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THE USE OF CT SCANNING FOR BOWED STRINGED INSTRUMENT IDENTIFICATION AND COMPARISON



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Galleria dell'Accademia,
Dept. Of Musical
Instruments, Florence





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The bowed instrument collection



A.Stradivari,
Viola tenore e
violoncello
'Medicei',
Cremona
1690



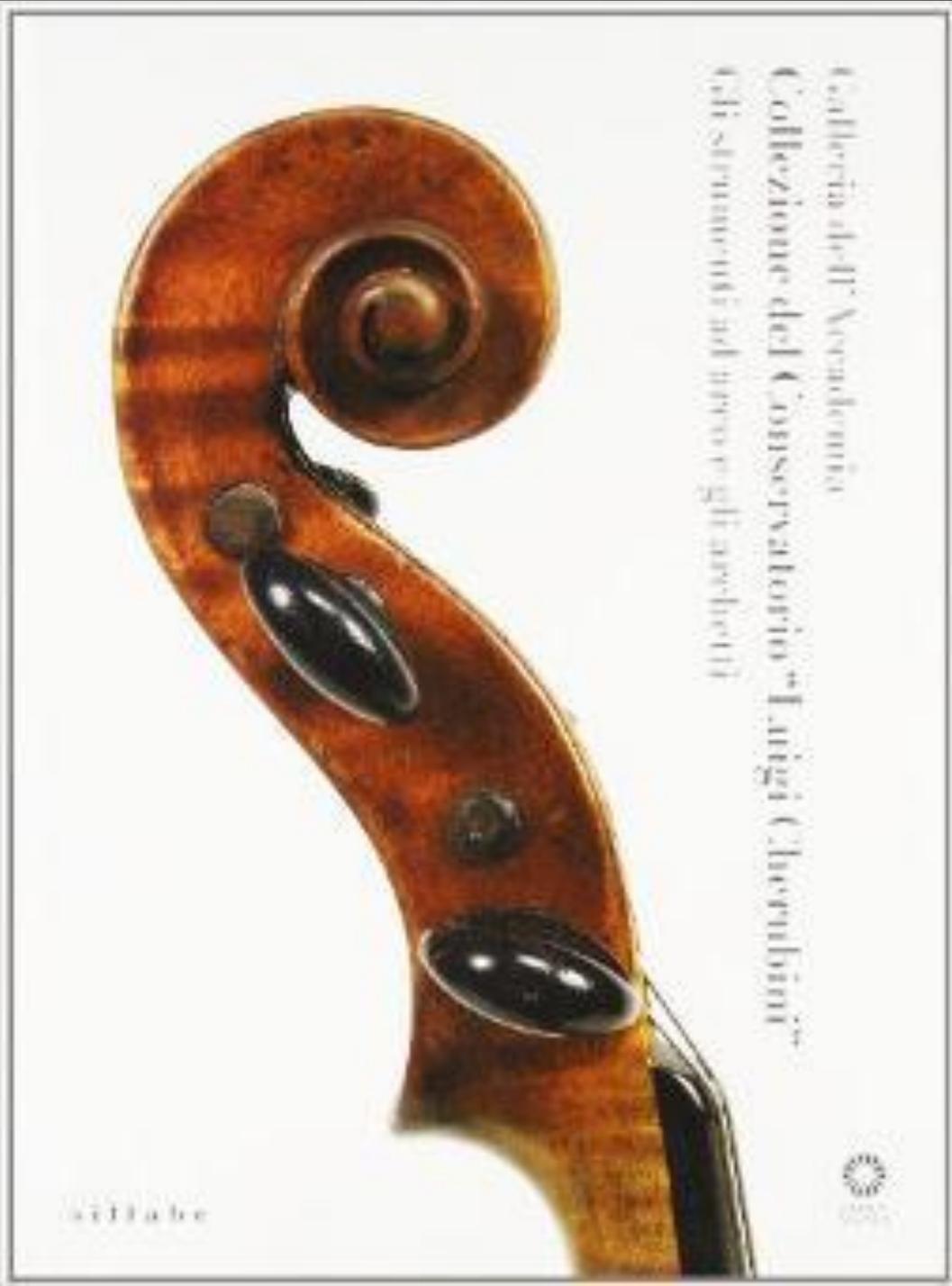
N.Amati,
Violoncello
'Medici',
Cremona
ca.1650





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Catalogue of the bowed
instruments and bows, ed.
G.RossiRognoni, Leghorn : Sillabe,
2009



Galleria dell'Accademia
Collezione del Conservatorio "Luigi Cherubini"
Gli strumenti ad arco e gli archi

sillabe





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5. Violin

[Florence, 1770 ca.]

Giovanni Battista Gabbrielli (attr.)

(Florence, 1716–1771)

Inv. Cherubini no. 1088/9

Description

The BELLY is made of two quarter out pieces of spruce (*Picea abies* Karst.) with hazel figure markings and medium-wide grain converging towards the joint (mean width 1.8 mm at the centre, 2.1 mm at the edges). The two pieces come from the same log although a 22.4 mm wide strip was cut from the centre of the piece on the right. The grain shows an anomaly in the wood growth near the edge of the left C-bout, but not on the right side. There are no positioning pins.

The arching is well-shaped with deep and wide fluting. It reaches its maximum height between the upper eyes of the F-holes.

The F-holes are short and vertical with small eyes, wings with diverging sides and no fluting. The notches are small, and those of the left F-hole are inverted, the outer one lower than the inner, while the notches on the right F-hole are quite slanted (63°).

