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Dynasty and Alchemy[1] or a Brief Foray into the Evolution of the Cello

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Abstract: The beginnings of scientific research in this field date back to the 16th century, when the first treatise on the subject was published. At the beginning of said century, the ancestor of string instruments - the fiddle - was gradually replaced by the lyre, an instrument developed in the first and kept in use until the middle of the following century. The Italian schools of luthiers, through members of the famous Amati, Guarneri and Stradivarius families, made an essential contribution to the present form of string instruments. The cello is considered to be the lowest sounding instrument of the violin family, its Italian name "violoncello" including both the superlative suffix"-one", and the diminutive "ello" – "a big little violin" in translation. The term "violoncello" was used more often in publications of the late 17th century, although the earlier term "violone" persisted until the end of the following century. The basic, Stradivarius-standardized form of the cello was very little changed in the 19th century. Cello manufacture continued to be based on Italian models, particularly Stradivarius Type B. The question "Quo vadis the performance and composition dedicated to it?" is a recurring one in this century, marked by the rapid pace at wich all aspects of social, cultural and artistic life evolve. It is with joy, pride and hope that we can answer that the future of the cello and of violin performance is in good hands, both nationally and internationally, as long as musical art endures...

Keywords: cello, luthiers, Stradivarius, Guarneri, Amati.

1. Preamble[2]

> In a small Dictionary of Wood Trades, a hundred terms (from "coalman", to "corkmaker" - a craftsman who makes and sells corks – to "cabinetmaker", "floor maker" or the generic "carpenter"), there is a trade at letter L whose name sounds like music in itself: *the luthier*. The term, in Italian (liutaio) began to circulate in the common vocabulary in the mid-16th century and designates "a maker of stringed instruments and sound boxes (lute,

[1] Phrase used in the article *Lemnul care cântă* [The wood that sings] (2007, retrieved from http://www.descopera.ro/cultura/2306122-lemnul-care- canta).

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[2] I have inserted this introductory paragraph taken from the web source http://www.descopera.ro/cultura/2306122-lemnul-care-canta due to the fact that it is an extremely successful and expressive literary layout of the entire theme of this paper, as well as a starting point for the research that I have completed in my PhD thesis.

violin, guitar, etc.) other than keyboard instruments." According to a winding etymological path, with stops in the forms of "lauto" or "leuto" and designating a musical instrument common to the Renaissance period (similar to the guitar or kobza), the word "liuto" derives, if we are to take into account a fairly widespread etymological hypothesis, from the Arabic "al oud" – meaning "wood".

Dynasty and alchemy

The invention of the violin, the noblest, most elegant and expressive stringed and sounding instrument is commonly attributed to Andrea Amati (1511-1580). Even though this tradition may be a blur on the great world history of luthiers, its permanent memory is not without serious justification: it must be known that Andrea, in the way he passed on to his sons – Girolamo and Antonio – the secrets of manufacturing and the skill of grinding wood, created a dynasty of the luthiers, whose prince would be Niccolo Amati. He would pass on his secrets - both those received under the seal of secrecy in his father's workshops as well as those born of his own skill - to Jakobus Stainer, Antonio Stradivari (or Stradivarius, as his name is commonly Latinised) and to Andrea Guarneri. If, through the Great Alchemical Work, lead would change its properties becoming gold, so too, under the hands of the aforementioned luthiers and their pupils, wood, a heavy, earthy material, would become perfect sound, pure music. [...]

The mysteries of the Stradivarius violin

Joseph Nagyvary[3], a Hungarian researcher at the University of Texas, claimed, after testing the wood of the Cremonese violins using nuclear magnetic resonance and infrared spectroscopy, that the molecules of one of the wood's components, hemicellulose, were broken.

According to Nagyvary, this phenomenon is the result of the oxidation caused by a pesticide used at the time. The acoustic properties of the instruments would have been changed, somewhat unintentionally by the luthier. [...]

