

12 Antonio Stradivari and baroque guitar making

STEWART POLLENS

Antonio Stradivari (b. 1644; d. Cremona, 1737) is the most celebrated violin maker in history, yet it is not generally known that he also made a variety of lutes, mandolas, mandolins, guitars, and harps. Compared to the approximately 600 of Stradivari's violins, violas, and cellos that have survived, only a few mandolins and guitars and one harp are extant. Of the guitars, probably the best-known example, dated 1688,¹ is in the Hill collection at the Ashmolean Museum in Oxford (see Plates 21 a–d). Other examples include the “Sabionari” (1679), in a private collection in Italy; the “Giustiniani” (1681), also in a private collection in Italy; and the “Rawlins” (1700), in the Shrine to Music Museum in Vermillion, South Dakota. Doubts have been cast on two others: the “Canobio-Pagliari,” apparently by another maker though bearing a label “Revisto e coretto da me Antonio Stradivari in Cremona l'anno 1681” (“Revised and corrected by me, Antonio Stradivari in Cremona in the year 1681”), whereabouts unknown; and the “Vuillaume” (1711), in the Musée de la Musique in Paris.² A guitar neck inscribed “ANT:^sSTRADIVARIVS/CREMONEN:^sF.1675” is privately owned in the United Kingdom.

To better understand Stradivari's contribution to the craft of guitar making, it is helpful to trace the development of the baroque guitar and to examine early writings that describe the guitar's design from a theoretical standpoint. Only two pre-baroque guitars and three early vihuelas are extant. One guitar, in the Royal College of Music (London), is labeled in Portuguese “Belchior Dias made (by) me / Lisbon month of December 1581”³ and also inscribed “BCHIOR DIAS LXA [Belchior Dias Lisbon]”; a similar, though slightly larger and unsigned instrument (formerly in the Robert Spencer collection) is now in a private collection in the United States. Though the term *vihuela* is imprecise (during this period it referred to both bowed and plucked instruments of various sizes and shapes), three instruments of the plucked, guitar-shaped form of the vihuela have been identified: one from the sixteenth century (or earlier) in the Musée Jacquemart André (Paris) is inscribed GVADALVPE; an anonymous example, possibly from the early seventeenth century, is preserved as a relic in a shrine to S. Mariana de Jesús (1619–45) at the Iglesia de la Compañía de Jesús in Quito, Ecuador;⁴ and another anonymous, undated example is in the collection of the Musée de la Musique in Paris.⁵ Though the earliest non-Hispanic guitars were made in



Plate 21a–d The “Hill” Stradivari guitar, 1688 (Ashmolean Museum, Oxford)

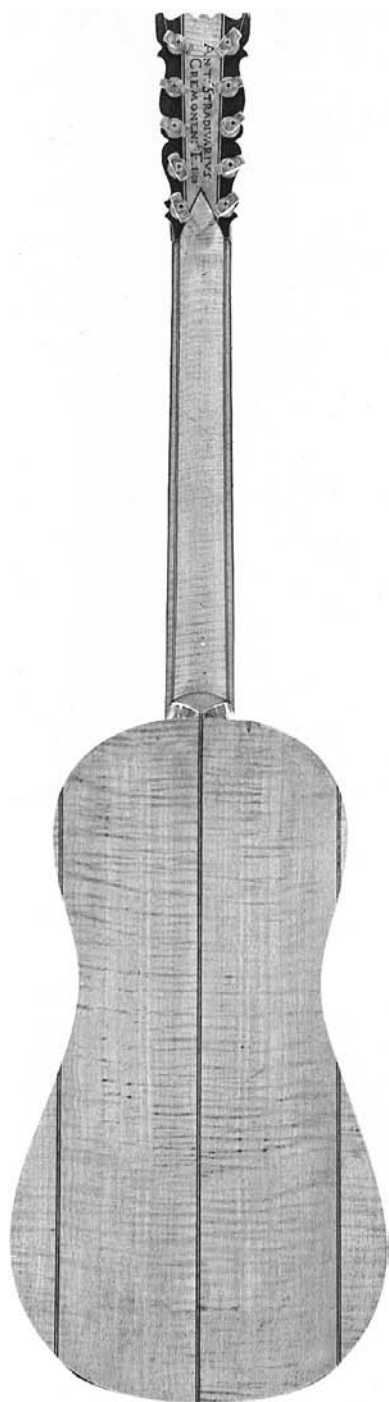


Plate 21 (*cont.*)



Plate 21 (*cont.*)