The corners are elongated with similar openings on the lower and upper corners, defining very open C-bouts (83 mm). The thickness is only slightly greater than that of the edge.

The purfling consists of three lines: the middle line is beech wood (*Fagus sylvatica* L.) while the two outer rows are of stained, unidentified wood (total thickness 1.6 mm; white 0.5 mm). The purfling joint is very precise, centrally placed at the corners and reaches almost their end. The distance from the edge is 3.2 mm.

The ebony (*Diospyros* sp.) saddle is not original; it is very narrow and high on the belly; it protrudes beneath the belly and overlaps the rib. It also cuts into part of the brand mark on the belly.

The SACK comprises two pieces of quarter cut maple (*Acer* sp.). The right board has a slight flame pattern descending towards the edge, while there is no curl on the left piece. There are no positioning pins.

The arching reflects the style of the belly with deeper fluting that gives it more emphasis notwithstanding a slight deformation caused by the pressure of the sound-post. The maximum height just below the upper corners is higher than that of the belly.

The corners also reflect the style of the belly and are thicker than the rest of the edge.

The purfling is made of the same material as the purfling on the belly, but the black lines are narrower.

The original, intact BUTTON is rather wide at the base, semi-circular, and is notably thicker at the top than at the base.





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The six ribs are made of nearly quarter cut maple (*Acer* sp.) with a flame pattern that is barely visible on the lower ribs and perpendicular to the surface of the back. The bending of the wood near the corners caused wrinkling on the wood surface.

The blocks are made of conifer wood with characteristics compatible with fir; except for the upper block made of walnut they are all original. The linings are original, made of broadleaved wood with features compatible with beech wood. The linings are not inserted into the blocks and in some cases are too short and do not reach them. The bassbar is very small, thin and may be original.

The maple (*Acer* sp.) NECK, without any flaring is original. Its angle was modified by the insertion of two wedges between the heel and the upper block and between the heel and the button creating an elevation of 4.5 mm and an angle of 7° with respect to the surface. The bone nut was moved upwards to lengthen the body stop, so now it is beyond the base of the pegbox.

The work is similar to what was done on instrument inv. no. 1988/6 (cat. no. 18) and can be attributed to the same hand.

The ebony (*Diospyros* sp.) fingerboard is not original.

The HEAD is of one piece with the neck. The pegbox is narrow, the base forms a 113° angle with the surface of the neck, and is coarsely dug out at the top. The pegbox flanks are slender and of the same width throughout the length.

The scroll is slightly twisted towards the left in relation to the pegbox. However, it is well-proportioned and develops evenly notwithstanding some asymmetry. The beginning of the spiral is anticipated at the eye by a slender scratch. The sides of the back of the scroll converge slightly and the heel of the scroll is deeply fluted and protrudes notably.

The VARNISH is golden brown.

The instrument has NO LABEL. However, there are three BRAND MARKS with the initials 'G-B-G' within a rectangle made with the same punch used for violin inv. no. 1988/6 (cat. no. 4): they are on the button, at the joint of the lower ribs below the endbutton and on the belly near the saddle. There are no visible markings inside the instrument.

The modern pear wood (*Pyrus* sp.) pegs are decorated with a bone button on the sides.

Dendrochronological dating of the belly

Fifty-two and forty-eight rings were counted on the right and left boards respectively. The mean chronology of

fifty-eight rings cross-matches with some Central European chronologies, including Wilson's that is applicable to Germany (Falkenstein). Dating of the last measured ring: 1768, T_{sp} 4,60, Gk: 73,30^{***}. The dating can be considered reliable.

State of conservation

Even though it shows some signs of wear the instrument is in fair condition. The BELLY presents a significant fracture along the grain involving the entire lower right from the edge to the eye of the F-hole; it was reglued and consolidated with a single square reinforcement. There are some nicks, especially beneath the tailpiece. The edge, which is generally quite worn, was repaired at the upper and lower bouts, while the corners are very worn but original. A 20 mm long crack along the edge – from where the above mentioned crack begins, required doubling of the upper part of the edge and the replacement of the purfling in that section.

The BACK is in good condition even though it has some scratches and shows signs of moderate wear.

The RIBS are in fair condition: the upper right rib has a small crack near the block that was reglued from the inside. There is no other damage aside from a significant bulge on either side of the lower block.

The NECK and HEAD are in fair condition, but the right pegbox flank has some unrepaired cracks between the E and G pegs and above the A peg. The area around the D peg on the left flank was doubled on the outside. The neck shows a 9 mm crack on the right side just under the head.

Historical documentation

See preceding entry (cat. no. 4). This instrument also comes from the Accademia del Regio Istituto Musicale. In an appraisal dated 1867 it is listed as 'ordinary' from the qualitative standpoint and was valued at only 50 lire, half the amount of the other Gabrielli violin.¹

The 1867 report by Castellani described this instrument as 'fairly well set up' and, because of its 'ordinary quality' advised against the work planned for the other instruments.²

In 1947 Alfredo Del Lungo submitted an invoice for the repair of the volute on the scroll and of a crack in the lower left part of the belly.³

Then in 1988, within the context of the restorations commissioned after the 1966 flood, he presented a bill for regluing the body, cleaning the inside, smoothing the fingerboard, touching-up the original varnish and polishing the neck, replacing the





