that one wishes to have, all of him and him alone: his conception, his hand, his qualities, his faults – yes, even his faults and the defects of his construction, should there prove to be any.<sup>38</sup>

Sibire does not provide a step-by-step method to enlarge the instrument, but his book is illustrative of the technique involved. Figure 8 shows a Brescian violin in the collection of the National Music Museum (NMM 3426); it dates from the early seventeenth century and is quite similar to the instrument Sibire describes and the one that Praetorius would have known. When viewed under ultraviolet fluorescence, the extension of the instrument is clear: it provides an excellent example of the technique described by Sibire.

Unfortunately, no written records with the same level of detail survive for reductions.

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<sup>38</sup> “Voici dans un genre opposé une autre commande qui vous arrive. Il s’agit, pour ainsi dire, de réparer une maison neuve; un violon de cent ans, d’un style précieux et d’une si belle conservation, qu’on jurerait, à le voir, qu’il sort tout fraîchement de la fabrique. Le modèle n’est que moyen, et il faut l’agrandir, sans toutefois qu’il y paraisse le moins du monde, et de manière que l’addition du neuf au vieux ne soit que la continuation de l’objet, et l’extension même de l’original; quant au son, il y gagnera infailliblement plus de force et de volume; car l’instrument, tel qu’il est a trop de bois, et il se trouvera juste d’épaisseur, mais l’embarras est de sauver à l’œil toute espèce de disparate. Ce serait un meurtre que, n’ayant pas même la plus légère égratignure, il s’ébrêchât dans vos mains, ou fut comme on dit vulgairement, de plusieurs paroisses. Comment vous y prendrez-vous pour l’allonger et l’élargir, sans le déparer aucunement ? Ferez-vous resservir les bords, les coins, le filet ? Bien entendu c’est chose convenu avec le propriétaire, et vous en avez contracté l’engagement. Vous allez donc vous occuper sérieusement de remplir son attente; de choisir entre mille les matériaux convenables; d’adapter du même bois à celui de l’antique; de suivre scrupuleusement le fil et les ondes; de maintenir précieusement les formes données, et le ton même du coloris; de pousser, en regard du filet original, un double filet qui soit spécifiquement et indiscerniblement le même; d’arrondir le tout d’un seul jet; en un mot, d’amalgamer, de fondre, d’identifier votre façon avec celle de l’auteur; car encore une fois, c’est lui qu’on veut avoir, lui tout entier, lui seul; son idée, sa main, ses qualités, ses défauts; oui, jusqu’à ses défauts même, et ses vices de construction, si tant est qu’il s’en trouve.” (Translation mine, with the assistance of Michael Talbot.) *Ibid.*, 167–169.



**Figure 8**

Anonymous, violin, Brescia, c. 1600–1630, National Music Museum, NMM 3426, viewed under ultraviolet fluorescence. (Photo by Tony Jones, reproduced by permission of the National Music Museum.)

Shrinking the inside of the body with a veneer as Sibire describes is a reduction of sorts; however, this particular technique is more effective as a permanent mute and is not the type of reduction we are considering. One of the best descriptions is from 1 April 1816, when the first established connoisseur of Italian violins, Count Ignazio Alessandro Cozio di Salabue (1755–1840), notes that a Brothers Amati viola of 1612 was reduced by the violin maker Carlo Mantegazza. Cozio di Salabue writes: “To make it shorter, it was reduced both from above and from below; one *uncia* [inch] was taken off the corners. It ended up being a good model. It was shortened also in length, in the middle, in a way that is not visible. [...] The arching below the C-bouts is naturally lower, and it is more shallowly cambered near the new edges; these are flatter beyond the C-bouts. In other words, the arching is flat up to the edges”.<sup>39</sup>