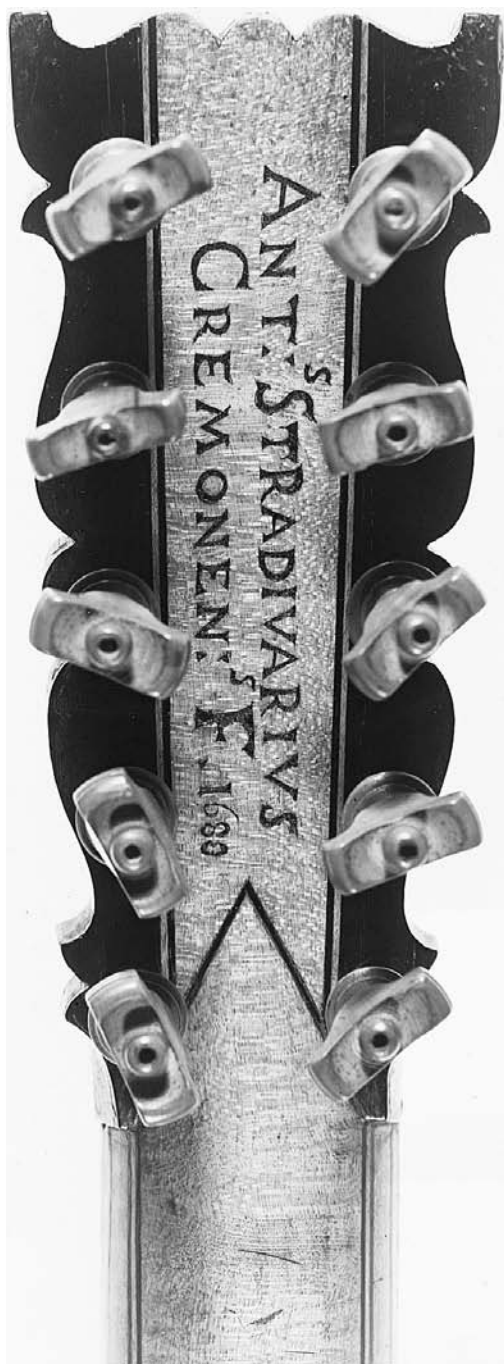


Plate 21 (cont.)

the fifteenth century, the oldest surviving ones date from the early seventeenth century and include examples by Christopho Cocho and Giorgio Sellas of Venice, Giovanni Smit of Milan, Giovanni Tessler of Ancona, and René Voboam of Paris.

Since technical descriptions and measurements of the three vihuelas and two sixteenth-century guitars have appeared in recent studies, only a few general comments on their construction will be made here.⁶ The three vihuelas and the Belchior Dias guitar in the Royal College of Music exhibit certain structural elements, such as the one-piece neck and neck block with slots for the ribs (otherwise known as the “Spanish foot,” or “slipper foot”), that are still employed in classical Spanish guitar construction. While some early seventeenth-century non-Hispanic guitars, such as those made in Paris by René Voboam, also have the integral neck and top block, others, such as those made by the Sellas family in Venice, employ an independent top block glued inside the ribs, with the neck (mitered to the neck foot) secured to the block by a long iron nail driven from the inside of the instrument. This form of construction (involving the use of an inner block and nail to secure the neck) was a feature shared with the lute as well as with Cremonese violins made through the mid-eighteenth century. The guitar’s mitered heel provides an elongated gluing surface not unlike that of the lute’s angled inner block. The inner block and nail is the form of construction found in Stradivari’s guitars. Italian makers such as Gennaro Fabricatore of Naples continued to use the nailed-on neck into the nineteenth century.

The six-course vihuela in the Musée Jacquemart-André exhibits the most unconventional construction of the three surviving examples. The body is uncharacteristically large (length 581 mm), and the back and top are heavily built (4–5 mm and 2–3 mm thick, respectively). Because of the neck’s unusual scarfed and butted construction, it is impossible to establish whether the neck and string lengths are original. Furthermore, there are two bridge positions indicated on the top, and it is unclear which is the earlier one. The string length is presently 790 mm, but if the neck is the original length and the lower bridge position is earlier, the string length may have been as long as 840 mm. As presently configured, the first and last strings would lie off the edge of the fretboard, and this, combined with the lack of evidence of wear from playing and impressions from tied frets, suggests that the instrument may not be authentic.

The six-course instrument identified as a vihuela in the shrine to S. Mariana de Jesús in Quito has a body length of 505 mm and a string length of 727 mm. The thin-walled construction of the body is more conventional than that of the vihuela in the Musée Jacquemart-André – were it not for its

six-course disposition, it might pass as a seventeenth- or eighteenth-century guitar. Many instruments made in Central and South America do, in fact, exhibit archaic qualities that lead to improper dating, and some experts have questioned the early seventeenth-century date and whether this instrument is a true vihuela.⁷

The smaller six-course vihuela in the Musée de la Musique has a body length of 435 mm and a string length of approximately 645 mm.⁸ Like the five-course 1581 Belchior Dias guitar in the Royal College of Music (body length 366 mm; string length 553 mm), the Musée de la Musique's vihuela has an arched back composed of seven deeply fluted ribs.

The ex-Spencer guitar (body length 454 mm) was converted to a *chitarra battente*, which involved cutting down the ribs, installing a cranked top, and reducing the neck length. It was subsequently restored as a conventional five-course guitar by building up the ribs, installing a new top (the rose is thought to be original) and bridge, and extending the neck. The Dias guitar (body length 366 mm; string length 553 mm) is also fitted with a later top and bridge.

In his *Declaración de instrumentos musicales* (Osuna, 1555), Juan Bermudo (b. Ecija, c. 1510; d. Andalusia, c. 1565) makes a distinction between the vihuela and the guitar. He gives tuning systems for vihuelas of six and seven courses, and though he indicates that the guitar was smaller in size and commonly equipped with four or five courses, he describes a “vihuela nueva pequeña” (new small vihuela) that was the size of “a large guitar strung with six courses.”⁹ He suggests that a vihuela could be converted into a guitar by removing the top and bottom strings.¹⁰ Bermudo specifies that both instruments can be fitted with ten frets and provides various systems for positioning them, though he adds that “small instruments, or those that play simple music, use only five or six.”¹¹ The number of frets specified in early descriptions of the vihuela and guitar may not be an indicator of the length of the neck, as the neck may have extended beyond the number of frets that were fitted to it.