DIMENSIONS	LENGTH	WIDTH	DEPTH
TOTAL LENGTH	591	—	—
VIBRATING STRING	330	—	—
BODY STOP	199	—	—
BELLY	355	159-151-104-177-201	—
BACK	357	161-153-105-179-201	—
RES	—	—	32-32-30.7-32.7-30.7
F-HOLES	73	45-74.3-126.5	—
FINGERBOARD	266	20.7-42.3	—
HEAD	109	—	—
SCROLL	36.6	41.2	—
PEEBOK	—	7-17.4	—

PROJECTION HEIGHT OF THE FINGERBOARD AT THE BRIDGE POSITION: 28



string and a general revision.⁴

Critical history

In 1911 Bargagna described the instrument as 'entirely identical to the preceding one and the label has the same information' this would suggest the existence of a label that was lost before 1969 when Gai stated that it was missing. However, it is strange that this was the only case in which Bargagna did not transcribe the text of the label, so it is possibly legitimate to assume that he was referring to the brand mark.

Stylistic notes

This violin is slightly narrower and longer than the preceding one. It does have the same stylistic features even though they are less carefully wrought, perhaps because of the maker's advanced age. The cut and placement of the F-holes and the purfling have the same characteristics. His choice of wood with a wider grain for the belly, however, led to greater thicknesses.

The workmanship on the scroll is highly asymmetrical especially when viewed from the front and back, and in particular the development of the second turn. The hollowing on the heel of the scroll is deeper on this violin than on the preceding instrument.

The inlay channels and the thickness of the black lines of the purfling are also less even than in the previous instrument. Furthermore the white purfling is further extended towards the end of the corners.

The beautiful golden brown varnish is lighter than that of the preceding violin, but its consistency is similar.

Exhibitions

Antichi strumenti, Florence, Palazzo Pitti 1980

Antichi strumenti, Florence, Palazzo Vecchio 1981

Bibliography

BARGAGNA 1911, p. 23

GAI 1969, p. 100

Antichi strumenti 1980, pp. 31, 39*

CORONA 1980

CORONA 1998

Notes

¹ ACF, Biblioteca, loose sheets.

² ACF, Rendiconti, 1967.

³ ACF, Rendiconti, 1947 and Biblioteca, loose sheets.

⁴ ACF, Rendiconti, 1968.



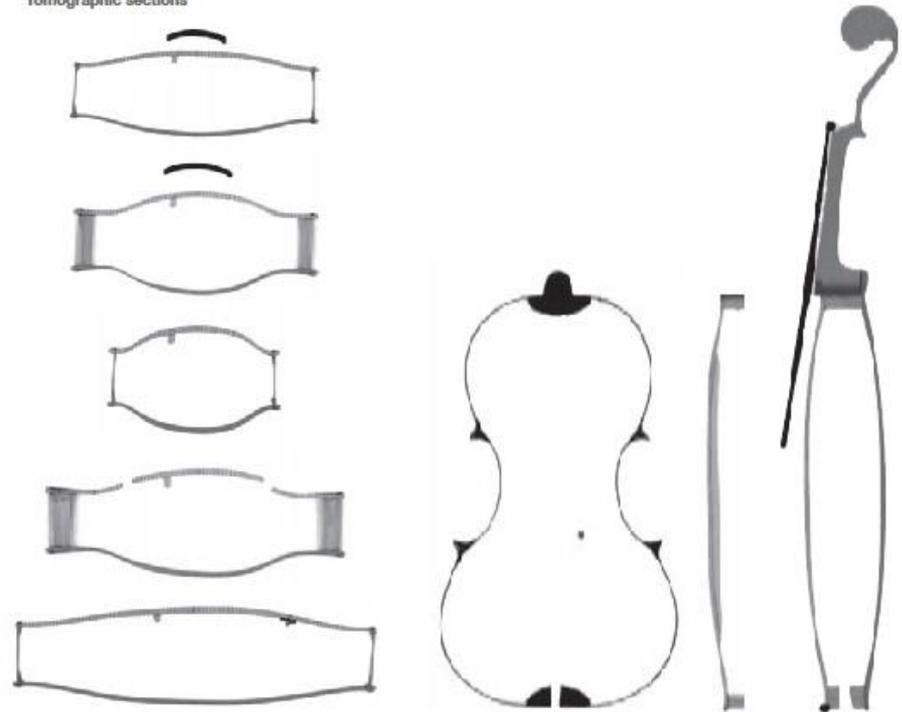
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Thickness of the boards



Tomographic sections



violins



Issues: cost and logistics



CT Scanner: General Electrics
'HighSpeed'

Step between 'slices': 0,7mm

80 or 100 KV

40-50 milliAmpère/sec.