Cozio describes a common feature of reduced instruments visible on the “King” cello by Andrea Amati (NMM 3356), one of the ten surviving members of the Charles IX set. The “King” started out as a *basso da braccio*, one of the large instruments pictured by Praetorius and called a *Bas-Geig de braccio*. The “King” bears an inscription on the inside of the back that reads: “Mended by Renault Luthier” (followed by his address) and “Paris, 1801”.<sup>40</sup> Conventional thought would indicate that Sébastien Renault, who was active in Paris from about 1765–1811 and worked in partnership with François Chatelain for much of his career, reduced the cello in 1801. However, the choice of the verb “to mend” rather than “to reduce” may be significant. From a practical standpoint, however, 1801 is the year when the current state of the cello was realized. As can

<sup>39</sup> Cozio di Salabue, *Memoirs of a Violin Collector*, 231–232.

<sup>40</sup> Zeller, “The Violin-Family Designs of Andrea Amati”, 135.



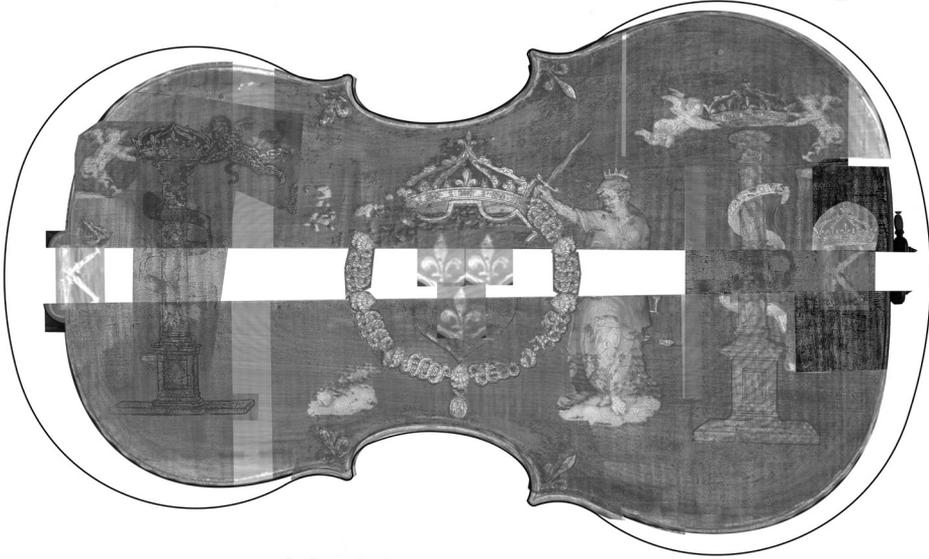
**Figure 9**

Andrea Amati, cello, the “King”, Cremona, c. 1560–1570, National Music Museum, NMM 3356. Edge channels in middle and upper bouts. (Photos by Byron Pillow, reproduced by permission of the National Music Museum.)

be seen from Figure 9, the bass side has the full edge channel we expect from Andrea, but on the treble side the instrument has no edge channel whatsoever. The cross-arch runs straight into the edge, a clear indication that the bout has been altered. It is the same with the long-arch at both the upper and the lower bouts: this runs straight into the edges. The edge profiles are also completely different between the middle bouts on the bass and treble sides. The bass side exhibits a full, rounded edge, while on the treble side the edge is carved inwards. Exactly as Cozio describes for the reduced viola of 1612, the arching is flat up to the edges where the “King” is reduced.

The edges and edge channels are just two of the myriad details that must be meticulously examined to judge reduced instruments properly. In the case of the “King”, the corners, purfling and painted decorations are quite telling. Figure 10 shows just one of a few possible reconstructions: the “King” originally had a back length of about 840.7 mm instead of the 751 mm it currently measures.<sup>41</sup> As can be seen, a large wedge-shaped strip

<sup>41</sup> For a detailed discussion of the reconstruction of the outline of the “King” cello, see Zeller, “The Violin-Family Designs of Andrea Amati”. Techniques used to make these reconstructions include x-ray computed tomography, ultraviolet fluorescence and infra-red photography, endoscopic and microscopic photography and, of course, detailed measurement and observation. A full discussion of Amati family design methods and reconstructions of this and other important historical instruments are the subject of a book in progress by the present author.