Why does a Stradivarius violin sound different from its siblings in other lands? Legends say that the Master sold his soul to the devil,

[3] **Joseph Nagyvari**, professor emeritus in the department of biochemistry at Texas A&M University has been studying the chemical composition of Stradivarius violins since 1976. At the end of a titanic work, he concluded that the chemicals, and not the wood used by Stradivarius gave it its unique sound. The study, published in the Nature journal by Nagyvary and his team of collaborators demonstrates unequivocally that the wood used by Antonio Stradivarius and Guarneri del Gesu was subjected to a very aggressive chemical treatment, and that these chemical substances – most of them acting as oxidising agents – played a fundamental role in creating the sound specific to mid-18th century Italian violins.

that he dipped the violin in the blood of a Phoenix bird, that he brought the wood from who knows what exotic lands..."

2. The evolution and refinement of the cello

The beginnings of scientific research into the development and refinement of instruments can be found in the 16th century, when the first treatise on the subject appeared, namely *Musica getutscht und aussgezoge* by Sebastian Virdung (1511). In the same year, Arnolt Schlick wrote a work on organ and organist entitled *Spiegel der Orgelmacher und Organisten*. A series of works on organology continued to appear in that century, at the impetus of the spectacular improvement of instruments belonging to different families. They can be listed here:

- Hans Gerle[4]: *Musica teutsch, auf die Instrument der grossen und kleinen Geygen, auch Lauten geschrieben* (1532)
- Silvestro Ganassi[5]: *Opera intitulata Fontegara* (1535, about wind instruments), *Regola Rubertina* (1542, about viola da gamba), *Lettione seconda* (1543, about viola da gamba, violin and lute)
- Diego Ortiz[6]: *Tratado de Glosas* (1553, about viola da gamba)
- Philibert Jambe de Fer[7]: *Epitome Musicale* (1556, about violin, blockflute and flute tabs)
- Juan Bermudo[8]: *Declaratión de Instrumentos musicales* (1555)
- Ludovico Zacconi[9]: *Prattica di Musica* (1592)

The list of these treatises would then continue in the early 17th century, with the following titles:

- Pietro Cerone[10]: *El Melopeo y Maestro* (1613, a translation of Zacconi's work)
- Michael Praetorius[11]: *Syntagma Musicum II* (1619, one of the most

[4] **Hans Gerle** (around 1500-1570), Renaissance lutist and orchestrator.
[5] **Silvestro di Ganassi dal Fontego** (1492-around 1550), Venetian musician, author of important treatises on instrumental technique.
[6] **Diego Ortiz** (around 1510around 1570), Spanish composer and theorist, published treatises on vocal and instrumental performance technique.
[7] **Philibert Jambe de Fer** (around 1548–1564), French composer of religious music, known today for his writings on instrumental technique.
[8] **Juan Bermudo** (around 1510 – around 1565), Spanish composer, theorist and mathematician.
[9] **Lodovico** (**Ludovico**) **Zacconi** (1555-1627), Austro-Italian composer and theorist of the late Renaissance and early Baroque.
[10] **Pietro Cerone** (1566 – 1625), Italian theorist, singer and priest, famous for an enormous treatise on music written in 1613, in which he describes the compositional practices of the 16th century.
[11] **Michael Praetorius** (1571 – 1621), German composer, organist and theorist.

important and valuable bibliographical sources of the period)

- Marin Mersenne[12]: *Harmonie universelle* (1636)

At the beginning of the 16th century, the ancestor of string instruments – the fiddle – is gradually superseded by the lyre, from which it evolved and remained in use until the middle of the following century.