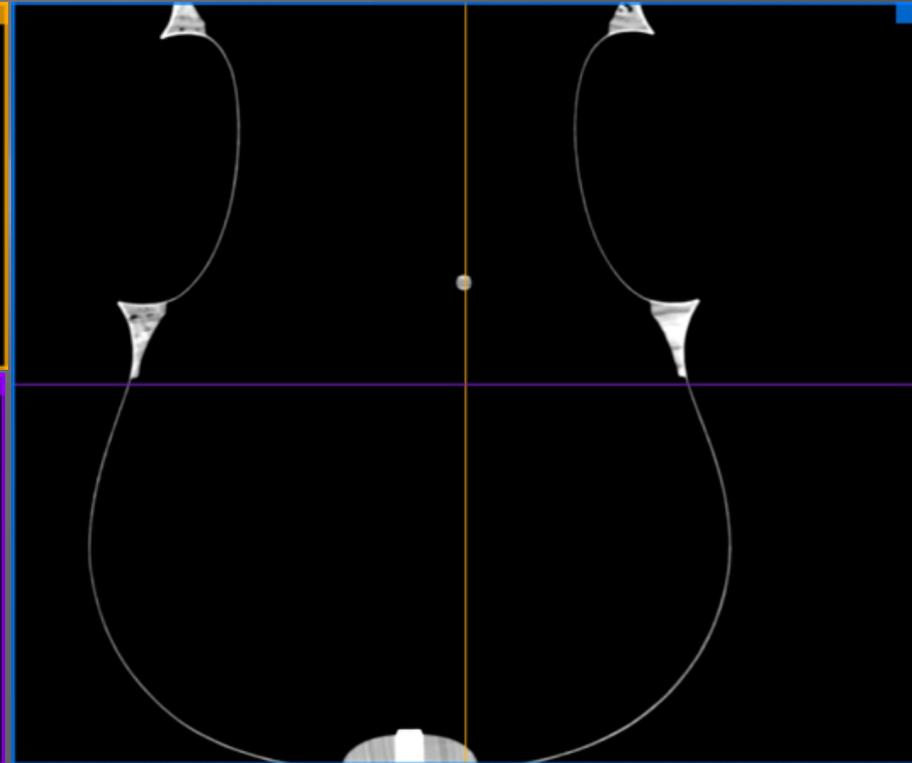
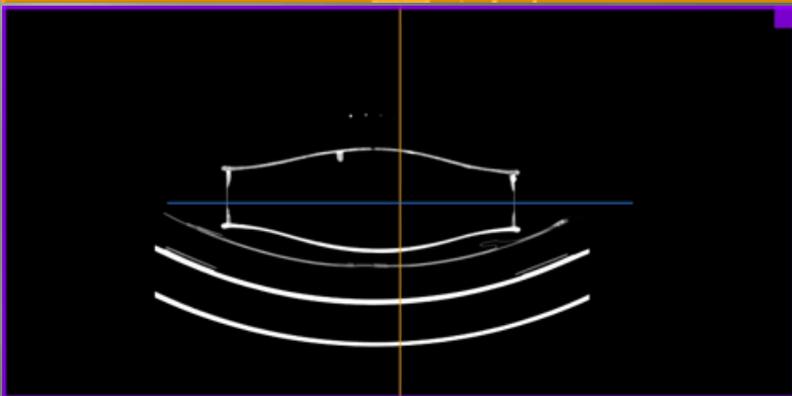
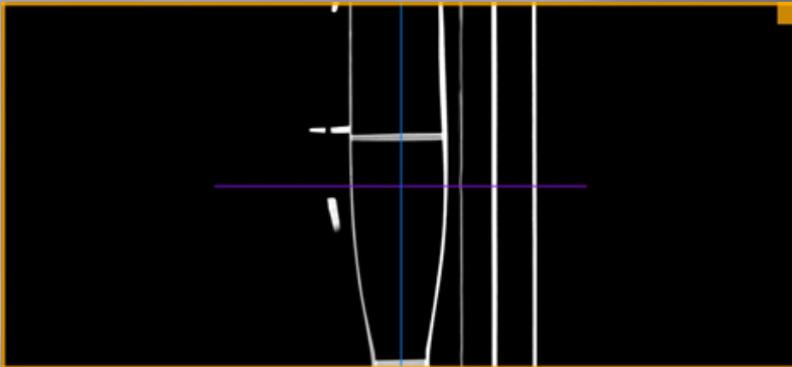
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Hounsfield Units: 1000 HU
(oscillation) and -600 HU
(reading window)