Bartolomeo Lieto's *Dialogo quarto* of 1559 provides instructions for intabulating music for the *viola a mano* or lute. In describing the proportions of the body of the instrument (Lieto does not specify whether he is referring to the *viola a mano* or lute), the author indicates that

you will make it according to a ternary proportion . . . decide first the length of the instrument following your desire, not including the neck, and then divide this length and make three parts, two for the width and one for the height. Make the neck as long as there is from the bridge where the strings are tied to the end of the body, excluding the small [peg head] where they are wound onto the pegs.¹²

Lieto indicates that the neck is half the string length, and thus long enough to support twelve frets. The body proportions are perhaps more suggestive of the lute than the vihuela.

Pablo Nassarre (b. Aragon, c. 1650; d. Zaragoza, c. 1730) basically reiterates Bermudo's description of the vihuela and the guitar:

Vihuelas are of seven, six, or five courses (the last are called Spanish guitars); there is no distinction in material, form, or in the proportions that should be maintained in the body, nor in the material of the strings. All of these instruments are played with strings, like the harp, and are only distinguished by two things, one is that the *vihuelas* of six and seven courses have a body of greater size than those of five. The second thing is in the outline [*concavo*], because there are different types, but since there is no difference in the fabrication of the three instruments, what I say for one should be understood to apply to all.¹³

Nassarre goes on to provide detailed information about the structure and proportions of the vihuela and the guitar.¹⁴

Michael Praetorius indicates in his *Syntagma Musicum II: De Organographia* (1619) that "the guitar, or *chiterna*, is a four-course instrument tuned like the original lute. Its back is not round, however, but completely flat, rather like that of the pandora; the sides are at most two or three fingers-breadth in depth." He adds that "Some guitars have five courses of strings; in Italy, the *Ziarlatini* and *Salt'in banco* [clowns and mountebanks] use them for simple strummed accompaniments to their *villanelle* and other vulgar, clownish songs."¹⁵

Marin Mersenne (b. La Soultière, 1588; d. Paris, 1648) provides additional information on the geometry of the guitar in his *Harmonie Universelle* (1636–7):

The first guitars, the invention of which seem to have been in Spain, had only four courses of strings, of which the first is single, and called the treble string like the first of the other instruments, because it serves for the part of the soprano and often sings the melody . . . the neck is divided into eight frets, so that each string can be raised up by a minor hexachord.¹⁶

Mersenne's diagrams show a guitar with five pairs of double strings (though some, he says, use only a single treble course) and a fingerboard with eight frets like the preceding one. He concludes that the back of the instrument is "sometimes as flat as a table and other times a little convex. This is not of much importance, and whatever the style one gives it, its sounds are related to the kettle and always seem to whine."

We learn a little more about the proportional scheme of the guitar from Giovanni Battista Granata's introduction to his *Nuovi soavi concerti . . . opera sesta* (1680). Granata states that the neck of his guitar had eleven tied frets

Table 12.1 *Guitar and vihuela proportions (with decimal equivalents) in theoretical writings*

Author	Body length/ lower bout width	Body length/ center bout width	Body length/ neck length	Lower bout width/upper bout width	Top of body to center of rose/center of rose to bottom of body	Bout width/ rib height	Body length/ rib height	Number of frets
Bermudo 1555								10
								5–6
Lieto 1559	3:2 (1.5)					2:1 (2.0)	3:1 (3.0)	12
Mersenne 1636–37			3:2 (1.5)		1:2 (0.5)			8
Granata 1680								11
Nassarre 1724	2:1 (2.0)	3:1 (3.0)		5:4 (1.25)		5:2 (2.5)		6–8

and three of ebony glued to the soundboard. It is interesting that his earlier *Soavi Concerti di Sonate Musicali per la Chitara Spagnuola* (1659) includes an engraving of the author holding a five-course guitar having a neck that was only long enough to accommodate eight tied frets. Thus, the proportional inflexibility between neck length and body length that one finds in the violin, for example, appears to be absent in the guitar. As composers for the guitar wrote in increasingly higher ranges, the instrument's proportions were evidently adapted to provide players with more frets on the neck to make playing easier. Table 12.1 provides a summary of the proportions indicated in the theoretical works cited above.

Stradivari's guitars

Unfortunately, the Stradivari guitars that have survived are not in a pristine state. The 1679 "Sabionari" has a shortened neck, non-original fixed frets, new peg head, new bridge, as well as new blocks and internal bracing. The "Giustiniani" also has a shortened neck, non-original fixed frets, and a peg head that has been redrilled and refaced to support six double courses, which is a modification of the original five-double-course disposition. In addition to having lost its original soundboard rose, the "Giustiniani" guitar has a new bridge, reinforced internal construction, and soundboard barring in apparently non-original position. The "Rawlins" guitar also has a cut-down or, more likely, non-original neck that has been fitted with inaccurately placed fixed frets (there is no evidence that the present neck ever had tied

frets). Neither the bridge nor the rose is original. The “Rawlins” guitar has some uncharacteristic features: transverse braces running across the back (the other Stradivari guitars do not have back bracing); a markedly shorter length (which may indicate that the body was cut down); a sound hole that is not positioned according to the same proportional scheme as the “Hill,” “Giustiniani,” and “Sabionari” guitars; a simplified ebony ornament at the bottom of the soundboard (consisting of a shallow, elongated bracket rather than the shorter bracket and inverted heart used in the “Hill,” “Giustiniani,” and “Sabionari” guitars); and a peg-head profile that does not match the “Hill” and “Giustiniani” guitars or any of the surviving templates in Cremona (Plate 22). The aberrant profile is highly disturbing, as the maker’s name is located on the peg head. The neck and heel design and neck decoration are also unlike the “Hill” and “Giustiniani” guitars. The inlaid frets are again inaccurately positioned.