Fig. 1 The oldest preserved *lira da braccio* (Giovanni d`Andreea, Verona, 1511)

There were two versions of the instrument: the *lira da braccio*, with five strings and two unstopped *bourdon* strings, tuned like the fiddle:

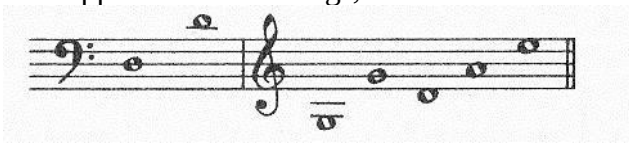

Fig. 2 Tuning of the *lira da braccio*

In his treatise, Praetorius mentions the tuning of a *lira da gamba* with 12 + 2 string as such:

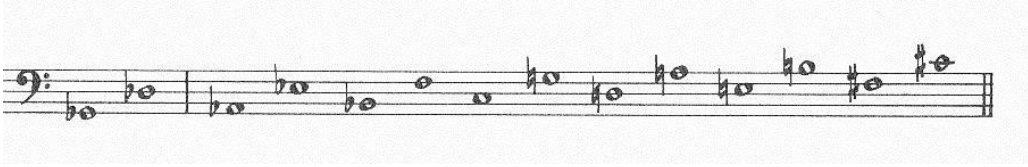

Fig. 3 Tuning of the *lira da gamba* with 12+2 strings

[12] **Marin Mersenne**, **Marin Mersennus** or ***le Père Mersenne*** (1588 – 1648), French theologian, philosopher, mathematician and music theorist, considered the "father of acoustics".

The larger version was the *lira da gamba* or *lirone*, which appeared at the end of the 16th century. It could have up to 16 strings and up to 4 *bourdon* strings, as in the case of the instrument built in 1590 by Wendelin Tieffenbruckner of Padua.

Due to the bourdon strings, neither the *lira da braccio* nor the *lira da gamba* survived the spectacular evolution of instrumental music and the refinement of instrument construction from the 16th century, even though the admiration for the culture and civilisation of ancient Greece cultivated in the Renaissance went as far as Vincenzo Galilei's assertion that the *orphic lira* was an instrument with strings and bow[13].

The path the cello followed to establish its modern construction still known today derives from the *viola* family.

2.1. Development of lutierie schools

2.1.1. The Amati family

The patriarch of the family, Andrea Amati (around 1511-24 Dec. 1577, Cremona) is considered to be the founder of the modern violin and was certainly the first luthier in Cremona, a city whose name is today synonymous with violin making. The earliest instrument he built, of which there is documentary evidence and which was still found in Milan at the beginning of the 19th century is a three-stringed viola dated from 1546. Of the instruments that have survived to the present day – violins, tenor violas and grand cellos – most have the emblem of King Charles IX of France painted on their backs and were built between 1564 and 1574.

Although violins were already being built in Amati's time, he is credited with the present form of the violin, viola and cello. His conception of the design was carefully thought through with the standards of proportion and measure of the time. These principles of construction distinguish the instruments of the Cremonese school from those built almost anywhere else giving them visual superiority.

The earliest known cello was created by Andrea Amati. The total number of cellos he made is unknown, but only three have survived to the present day.

[13] Vincenzo Galilei, *Dialogo della Musica antica et della moderna*, Edizione Giorgio Marescotti, Florence, 1581.

Fig. 4 The cellos *The King*, 1572, Andrea Amati, "Witten-Rawlins" Collection

Fig. 5 Rib garlands with the words *Pieta* and *Justicia*, lily flowers motif, respectively

For the contemporary specialist, the modernity and sophistication of Amati's instruments is surprising. The shape and curvature of the body of the instruments would become the standard in modern luthiery.

Andrea Amati had two sons: Antoni Amati (around 1540, Cremona – 4 Feb. 1607, Cremona) and Girolamo (Hieronymus) Amati (around 1561, Cremona-21 Oct. 1630, Cremona), known in history as the "Amati brothers". An innovation attributed to them is the viola contra-alto. The instruments they built spread throughout Italy and the European continent, their influence on other schools of viola making being priceless.

Nicolò Amati (3 Dec. 1596, Cremona – 12 Apr. 1684, Cremona) was the son of Girolamo Amati and is considered today as the most refined luthier of the family. Around 1640, the Cremonese luthiers gained new momentum, Nicolo's work entering a new phase, in which he collaborated with Andrea Guarneri, G.P. Rogeri, Giacomo Gennaro, Bartolomeo Pasta and Bartolomeo Cristofori.

Most of the instruments built by Nicolo were violins, the number of violas and cellos being very small compared to those built by his father and uncle.