CT scan: 2D





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CT scan: 3D

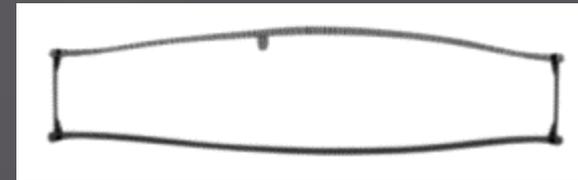
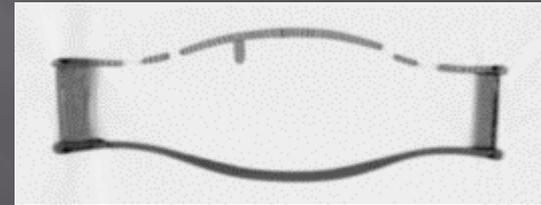
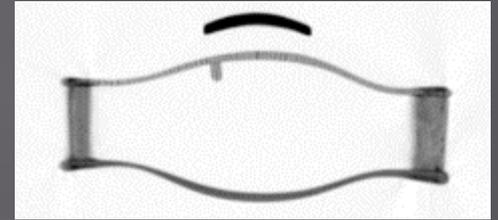
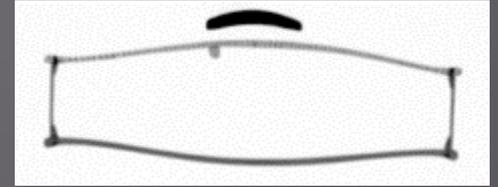
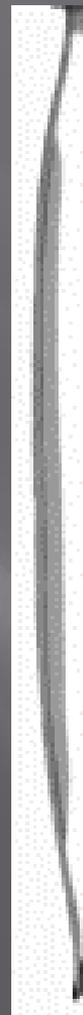
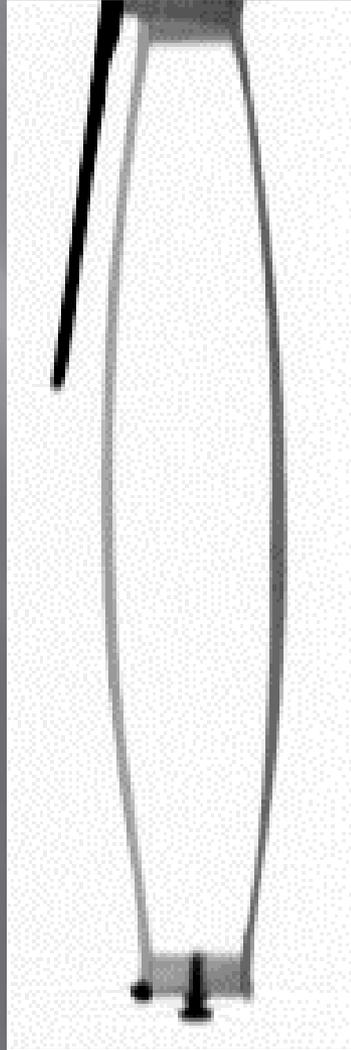
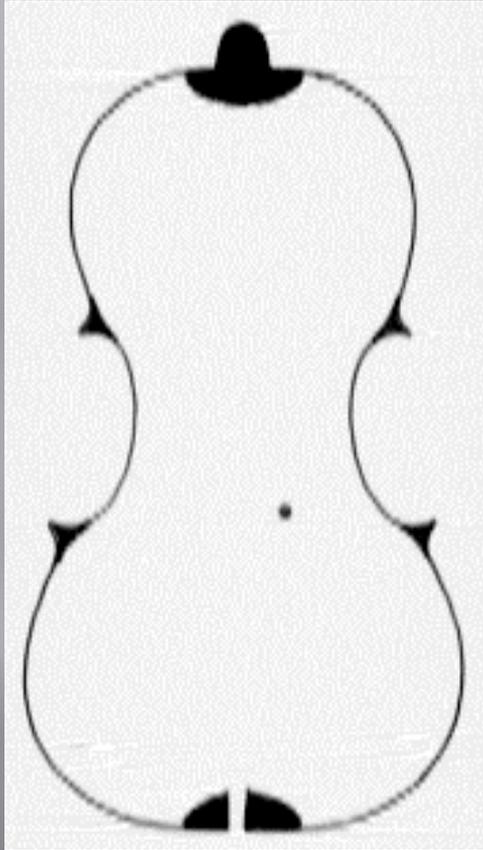


A. Stradivari, Tenor
viola 'Medici',
Cremona 1690



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Selection of comparable data

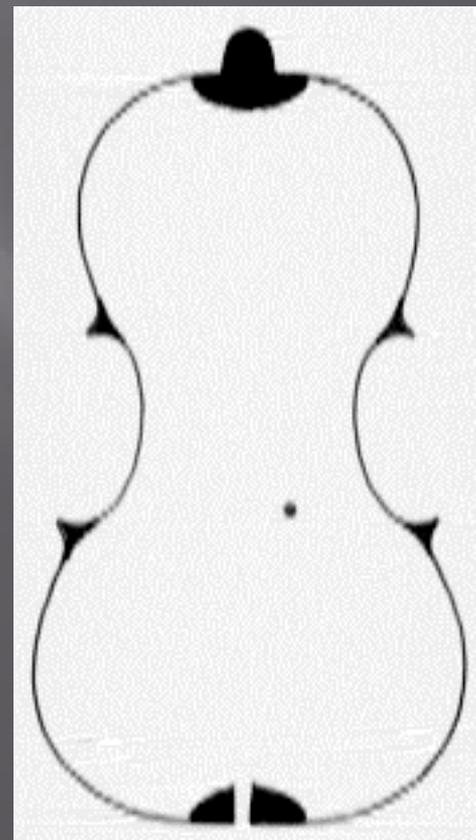




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Elements towards identification