Regarding the “Hill” guitar, the original decorative projections of the bridge (the “baffo” or “moustache”) have been removed. Traces of these decorative elements indicate that the present bridge is properly positioned relative to them. The bridge itself has atypical triangular openings for the strings. Though the triangular openings allow the player to adjust the string spacing (without reducing the gluing surface between the bridge and top), original bridges for mandolas, mandolins, and lutes preserved in the Museo Stradivariano in Cremona indicate that Stradivari used drilled holes 1.06–1.12 mm in diameter, rather than triangular cutouts, to position and mount the strings. Thus, it is likely that the “Hill” bridge is not original. The neck of the “Hill” guitar, though apparently the only one with its original length intact, is veneered over a core of lime or poplar wood. Frets have been fitted at a later date, and as in the “Rawlins” guitar, these are not positioned in strict accordance with the current bridge position (the twelfth fret, for example, falls considerably short of half the distance to the bridge).¹⁷ The frets were likely fitted by someone unacquainted with the finer details of guitar construction, perhaps the Hills. The rose of this guitar has also been called into question as it is very similar in design to that of the “Canobio-Pagliardi” guitar, which is not believed to be authentic.¹⁸ A similar rose can also be found in an anonymous guitar in the Museo degli Strumenti Musicali in Rome.¹⁹ It is also clear that the “Hill” rose was intended for a larger opening, as all of the ornaments around the perimeter are partially occluded by the beveled orifice of the sound hole. Most guitars of this period had sunken roses; the flat rose of the “Hill” guitar resembles those employed in Italian harpsichords, its probable source.

Though the “Sabionari,” “Giustiniani,” and “Hill” have similar body dimensions, their outlines, and that of the “Rawlins,” do not match any original

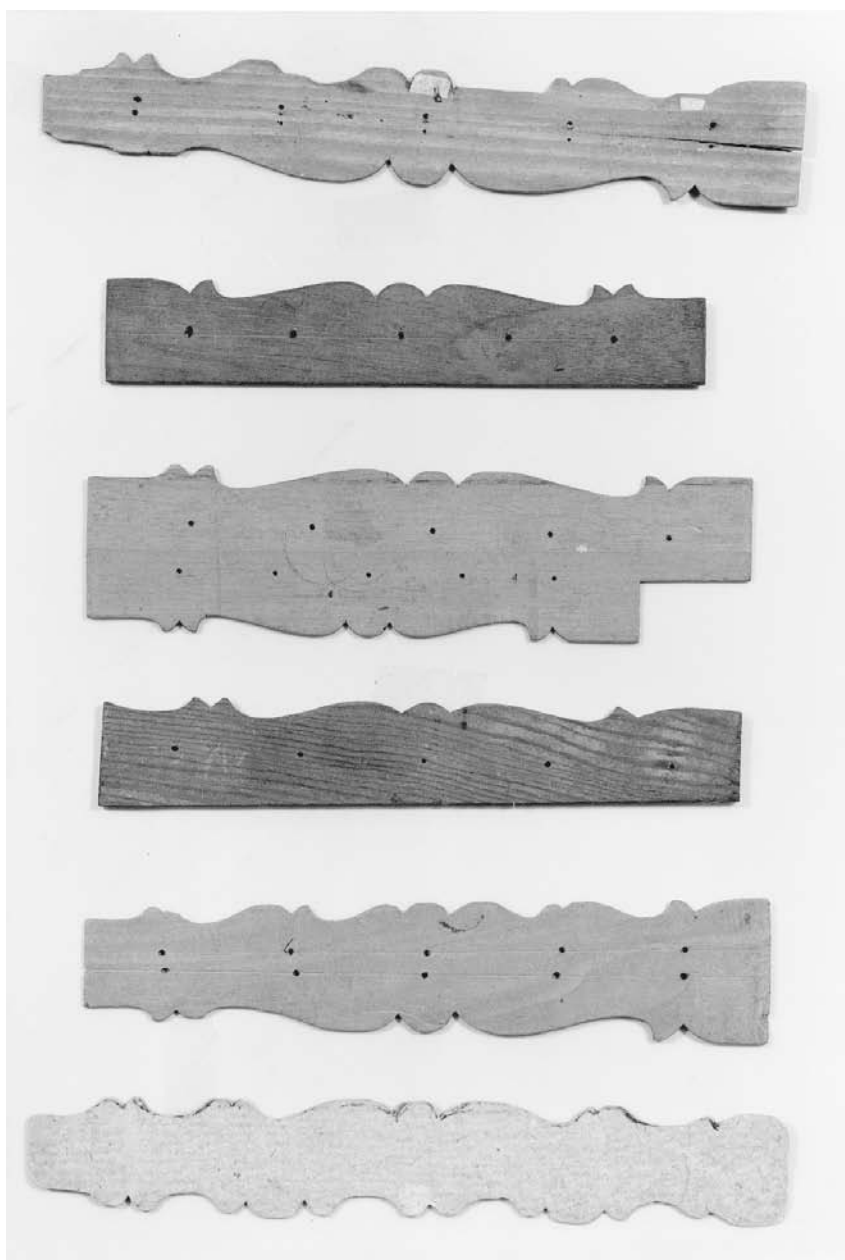


Plate 22 Stradivari peg-head templates (Cremona, Museo Stradivariano, MS 376–381)

Stradivari paper body pattern or wood form preserved in the Museo Stradivariano in Cremona and Musée de la Musique in Paris. This observation is not made to cast doubt on the authenticity of these guitars, as it is possible that some of Stradivari's patterns, forms, and templates may have been lost.