2.1.2. The Guarneri family

Andrea Guarneri (13 Jul. 1623, Casalbuttano – 7 Dec. 1698, Cremona), a pupil of Nicolo Amati, took over the principles of violin design and construction from him, which are recognisable in the instruments he made both during his apprenticeship as well as later. When it comes to cello construction, he was among the first to design a smaller cello that was technically much easier to handle than the Amati instruments.

1669	Leandro Bisiach
1689	Theobald
(without date)	Emile Doehaerd
1690	J.H. Bowman
1692	J.B. Smedley
1693	Franz Fassbinder
1695	Hans Bottermund

Table 1 Cellos built by Andrea Guarneri

Of his seven children, two of Guarneri's sons also became luthiers: Pietro and Giuseppe.

Pietro Giovanni Guarneri (18 Feb. 1655, Cremona - 26 Mar. 1720, Mantua) was the eldest son of Andrea Guarneri and known as "Pietro di Mantua" to distinguish him from his nephew, Pietro Guarneri "di Venezia". He began his work in his father's workshop probably before 1670, the characteristic features of the instruments he made being the elegantly drawn and cut 'f' shaped orifices. Of the known lacquers, the one used by Pietro is a light, reddish orange colour, transparent considered to be among the best. His violins stand out for their high-quality sound, full and rich in harmonics. There are no known violins made by Pietro and only one cello is documented.

Giuseppe Giovanni Battista Guarneri (25 Nov. 1666, Cremona - around 1740, Cremona), Andrea's third son, nicknamed "filius Andreae" is known for his series of remarkable cellos dating from before 1690. He is considered to be among the greatest luthiers in violin making. It seems that he did not build violas, but there were several cellos, which, by their different sizes, demonstrate his conception of the design of this instrument.

Period 1695-1700	Dr. Price Jones, ex Ker
1707	Russell. B. Kingman, ex Beal
1709	Andre Levy, ex Delsart
Period 1710	Hammig, ex Kummer
1712	May Fussell
1712	Snelling
1731	James Messeas, ex Pendarves

Table 2 Cellos built by G.G.B. Guarneri

"Pietro di Venezia" was the son of G.G.B. Guarneri. The instruments he built are very rare today.

1725	Carl Hamburger
1730	Waddington, ex van Gelder
1735	J.H. Newcombe, ex Hoare
1735-9	Beatrice Harrison, ex Deprets
1740-50	Paris Conservatory Museum

Table 3 Cellos built by "Pietro di Venezia"

Among their characteristics are the wide volutes with prominent chisel marks and the flamboyant Venetian 'f'-shapes. His cellos are particularly prized, although only a few have survived to this day.

Bartolomeo Giuseppe Guarneri "del Gesu" (21 Aug. 1698, Cremona – 17 Oct. 1744, Cremona), the youngest of G.G.B. Guarneri's sons is the last member of this famous family of luthiers and one of the two great luthiers of all time, alongside Stradivari.

2.1.3. The Stradivari family

Antonio Stradivari (around 1644, Cremona – 18 Dec. 1737, Cremona) is considered the greatest violin maker since the end of the 18th century. The

quality of sound, design, beauty of appearance and accuracy of workmanship of his instruments has never been equalled. With a century's tradition of Cremonese violin-making before him, Stradivari took this art-craft to the heights of unparalleled perfection in his almost 70-year long career. A total of around 650 instruments built by Stradivari survive, many of which are used by some of the world's greatest instrumentalists.

At the turn between the 17th and 18th centuries, Stradivari began to direct his inventiveness towards the cello. Up to that time, he had exclusively built large cellos (approximately 35 instruments). Maggini had made some smaller cellos, and in the last quarter of the 17th century, both the Cremonese and other Italian luthiers would do the same, thus facilitating the emergence of a new type of virtuoso cellist.

Fig. 6 The "Paganini-Countess of Stanlein" cello

The first small instruments date from 1707-1710, and are known as having a "B-from", which serves as a pattern for almost all cello makers from the early 19th century until today. Its making, although only 20 (60 according to other sources) of the instruments have survived, is in no way inferior to the violin making.