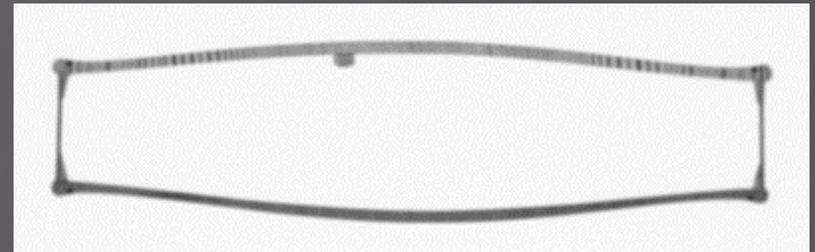
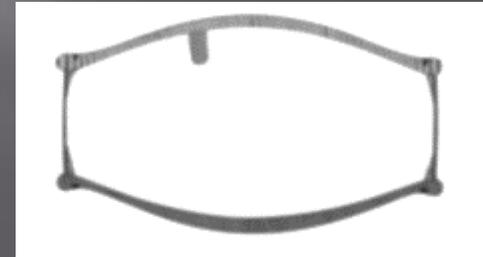
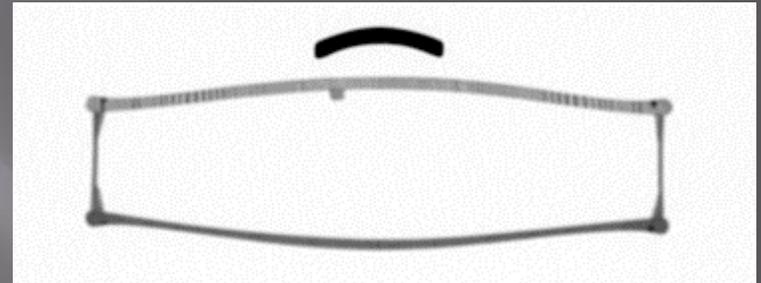
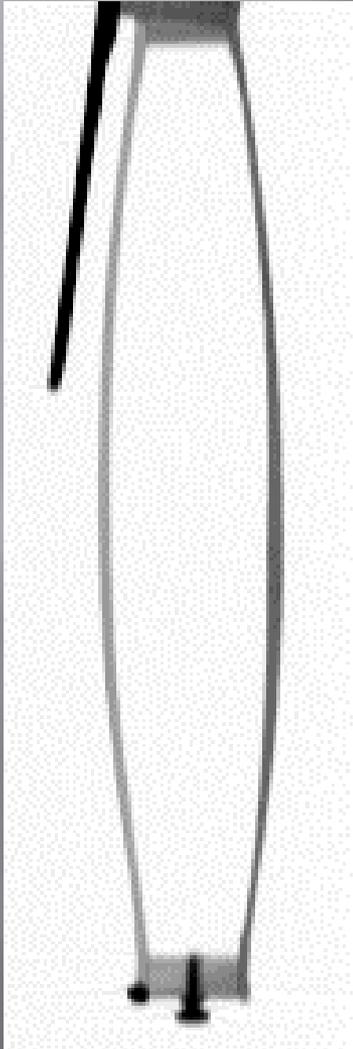
Variations in shape, thickness and position of parts that were built according to a template that was unique to a certain workshop





Elements towards identification

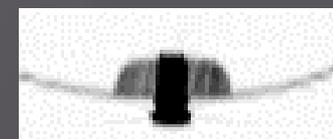
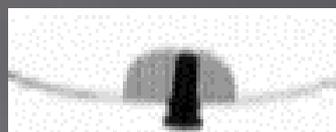
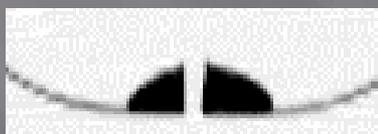
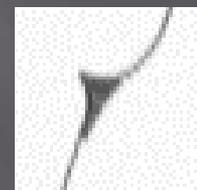
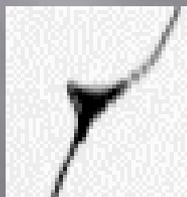
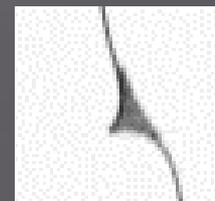
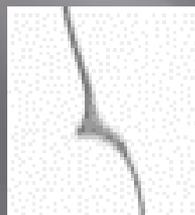
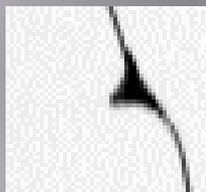
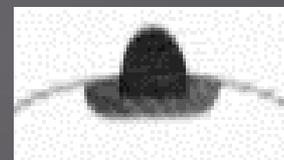
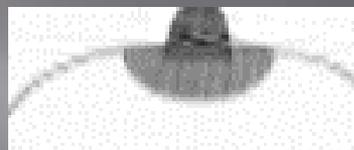
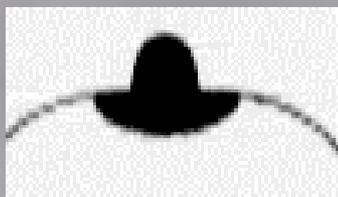
Variations of elements that, although entirely controlled by hand, have a strong impact on the sound quality of the instrument





Elements towards identification

Variation in shape, size and position of structural and internal parts of the instruments



G.B. Gabbrielli,
Florence, 1764

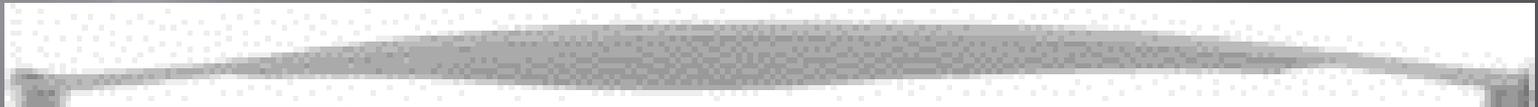
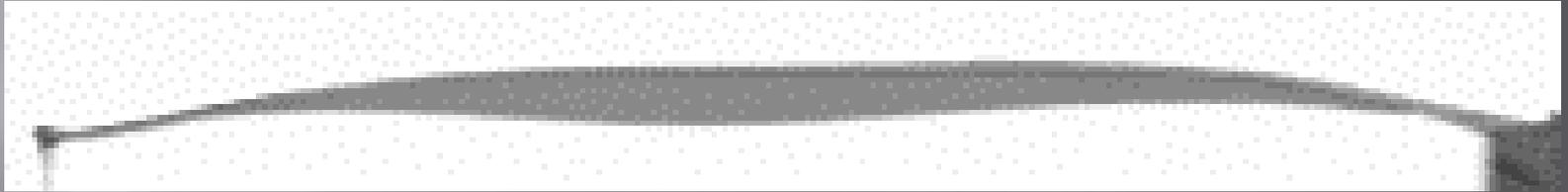
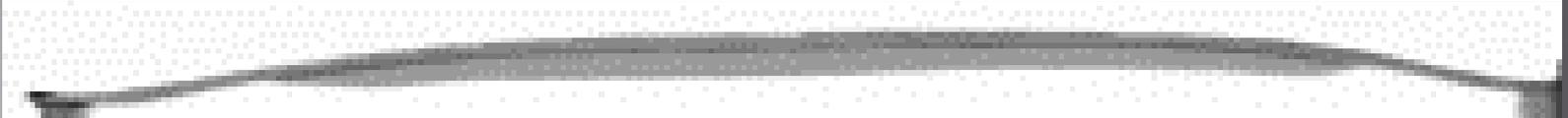
A.F. Mayr, Salzburg,
1764 ?