Table 12.2 *Dimensions of Stradivari's guitars*

	Body length	Upper bout width	Center bout width	Lower bout width	Rib height: top; bottom	Rose diameter	Top of body to center of rose	Neck length	Neck width: top; bottom	String length
"Giustiniani" 1681	473	211	175	269	97 105	85		294 ^a	47 ^a 53	649 ^a
"Hill" 1688	471	214	178	270	95 105	82	161	363	46 54	742 ^a
"Rawlins" 1700	439	211	170	267	78.5 89	78		249 ^a	37 ^a 44	640 ^a

^aNon-original dimensions due to reduction in neck length and/or non-original bridge placement

Dimensions of the "Giustiniani," "Hill," and "Rawlins" guitars are given in Table 12.2.²⁰

Stradivari's workshop materials

Since all of Stradivari's known guitars have been compromised to some extent, perhaps a clearer understanding of the Stradivari guitar design can be achieved from studying the surviving templates and forms that are preserved in the Museo Stradivariano and the Musée de la Musique. The materials in the Museo Stradivariano were purchased from Antonio Stradivari's grandson, Antonio II, by Count Ignazio Alessandro di Salabue (b. Casale Monferato, 1755; d. Salabue, 1840) in 1776.²¹ The workshop materials remained in the possession of the Count's family until 1920, when the violin maker Giuseppe Fiorini purchased them. He donated these artifacts to the city of Cremona in 1930.²² Of the approximately 700 patterns and forms that are today preserved in the Museo Stradivariano, approximately fifty were for plucked string instruments.

At the end of the eighteenth century, several of Stradivari's forms became separated from the bulk of his workshop materials. Three of these were wood forms for guitars that later came into the possession of the violin maker J. B. Vuillaume. After Vuillaume's death, these forms were purchased at auction by the museum of the Conservatoire National de Musique, and are now in the Musée de la Musique in Paris.²³ The wood forms served as a temporary platform for mounting the top and bottom blocks and ribs during the construction of the guitar body. Stradivari's paper patterns and wood forms are invaluable for the study of his instruments since they not only provide uncorrupted outlines of the body but also have positioning marks for the bridge and rose, scribed arcs indicating the tapered height of the ribs, and outlines of the fingerboard (see Plates 23 and 24). Dimensions of the three

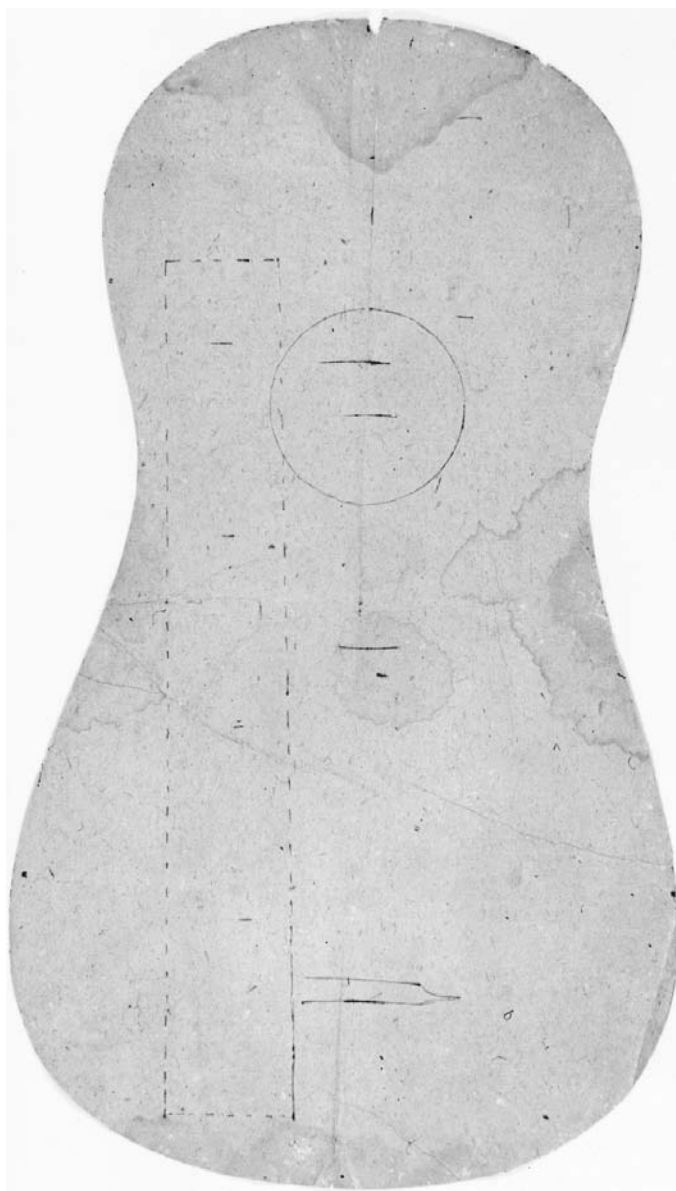


Plate 23 Stradivari paper pattern for guitar (Cremona, Museo Stradivariano, MS 374)



Plate 24 Stradivari wood guitar form (Paris, Musée de la Musique, MM E901d)

wood guitar forms in Paris and the four paper patterns for guitar outlines in Cremona are given in Table 12.3.