Antonio Stradivari built between 70 and 80 cellos during his lifetime, of which 63 still exist today.

Name	Year	Provenance	Observations
ex Vatican Stradivarius	1620	Wendy Sutter Emmanuel Gradoux-Matt, New York	Originally built by Nicolo Amati as a *viola da gamba*, transformed into a larger, more modern cello by Stradivari.
ex-Du Pré; ex-Harrell	1673	Jacqueline du Pré Lynn Harrell Yo-Yo Ma	
General Kyd; ex-Leo Stern	1684	Leo Stern, Los Angeles Philharmonic	The instrument was stolen in 2004 and then recovered.
Marylebone	1688		Donated to the Smithsonian Institute in 1997 by Herbert R. Axelrod.
Barjansky	1690	Alexandre Barjansky Julian Lloyd Webber	
ex-Gendron; ex-Lord Speyer	1693	Edgar Speyer; Kunststiftung NRW	Borrowed to Maria Kliegel; previously borrowed to Maurice Gendron (1958–1990)
Spanish Court* or *Decorado	1694	Patrimonio Nacional, Palacio Real, Madrid	Also known as *Quinteto Real* or *Quinteto Palatino* when it included the twio violins, *losDecorados* (*Spanish I and II* 1687-1689), the *Bajo Palatino* cello from 1700 and the viola *Spanish Court* from 1696. It is the original instrumental quartet.
Bajo Palatino	1700	Patrimonio Nacional, Palacio Real, Madrid	Also known as *Quinteto Real* or *Quinteto Palatino* when it included the two violins, *losDecorados* (*Spanish I* and *II* 1687-1689), the *Bajo Palatino* cello from 1700 and the *Spanish Court* viola from 1696.
Bonjour	1696	Abel Bonjour Canadian Council of Arts	Borrowed to Arnold Choi
Lord Aylesford	1696	Japanese Music Foundation	Borrowed to Danjulo Ishizakapreviously borrowed to Janos Starker(1950–1965)
Castelbarco	1697	Library of Congress	Presented by Gertrude Clarke Whittall
Stauffer; ex-Cristiani	1700	Johann Georg Stauffer,Jean Louis Duport, Elise Barbier Cristiani	Exhibited at the Civic Museum of Cremona
Servais	1701	National Museum of American History	Borrowed to Anner Bylsma
Paganini-Countess of Stanlein	1707	Bernard Greenhouse	Sold in January 2012 for $6 million to a Montreal patron of the arts; borrowed to Stephane Tetreault

Boccherini; Romberg	1709		It used to belong to Pablo Casals
Markevitch; Delphino	1709	Property of the Fridart Foundation	
Gore Booth; Baron Rothschild	1710	Rocco Filippini	
Duport	1711	Mstislav Rostropovich	
Mara	1711	Heinrich Schiff	
Davidov	1712	The Count Matvei Wielhorski (1794–1866); Karl Davidov Jacqueline du Pré	Borrowed to Yo-Yo Ma
Batta	1714	J. P. Thibout Alexander Batta W.E. Hill & Sons Baron Johann Knoop Gregor Piatigorsky	Exhibited at the Metropolitan Museum of Art, New York
de Vaux	1717		Borrowed to Adam Klocek
Amaryllis Fleming	1717	ex-Blair-Oliphant, ex-Hegar, ex-Kühn, ex-Küchler	It belonged to Amaryllis Fleming, half-sister of writers Ian and Peter Fleming. Some parts are not original, after a massive 18th-century restoration by Spanish luthier José Contreras; auctioned in 2008.
Becker	1719	Hugo Becker	
Piatti	1720	Carlos Prieto	
Vaslin	1723	LVMH	Borrowed to Christian-Pierre La Marca
Baudiot	1725	Gregor Piatigorsky	Bequeathed to Evan Drachman by his grandfather, Gregor Piatigorsky
Chevillard	1725	Museu da Música, Lisbon	
Marquis de Corberon; ex-Loeb	1726	Royal Academy of Music	It previously belonged to Hugo Becker and Audrey Melville who bequeathed it to RAM in 1960; Melville's friend Zara Nelsova had a life-long usufruct until her death in 2002. Currently borrowed to Steven Isserlis.
Comte de Saveuse	1726		Count of Saveuse d'Abbeville, Edward Latter, Archibald Hartnell, M. Edmonds, later borrowed to M.Evans.
De Munck; ex-Feuermann	1730	Emmanuel Feuermann Aldo Parisot	Borrowed to Steven Isserlis