**Figure 10**

Reconstruction of the “King” *basso da braccio* by Andrea Amati (NMM 3351). (Reproduced by permission of Matthew Zeller.)

was removed from the middle of the back, the instrument was shortened in length and it was reduced in width in all three bouts. Returning to Plate XXI, Praetorius’s *Bas-Geig de bracio* measures  $2 \frac{23}{24}$  Brunswick feet, which equates to 844.2 mm, only 3.5 mm longer than the original back length of the “King” cello of 840.7 mm, and certainly within a reasonable range of deviation (Figure 11).<sup>42</sup>

Praetorius does indeed depict appropriate Amati-style instruments: their overall proportions and specific dimensions are correct. Yet there is one feature that the astute observer will notice is not characteristic of the violin family: the *Bas-Geig de bracio* depicted has five strings. In his text Praetorius observes: “All sizes are tuned in fifths”, but he does not mention how many strings the instrument has.<sup>43</sup> In his tuning chart the only five-string instrument he lists as part of the violin family is the *Groß Contra-Bas-Geig*, depicted in Plate V.<sup>44</sup> Clearly, this contrabass is not the same instrument as his *Bas-Geig de bracio*, for which he gives two different four-string tunings in fifths, one starting on C2 and the other on F2.<sup>45</sup> He assigns the viola and the smaller instruments of the family their usual

<sup>42</sup> Carleen Hutchins calculates the body length of Plate XXI’s *Bas-Geig de bracio* as 844.55 mm, only 0.35 mm longer than my calculation. Hutchins, “350 Years of Violin Research”, 6.

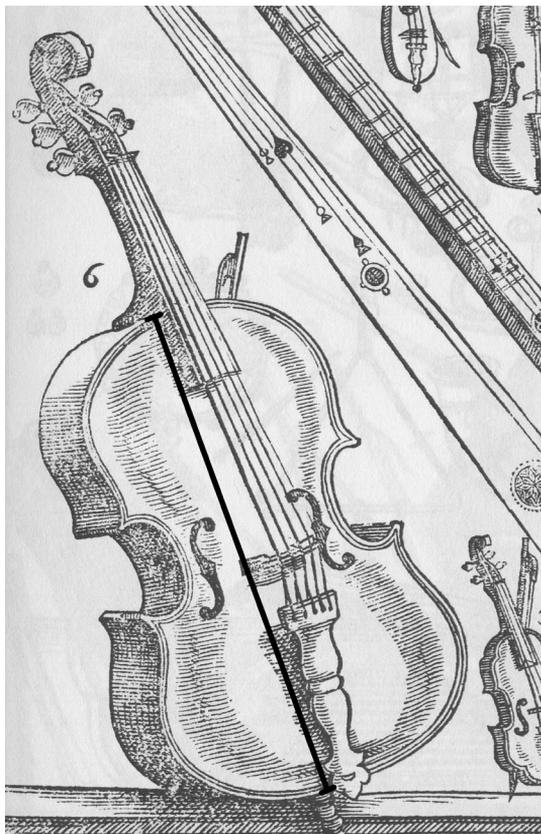
<sup>43</sup> Praetorius, *Syntagma musicum II* (1986), 56.

<sup>44</sup> An example of this type of instrument is No. 942 in Kinsky, *Katalog des Musikhistorischen Museums*, 574.

<sup>45</sup> To indicate pitch I have adopted Scientific Pitch Notation (SPN), also known as International

tunings. There are three possibilities: (1) the five-string depiction is the artist's conflation of the two different four-string tunings Praetorius provides in *De organographia*; (2) the artist had a five-string instrument for a model and Praetorius erred; or (3) much more likely, both the author and the artist are correct but are describing different morphologies of the cello-type instrument.