Dimensions of the paper patterns MS 719, MS 721, and MS 750 are also given in Table 12.3. These patterns are not listed in the original inventory and catalog of the Museo Stradivariano, and their provenance is unclear.²⁴ The proportions of the body outlines of these three patterns are consistent with those of the other Stradivari paper patterns and wood forms, and they appear to be seventeenth- or early eighteenth-century designs. Unlike the other patterns and forms, they do not include indications of fingerboard dimensions, bridge position, rib heights, or sound-hole diameters and positions. Their outer dimensions are included in Table 12.3 for comparative purposes. Proportional relationships derived from measurements of Stradivari's guitars, wood forms, and paper patterns can be found in Table 12.4. From the data presented in Tables 12.1 and 12.4, the following points are evident:

- (1) There is considerable variation in the proportions given in the theoretical writings. Most notable is the discrepancy between the number of frets on the neck, which may imply different ratios of neck length to body length. Also differing are the ratios of body length to lower bout width and bout width to rib height.
- (2) There is very little concordance between the proportions given in any of the theoretical writings and those found in Stradivari's patterns, forms, and extant instruments.
- (3) There is a marked discrepancy between the body-length to lower-bout-width ratios of the three surviving Stradivari guitars and those of Stradivari's wood forms and paper patterns. This ratio in the "Hill" and "Giustiniani" guitars hovers around 5 : 11 (2.2), whereas the forms and patterns exhibit a ratio of about 5 : 9 (1.8). When rib thicknesses (approximately 1.2 mm) are added to the form dimensions, this significant proportional discrepancy persists.
- (4) There is considerable similarity between the proportions of the "Hill" and "Giustiniani" bodies. The dissimilarities between the bout widths of these two guitars and the "Rawlins" suggest that the "Rawlins" may have been cut down in length. This might also explain why the shape of the inlaid ebony ornament on the lower edge of the "Rawlins" soundboard differs from that found on the "Hill" and "Giustiniani" soundboards.

String lengths, string diameters, and pitch

From the surviving instruments, wood forms, and paper templates, we know that Stradivari made guitars with a wide range of body and string lengths, as seen in Table 12.5.

Two seventeenth-century composers provided three or four different tuning ranges for different sizes of guitars. In 1640 Giovanni Paolo Foscarini

Table 12.3 *Dimensions of Stradivari's guitar forms and patterns*

Form or Pattern	Body length	Upper bout width	Center bout width	Lower bout width	Top to rose center	Rose diameter	Top to bridge	Neck length	Neck width: top; bottom	Rib height: top; bottom
MM E901d	382	165.5	139	207	137	56.8	321	246	43.5	77
MM E901e	338 ^a	163 ^a	125 ^a	201 ^a	86 ^a	54	267 ^a	283	69 20.4	82 75.7
MM E901f	220	92.5	80	117	79.3	41	181	145.5	49 41	82 54
MS 374	496	231	195	287	[165]	[83.5]	[407]	363	44 48	61.5 99
MS 719	459	195	160	255	—	—	—	—	55 —	122 —
MS 721	495	219	185	280	—	—	—	—	—	—
MS 750	412	191	157	236	—	—	—	—	—	—

^a Altered dimensions (MM E901e was converted by Stradivari from a guitar form to a viola d'amore form; its length was considerably shortened and the waist lowered)
 [] = Not measured directly but derived from other measurements

Table 12.4 *Proportions (decimal) found in Stradivari's guitars, patterns, and forms*

Guitar, form, or pattern	Body length/ lower bout width	Body length/ center bout width	Body length/ neck length	Lower bout width/upper bout width	Top of body to center of rose/center of rose to bottom of body	Bout width/ rib height: top; bottom
"Giustiniani" guitar	2.24	2.70	1.61 ^a	1.27		2.18 2.56
"Hill" guitar	2.20	2.65	1.30	1.26	0.52	2.25 2.57
"Rawlins" guitar	2.08	2.58	1.76 ^a	1.27		2.69 3.00
MM E901d wood form	1.85	2.75	1.55	1.24	0.56	2.15 2.52
MM E901e wood form	1.68 ^a	2.70 ^a	1.19 ^a	1.23 ^a	0.34 ^a	2.15 ^a 2.45 ^a
MM E901f wood form	1.88	2.75	1.51	1.26	0.56	1.71 1.90
MS 374 paper pattern	1.73	2.54	1.37	1.24		2.33 2.35
MS 719 paper pattern	1.80	2.87		1.31		
MS 721 paper pattern	1.77	2.68		1.28		
MS 750 paper pattern	1.75	2.62		1.24		

^a Altered dimensions (form MM E901e converted by Stradivari from a guitar form to a *viola d'amore* form; length considerably shortened)

Table 12.5 *Body lengths and string lengths of Stradivari's guitar forms*

Guitar, form, or paper pattern	Body length	String length	String length/ body length
"Hill" guitar	471	741	1.57
MM E901d	382	567	1.48
MM E901f	220	326.5	1.48
MS 374	496	770	1.55
MS 719	459		
MS 721	495		
MS 750	412		

wrote: "First you tune the *grande* [large guitar], as you wish, then the *mezana* [middle guitar] is voiced a little higher, that is touch the fifth string of the *grande* with the third of the *mezana*, tune the *Chitara piccola* [little guitar] by touching [its] fourth string at two [second fret], and make unison with the third open string of the *Chitara mezana*, and thus tune one fourth above."²⁵ In 1646, Carlo Calvi added another tuning range: "To tune four guitars in concert, first tune the third string of the *picciola Chitarra* (little guitar) to the fifth [string] of the *mezana* [middle-size guitar], and with the fourth