		Japanese Music Foundation	
Pawle	1730	Chi Mei Museum	
Braga	1731		Borrowed to Myung-wha Chung
Stuart	1732	Steven Honigberg	
Paganini-Ladenburg	1736	Japanese Music Foundation	This cello, together with the Paganini-Desaint violin of 1686, the Paganini-Conte Cozio di Salabue violin of 1727 and the Paganini-Mendelssohn viola of 1731 form a group of instruments known as the Paganini Quartet. Today the cello is borrowed to Clive Greensmith from the Tokyo String Quartet.

Table 4 Stradivarius cellos kept

3. The cello

During the 12th and 13th centuries, artists began to depict the violin in their paintings, thus proving the presence of this instrument of the stringed and bowed family. However, the cello did not make its appearance until the 15th century. The explanation for the late appearance of the lowest sounding instrument of the violin family lies – In part at least – in the evolution of the sound ideal in Western European music. Due to the supremacy of vocal music in the art of sound, it is natural that this ideal was determined and influenced by the signers of the time. Up until the 15th century, vocal performance practice required a high, nasal tonal sonority. This perception changed with the compositions of the Flemish school, exemplified by Johannes Ockeghem, himself a fine bass. The vocal ambitus expanded towards its lower limit, reaching the sound C in the high octave. At the same time, the sonic ideal evolved towards a much more open tonal sound than that we know today.

It is considered the lowest instrument of the *viola* family, its Italian name containing both the superlative suffix "-one" and the diminutive "-cello" in translation "a big little viola". The term viola bas was used for the original forms of the instrument in numerous variants, such as "violin bass", "basso di viola", "bass viol de braccio", "basse violon" in the 16th century, or "bassetto", "bassetto di viola", "basso di brazzo", "violetta", "violoncino", "violone", "violone basso", "violone da brazzo", "violone piccolo", "violonzino", "violonzono", "vivola da brazzo" in the 17th century. It was not until the early 18th century, with the standardisation of the smaller form of the instrument, that the name "violoncello" was adopted and generalised.

The variety of names over time has made it difficult to trace the evolution of the instrument known today as the cello. The earliest documentary

mention of the instrument's existence is found in Johannes Agricolas[14] *Ein Kurtz deutsche Musica* (Wittenberg, 1528). The earliest known image is the *Concerto degli angeli* painting by Gaudenzio Ferrari (1534-1536) in the dome of the Madonna dei Miracolo church in Saronno.

The brothers Marie and Leon Escudier, French museographers and founders of the *La France Musicale* magazine (1820-1880) attribute the invention of the cello to Father Tardieu of Tarascon. It is a known fact, however, that it was created in Italy and later introduced in France by the Florentine Giovanni Battistina during the reign of King Louis XIV.

The history of the instrument, before it became known as the cello, follows the same path as all the instruments of the viola family. The early bass viola existed in two sizes, with different tunings. Agricola and Ganassi (*Lettione seconda*, Venice, 1543) are the first to mention a three-string bass instrument.

Hans Gerle (*Musica teusch*, Nurnberg, 1532) is the first to describe a four-stringed cello with the tuning still used today (*C - G - D - A*), followed by Michael Praetorius (*Syntagmu Musicum*, 1619). However, in the years that followed and even later, the tuning of the bass viola was most often one tone lower (*Bb - F - C - G*), as a descending continuation of the violin tuning. The analysis of the writing used by various composers of the time in Italy, such as Claudio Monteverdi, favours the current tuning. The violas da gamba enjoyed their heyday for three centuries, from 1480 to 1780.