G. Scarampella,
Florence, 1886



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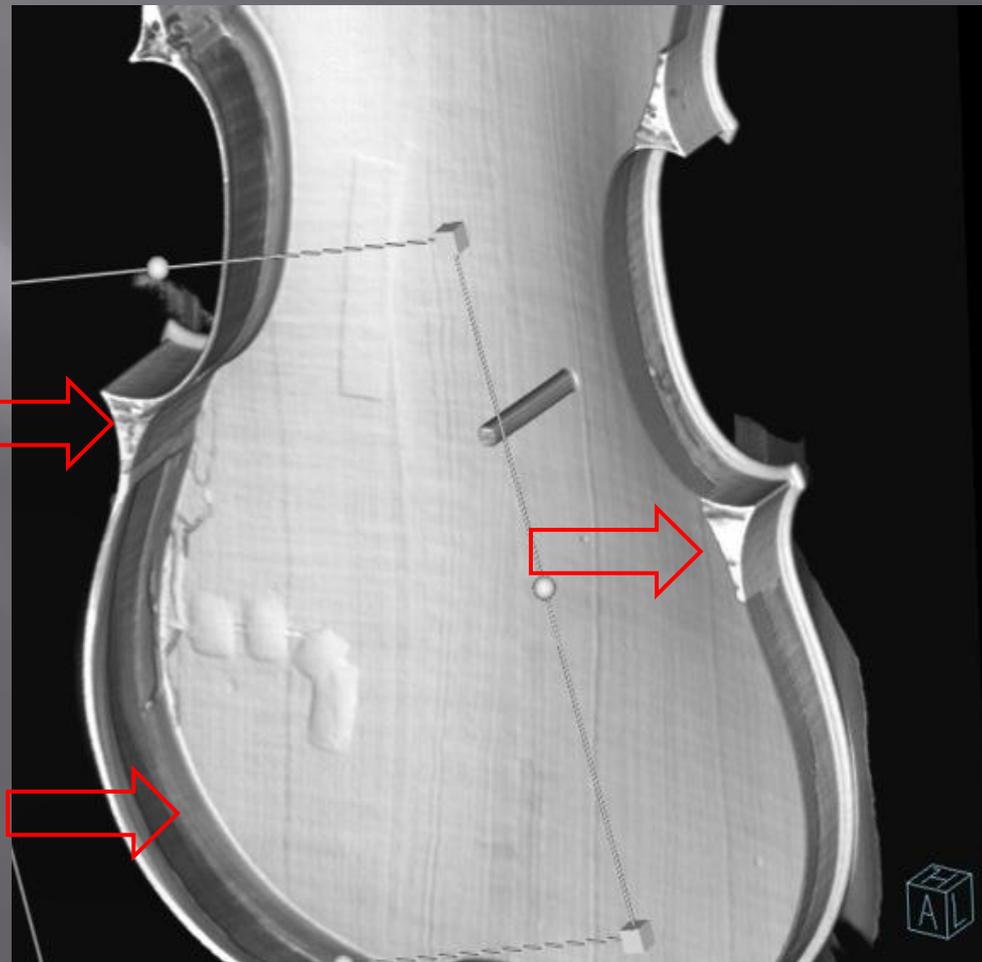
Elements towards identification





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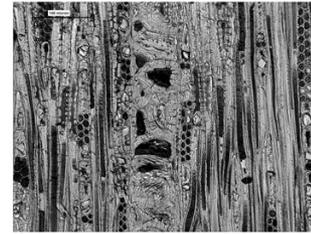
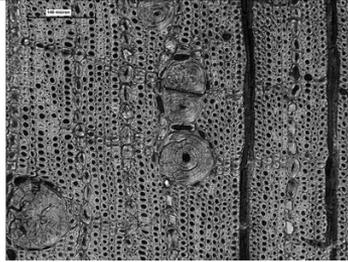
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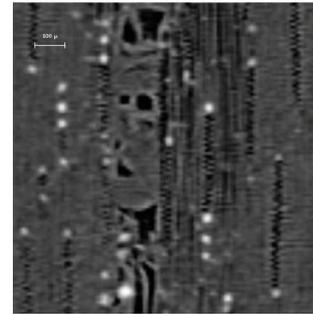
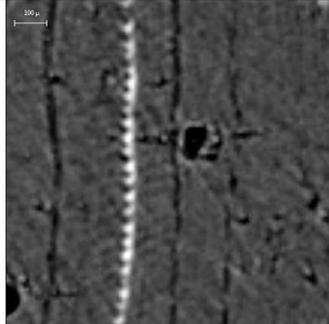