Table 12.6 *String lengths and body lengths of the largest Stradivari guitar and pattern and proportional lengths derived from them*

Guitar or pattern	String length; body length	8/9 string l.; 8/9 body l.	2/3 string l.; 2/3 body l.	3/4 string l.; 3/4 body l.	4/5 string l.; 4/5 body l.
"Hill" guitar	741	659	494	556	593
	471	419	314	353	377
MS 374	770	684	513	578	616
	496	440	331	372	397

[string] of the *più grande* [larger guitar] you make the unison. Play the third [string] of the other *Chitarra mezana* [second middle-size guitar] to the second string of the *grande* and make it the same. Thus the *picciola* makes a fifth with the *grande*, and the *mezana* a fourth [with the *grande*], and the other [mezana] the third [with the *grande*]." Though Foscari's *mezana* guitar was not necessarily smaller than the *grande* (there is only one whole-tone difference between the two), his *piccola* guitar was a fourth higher and was presumably a smaller instrument. Calvi's *mezane* were a third and a fourth higher in pitch, and his *picciola* was a fifth higher, suggesting two, three, or possibly four different sizes of guitars.

We know from Stradivari's surviving forms and patterns that he produced guitars in different sizes. To ascertain whether these sizes bear any relation to the pitch relationships presented by Foscari and Calvi, the string lengths of the largest paper guitar pattern and the "Hill" guitar (which is shorter than the largest pattern but more similar in size to other extant seventeenth-century guitars) were multiplied by the proportions representing a whole tone (8 : 9), major third (4 : 5), fourth (3 : 4), and fifth (2 : 3). The resulting dimensions are found in Table 12.6. The dimensions calculated in Table 12.6 do not yield any precise matches with body lengths and string lengths of the smaller forms and paper patterns (see Table 12.3); however, form MM E901d could conceivably have been tuned a third higher than a guitar having the dimensions of the "Hill" and "Giustiniani," and paper pattern MS 750 (though possibly not from Stradivari's shop) might have been tuned a whole tone higher than these extant guitars. Patterns or forms for a guitar tuned a fourth or fifth higher cannot be identified among the surviving workshop materials.

The *chitarra tiorbata*, or theorboed guitar (guitar with added diapa- sons having greater lengths than the fretted strings), is little known today; however, in the mid-seventeenth century a number of composers wrote for this instrument. For example, Giovanni Battista Granata includes several works for it in his *Soavi Concerti di Sonate Musicali per la Chitarra Spagnuola*

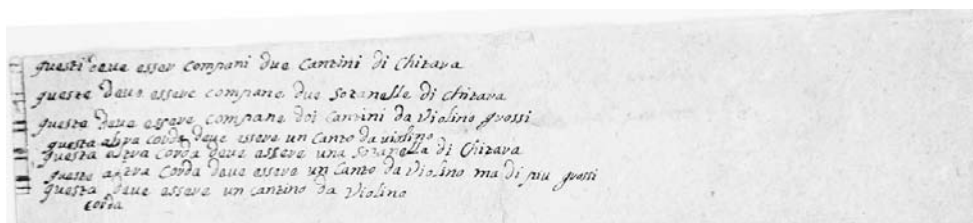


Plate 25 Stradivari neck pattern showing arrangement of strings (Cremona, Museo Stradivariano, MS 375)

(Turin, 1659); his *Preludio del terzo Tuono sopra la Chitarra Atiorbata*, written for Count Lelio Pioveni of Venice, calls for seven strings off the fingerboard. Stradivari left two neck patterns, one (MS 375) 318 mm long by 72 mm and 60 mm (widths at the juncture with the body and at the nut, respectively) inscribed “Measure of the length and width of the neck of the theorboed guitar,”²⁶ the other (MS 385) 921.5 mm in length and 53 mm in width, with indications for seven strings, inscribed “Measure of the length and width of the extension of the theorboed guitar and on the said extension are placed seven basses and at the top a fourth [string] of the violin and the remaining guitar [strings] total seven.”²⁷ Form MM E901d and paper pattern MS 374 indicate that string length to neck length ratios are 2.30 and 2.12, respectively. Assuming that the *chitarra tiorbata* was constructed with a similar number (ten or eleven) of frets on the neck to Stradivari’s conventional guitars, the instrument would have a fretted string length of 674–731 mm, and diapasons up to 1595–1653 mm in length. Body length would have ranged from 434 to 493 mm (using the ratios exhibited by the same form and pattern). A bridge pattern (MS 397), notched for five pairs and seven single strings, has an overall length of 165 mm and string spacing of 124 mm.

The neck pattern MS 375 is additionally inscribed on the reverse (each line next to marks for string pairs 1–5) as follows:

- [1] These should be paired two of the small top strings (*cantini*) of the guitar.
- [2] These should be paired two second strings (*sotanelle*) of the guitar.
- [3] These should be paired two small top strings (*cantini*) of violin thickness.
- [4] This should be a *canto* of a violin. / This other should be the second (*sotanelle*) of a guitar.
- [5] This should be the *canto* of the violin but a bit larger. / This other should be a top string (*cantino*) of a violin.²⁸

From the arrangement of the descriptions on the fingerboard, it is clear that the octave strings are mounted above (see Plate 25).