In the Baroque epoque, the same types of instruments of the violin family are found as in the Renaissance period, with the addition of instruments called "pardessus de viole", which appeared in the 18th century to cover the violin repertoire. Listed below are the instruments of the viola da gamba family, from the lowest to the highest sounding:

- *viola da gamba contrebasse*
- *viola da gamba grande basse*
- *viola da gamba bass*
- *viola da gamba tenor*
- *viola da gamba alto* (little used)
- *dessus de viola*
- *pardessus de viola* (tuned one octave higher than the *viola da gamba tenor* and having five strings)

[14] **Johannes Agricola** (originally Schneider, then Schnitter, 1494 – 1566), a German Protestant reformer.

The following table compares the tuning of the four-string cello in use in the most important musical centres of Germany, France, Italy and England in the 16th-17th centuries[15].

Year	Location	Documentary source	Tuning
1528	Wittenber, Germany	Agricola: *Ein kurtz deudsche Musica*	*C-G-d-a*
1532	Nürnberg, Germany	Hans Gerle: *Musica teutsch*	*B ♭-F-c-g*
1533	Brescia, Italy	Lanfrancho: *Scintille di Musica*	*B♭-F-c-g*
1556	Lyon, France	Jambe de Fer: *Epitome musicale*	*B ♭-F-c-g* *G-d-a-e'*
1592	Veneția, Italy	Zacconi: *Prattica di musica*	*G-d-a-e'*
1609	Bologna, Italy	Banchieri: *Conclusioni nel suono del organo*	*B ♭-F-c-g*
1613	Napoli, Italy	Cerone: *El Melopeo y maestro*	*B♭-F-c-g*
1636	Paris, France	Mersenne: *Harmonie Universelle*	*C-G-d-a* *F-c-g-d*
1619	Wolfenbüttel, Germany	Praetorius: *Syntagma Musicum*	
1664	London, England	Playford: *Introduction to the skills of musicke*	

Table 5 Cello tunning in the 16th – 17th centuries

Upon analysing it, the following conclusions can be drawn about the tuning of the four-string cello of the period:

- Two tuning systems coexisted in Italy; Monteverdi preferred instruments with *C-G-d-a* tuning, while composers like Giovanni Valentini (1619) opted for *Bb-F-c-g* tuning;
- The earliest evidence of "modern" *C-G-d-a* tuning was found in Germany; two treatises written 87 years apart mention the same tuning system, showing that it was already in common use in that country;
- In France, the only tuning used was *B'-F-c-g*; in his 1741 treatise, Corette shows that modern tuning was not introduced in France until

[15] http://www.wieboldt.de/baroquecello.html

after 1710;

- Similar to France, in England the *Bb-F-c-G* tuning dominated until about 1725, when the "new" system was chosen, as mentioned by J. de la Fond in his treatise *New System of Music*.

The term "violoncello" would be used increasingly frequently in publications of the time from the late 17th century, although the earlier term "violone" persisted into the next century[16].

Andrea Amati and his descendants, the Cremonese luthiers Gasparo da Salo (1540-1609) and his successor G.P. Maggini (?1580-?1630) in Brescia, were among the first makers of bass violas, followed in Cremona by Francesco Rugeri (1630-1698) and members of the Guarneri family, and in Brescia by G.B. Rogeri (?1670-1705) and members of the Grancino family.

The organological development of the cello has undergone several evolutionary stages. Although there is evidence that Maggini, Rugeri and members of the Amati family built a smaller type of cello before 1700, the standardisation and refinement of the instrument's dimensions are attributed to Antonio Stradivari, in 1707, with the so-called "B form" and "B piccolo form". The "B form" cello had a body length of 75-76 cm and a maximum width of 44-45 cm, both sizes being smaller than that of over 30 cellos he built between 1680-1701.

Famous examples from the first category are the "Duport" and "Mara" cellos, both built in 1711, and from the second, the most famous example is the "Servais" cello, built in 1701, with a body of 79 cm long and 47 cm wide.