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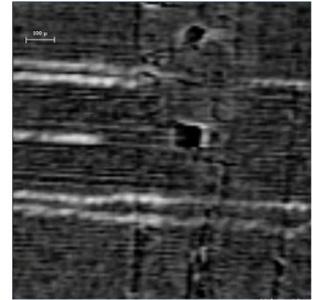
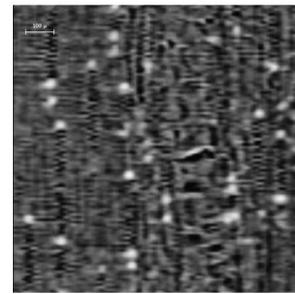
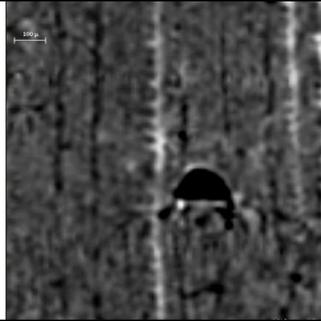
**Control sample:
Microscopic sections**



**Control sample:
Micro-TC in phase
contrast (9µm/pixel)**



**Bow n°52:
Micro-TC in phase
contrast (9µm/pixel).
Same features
In bows n° 53 and 56**



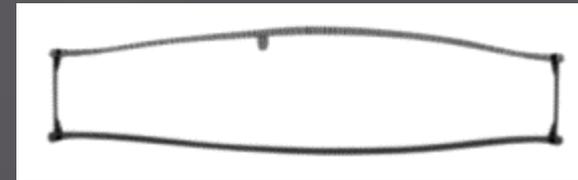
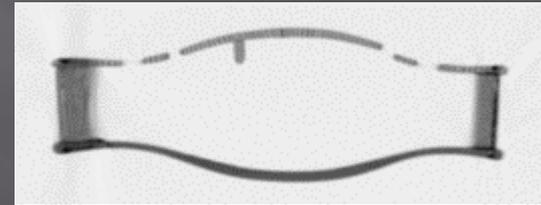
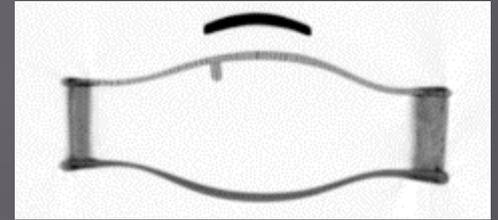
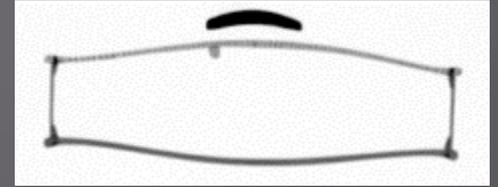
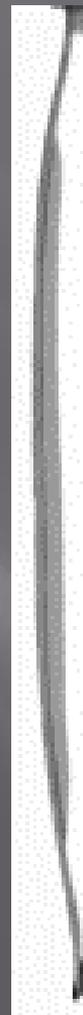
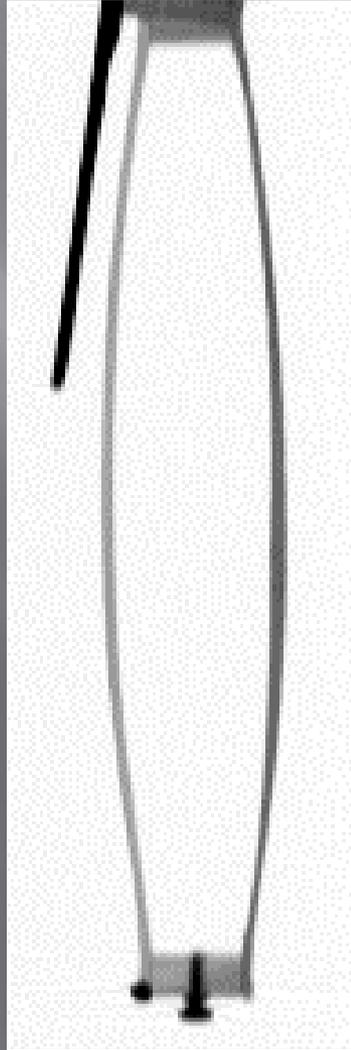
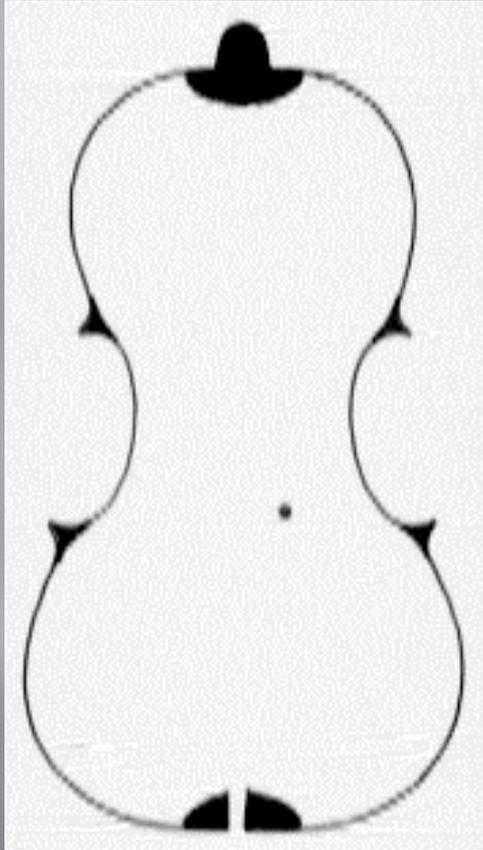
SNAKEWOOD

Brosimum guianensis (Aubl.) Huber



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Selection of comparable data





Selection of comparable data

- Dimension of the object
- Cost and logistic
- Publication/dissemination of the results