The “Hill” guitar has a body length of 471 mm and a string length of 741 mm, and the paper pattern MS 374 has a body length of 496 mm and a string length of 770 mm. Both the body lengths and string lengths of

these instruments are uncharacteristically long when compared with other extant seventeenth-century guitars, whose body lengths typically range from 430 to 470 mm and whose string lengths vary between 620 and 670 mm. Though the top string of the “Hill” guitar can be tuned to e^1 relative to $a^1 = 386\text{--}415$ Hz,²⁹ such a long string length would be precariously close to its breaking point at the higher end of this pitch range. Furthermore, the string lengths of Stradivari’s violins (whose top strings were tuned an octave above that of the guitar) were about 326 mm, or considerably shorter than half the length of Stradivari’s guitar strings. If one presumes that guitars and violins were tuned to the same pitch, the greater string lengths of his guitars are unexplainable. The combination of very long strings and the relatively wide string spacing afforded by the present nut and neck width is reported by one musician to be unplayable.³⁰ Did this large model guitar fulfill a special function or tuning (perhaps with the top string at D), or is it the errant product of a violin maker who was inexperienced in guitar design? Considering Stradivari’s deserved reputation as a luthier and the plethora of guitar-associated forms and templates that have survived, it is safer to assume the former.

The surviving wood forms are all considerably shorter than the extant guitars, and guitars made on these forms were likely tuned to higher pitches. Pattern MS 719, with a body length of 459 mm (though lacking any indications of neck length or bridge position), falls within the range of typical body lengths observed in extant seventeenth-century guitars. Unfortunately, the provenance of this pattern is unclear, and there is no evidence that it was made or used by Stradivari.

Additional notes on the construction of Stradivari’s guitars

Details of internal construction can be gleaned from X-ray photographs of two of the Stradivari guitars. As stated above, the necks were originally attached to the instruments by a long iron nail (about 70–80 mm long) driven through the inner top block.³¹ The nail is positioned high on the top block to align with the narrow neck, which is about 22–24 mm thick at its juncture with the body. The peg heads are attached at a 10–15 percent angle to the neck by a V-joint and are veneered on the front and back surfaces; the peg-head backs include a central panel of figured maple that serves as the nameplate. The necks of the “Giustiniani” and “Hill” guitars are veneered with figured maple, with two strips of black/white/black purfling running down the side and merging with similar purfling set into the heel.

The backs of the guitars are of figured maple and are variously constructed of one piece, two pieces, and two pieces with wings. The thickness

of the backs of both the “Giustiniani” and “Hill” guitars is approximately 2 mm.³² Though the “Rawlins” currently has three bars reinforcing the back, these were likely installed at a later time to counteract distortion, as the other two guitars do not show evidence of having been fitted with back reinforcements. The multi-part backs have spacers of black/white/black purfling. All jointed boards were originally reinforced on the inside with strips of paper, as well the juncture between bottom and ribs.

The original soundboard barring probably consisted of two transverse bars, one above and the other below the sound hole. Among the three guitars there is no agreement as to the layout of the soundboard bars, very likely because the bars have been moved in the course of repair or alteration. In the “Rawlins” guitar, both bars are approximately perpendicular to the center line of the instrument; in the “Hill” guitar, the upper bar is approximately perpendicular to the center line while the lower bar is angled; in the “Giustiniani” guitar, the bars are both angled. The guitars also have a number of short triangular blocks glued along the perimeter of the soundboard; these blocks were probably used to draw the ribs into alignment when gluing on the top. (The back was glued to the rib structure while it was still affixed to the inner form, and so the triangular blocks were not required in that stage of construction.³³) As far as can be determined, the present arrangement of these triangular blocks in the “Giustiniani” is as follows: one on either side of the upper block; one on either side of the rose; one below the rose on the right side; and three on each side between the lower block and the lower bar. The “Hill” has two on either side of the rose, angled downward and two at the lower bouts, somewhat above the bridge.

The soundboards are of quartered spruce with a central joint. The soundboard of the “Giustiniani” is reportedly approximately 1.6 mm thick³⁴ and that of the “Hill” about 1.5 mm thick. The roses of all three guitars are either missing, or recently fitted, or suspect. However, all three have a border around the circular opening for the rose that consists of an alternating series of ivory diamonds and squares (“Giustiniani” and “Hill”) and ivory diamonds and circles (“Rawlins”). This diamond-and-circle motif can be seen in the borders of Stradivari’s inlaid violins. The ivory pieces are set in a mastic of ebony filings, and bordered by strips of black/white or black/white/black purfling.

The ribs are of figured maple, approximately 1.2–1.25 mm thick in the “Giustiniani” and “Hill” guitars. The “Hill” and “Rawlins” have small plugged holes in the center of the rib at the waist, from which one may deduce that the ribs were temporarily pinned to the form during construction. Form M E901f has remnants of such wooden pegs jutting out of its perimeter along the waist.

The ribs and back were given the rich orange-colored varnish similar to that found on violins. The soundboards were probably originally unvarnished.

In conclusion, Stradivari's guitars are enigmatic. While most extant seventeenth-century guitars are richly decorated with sunken rosettes and vaulted or staved backs, his guitars are spartan in appearance, having flat backs and ribs of mildly figured maple and featuring little inlay or other decoration. The bodies and string lengths are considerably longer than most surviving seventeenth-century guitars. String lengths of 740 mm and up would appear to present difficulties for the guitarist, both in terms of string breakage and playing technique. Rather than discounting or constructing scaled-down versions of them (as has been the practice),³⁵ greater effort should be made to reconcile them with our understanding of late seventeenth-century repertoire and pitch. Stradivari's guitars may provide new insights into late seventeenth-century guitar timbre and performance practice. The surviving patterns and forms provide sufficient information for guitar makers to fabricate instruments of sizes not represented by extant examples.