There is ample evidence, both documentary and in the record of instruments, for a short-lived instrument intermediate in size between the  $\approx 470$  mm viola and  $\approx 840$  mm *basso* that was tuned to F2. Taking account of historical *basso* tunings on Bb1, the appropriate size for an instrument tuned a fifth below the viola and a fifth above the *basso* would be  $\approx 704$  mm. An example of such an instrument surviving from Praetorius's time is the "Fleming", a small cello-type by the Brothers Amati made *c.* 1600 that has a back length of about 705 mm. This instrument is currently set up with five strings, but may not have been originally made that way: it is just as likely that the fifth string was added at any time from the eighteenth to the twentieth century. This particular instrument is unique for its type and is possibly meant to be a member of the gamba family rather than the violin family; however, it could also be the controversial and inappropriately named "tenor violin" tuned to F2.<sup>46</sup>



**Figure 11**  
*Syntagma musicum II, Plate XXI Bas-Geig de braccio*  
with reference line for measurement. (Public domain.)

Pitch Notation (IPN), where middle C is C4.

<sup>46</sup> The term "tenor violin" is problematic because the instrument is larger and tuned a fifth below the so-called "tenor viola". Agnes Kory proposed the name "tenor violin" for an instrument of intermediate size between the viola and cello tuned F2, C3, G3, D4 in her 1994 article "A Wider Role for the Tenor Violin?". Ephraim Segerman took issue with the term and initiated a debate focusing on historical violin tunings. The *Prattica di musica* (1592) of Lodovico Zacconi (1555–1627) is the only non-German source to include the F2 tuning, which, when present, is assigned to either the tenor or the bass voice. Segerman appealed to Gerald Hayes's reading of Zacconi (1930) to dispute Kory's reliance on Boyden's reading of the same. (Other followers of

Evidence is strong for a larger five-string instrument having the morphology depicted in Plate XXI and dating from the first quarter of the seventeenth century. An excellent iconographic example contemporaneous with Praetorius is a *Still Life with Musical Instruments* from 1623 by Pieter Claesz (c. 1597–1660), which clearly shows a five-string instrument similar to Plate XXI (Figure 12). One extant instrument that might also fit the depiction of Plate XXI is the 1684 Stradivari cello named “General Kyd”, which narrowly escaped becoming a cabinet for compact discs after being stolen in 2004. According to the Hills, who “slightly reduced” its size at some point prior to 1902, “[...] the presence of holes in the head for a fifth peg clearly indicates the interesting fact that it was originally strung with five strings. [...] though built in every respect on the same lines as a violoncello, it was clearly intended for a bass-viol of extra large proportions, and, as far as we know, is unique of its kind”.<sup>47</sup> The Hills think that it was originally another type of instrument, but it could nevertheless have been a five-string instrument similar to the one depicted some sixty-four years earlier in *Theatrum instrumentorum*.

The “King” cello by Andrea Amati was certainly set up with five strings at some point, but the question of when is difficult to answer. The pegbox does not seem designed for five strings; nor is there any sixteenth-century documentary evidence to support a claim that it originally had that many. However, it cannot be ruled out that a fifth string was added before or during Praetorius’s time, which would indeed make it quite similar to the instrument in Plate XXI and Claesz’s *Still Life with Musical Instruments*. Marin Mersenne offers a different view of the five-string problem but evidences a trend towards adding a fifth string that existed during the early 1600s, thereby possibly supporting the addition of one to the “King” during this period. After considering the virtues of adding the extra string to violin-family instruments, which would facilitate ease of playing in all twelve modes, Mersenne writes: “This fifth string is not necessary, and [the violin] can even be played rather well with three”.<sup>48</sup> The evidence of transitioning between three, four and five strings is much more difficult to interpret than size alterations. A possible approach for determining dates of such alterations is to combine x-ray analysis with dendrochronology or carbon dating in order to ascertain when peg bushings were most likely carried out. However, this approach has not yet been explored.

While instrument expertise may have remained elusive to some earlier scholars who determined much of what they knew of the violin from iconographic and documentary sources, organological evidence today proves more reliable. Sources such as Praetorius do indeed provide invaluable information, but caution must be exercised when consulting depictions and descriptions alone. Combined with the record of extant instruments, textual and iconographic evidence corroborates conclusions based on observed features.

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Hayes included Bessaraboff, Galpin and Sachs.) Herbert W. Myers then came to the defence of Boyden in a rapid-fire exchange that took place in 1998–2000. Segerman’s unorthodox theories about tunings were laid to rest by Myers in 1998 and 2000. The relevant literature and arguments concerning this debate are set forth in the following writings: Zacconi (1592), Hayes (1930), Boyden (1959), Boyden (1965), Kory (1994), Segerman (1995), Myers (1998), Segerman (1999), Myers (2000) and Badiarov (2007): all are included in the Bibliography below.

<sup>47</sup> Hill, Hill and Hill, *Antonio Stradivari*, 119–120.

<sup>48</sup> Mersenne, *Harmonie universelle*, 241.



**Figure 12**  
Pieter Claesz, *Still Life with Musical Instruments*, 1623, oil on canvas, Musée du Louvre, RF1939–11. (Photo by Michel Urtado, reproduced by permission of RMN-Grand Palais/Art Resource, NY.)

Praetorius's *De organographia* and *Theatrum instrumentorum* provide a vital piece to the puzzle of reconstructing lost instruments, which in turn can confirm theories based on repertory. In the light of Praetorius's broad knowledge of Italian musical style and exposure to Italian-French violin practice, it is fitting that he accurately depicted Amati-style instruments.

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REKONSTRUIRANJE IZGUBLJENIH GLASBIL. PRAETORIUSOVA  
SYNTAGMA MUSICUM IN DRUŽINA VIOLIN OKOLI LETA 1619

Povzetek

Praetoriusova pogosto navajana izjava, da družina violin ne potrebuje dodatne razlage, ker je tako znana, že leta vznemirja tako muzikologe kot tudi organologe. Kljub tej izjavi je Praetorius o tej družini glasbil zapisal mnogo podatkov – že sama upodobitev je ne nazadnje vredna več kot tisoč besed. Praetoriusove grafike v prilogi *Theatrum instrumentorum* k drugi knjigi *Syntagma musicum* so znani in dobro raziskani viri, ki jih s pridom uporabljajo raziskovalci po vsem svetu, malo pozornosti pa je doslej veljalo neoštevilčeni prvi grafiki: ta prikazuje šest palcev Brunswickovega čevlja. Historična metrologija najpogosteje prinaša več vprašanj kot odgovorov, a v primeru Praetoriusovega grafičnega lista št. XXI prav Brunswickov čevelj daje dragocena izhodišča za novo razumevanje družine violin okoli leta 1619.

Zgodnja glasbila iz družine violin in njihove uglasitve so že dolgo predmet znanstvenih razprav. Poleg različnih sistemov uglasitev zmedo povzročata tudi dejstvo, da so bila skoraj vsa večja glasbila iz te družine v poznejšem času zmanjšana glede na njihove prvotne velikosti v 16. ali 17. stoletju. Praetoriusova ikonografska dokumentacija z merilom kaže na večja glasbila. Razprava, ki se osredotoča tudi na ohranjena izvorna glasbila iz 16. stoletja – predvsem tista iz Amatijeve delavnice – ob uporabi drugih sodobnih virov prikazuje, da Praetoriusovi deli *De organographia* in *Theatrum instrumentorum* opisujeta večja glasbila. Ta so po velikosti presenetljivo podobna izvornim dimenzijam glasbila, ki ga Praetorius imenuje *basso da braccio* (violončelo). Takšno glasbilo je prikazano na izjemno natančno opredeljeni upodobitvi družine violin in njihove uglasitve iz časa natisa njegovega monumentalnega dela.