In the 18th century, large cellos continued to be built for various uses, as J. J. Quantz mentions in his flute treatise *Versuch* (Berlin, 1752): large ones with thick strings for orchestral playing and smaller ones with thinner strings for solo playing.

Although the four-string cello predominated in Italy in the late 17th century, other countries used instruments with more strings. For example, in mid-18th century Germany, the five-string cello (with an additional E string) was used, as reflected in works such as *Suite No. 6 BWV 1012 for solo cello* or the cello part in J.S. Bach's *Cantata "Gott ist mein König" BWV 71*.

The basic form of the cello changed very little in the 19th century from the standard form of the previous century. Cello construction continued to be based on Italian models, in particular on Stradivari's "B form".

The German cellist B.H. Romberg (1767-1841) experimented with small adjustments to the instrument and invented the technical practice known today as "Romberg" or "daumen". It is possible that both sizes of the

[16] Corelli uses the term "violone" for low string instruments in all his published works.

cello were still being used in the 19th century, argued by the use of two different terms in an 1805 cello method from the Paris Conservatoire: "violoncelle" for the solo instrument and "basse" for the accompaniment or orchestral role.

The high demand for cellos in Italy from 1680-1740 is reflected in the increased production of the luthiers. Alongside Stradivari, a number of other makers in northern Italy produced cellos of superior quality in the late 17th and early 18th centuries, including Domenico Montagnana, Sanctus Seraphin, Pietro Guarneri and Matteo Goffriller in Venice, Francesco Rugeri, G. B. Rogeri, Andrea and Giuseppe Guarneri in Cremona, P. G. Guarneri in Mantua, the Grancino and Testore families in Milan, G. B. Guadagnini and later Giuseppe Rocca in Turin, the Gagliano family in Naples.

The luthier Jacob Stainer (around 1617 - 1683) worked in Absam in the Austrian Tyrol, presumably apprenticed in Italy.

Like him, some of the English luthiers of the 17th-18th centuries were influenced by Maggini's Brescian school, such as William Baker in Oxford, Barak Norman, Nathaniel Cross and Peter Wamsley in London.

In France, documentary sources show that instruments of Italian origin were owned by famous cellists of the time – such as J. L. Duport – which proves that they were preferred to locally made instruments.

Nowadays, the sizes of the modern 4/4 (whole) cello are stabilised as such:

Approx. horizontal width from key A to key C	16 cm
Back length	75 cm
Upper bouth width (shoulders)	34 cm
Lower bout width (waist)	44 cm
Bridge height	8.9 cm
Total length (without end pin)	121 cm
End pin lenth length	5.6 cm

Table 6 Sizes of a modern cello

The instrument evolved completely separately from the viola da gamba, with significant differences in construction. Edmund van der Straeten, in his work *History of the violoncello, the viola da Gamba, their precursors and Collateral Instruments*[17], frequently claims that the

[17] Edmund van der Straeten (2008), in his paper *History of the violoncello, the viola da Gamba, their precursors and Collateral Instruments*. London: Travis & Emery Music.

technical level of the cello was extremely low and could not be compared to that of the violin and viola da gamba. However, he exemplifies exactly the opposite by describing a virtuoso contest between the cellist Tonelli and the violinist D`Ambreville in the early 18th century, which was greeted with thunderous applause from the audience.

There is thus a certain discrepancy between the existence of a certain level of instrumental virtuosity on the cello and the lack of appropriate repertoire for it in the mid-17th century.

Nona Pyron, in the supplement to William Pleeth's[18] volume *Cello*[19], offers a possible explanation. The discrepancy between the large volume of works devoted to the violin in the 17th century and the absence thereof in the case of the cello can be understood in the light of two factors. The first relates to the early stage of composition for a specific instrument in relation to vocal composition; the second relates to the broader thinking about the viola family, in which cellists were considered violonists on a larger violin, which implied transposing and adapting the violin repertoire to the lower octave, without distinguishing between the different types of violins/violas of the stringed and bowed instrument family.

3. Conclusions – *Quo vadis* (today) the cello?

The cello, like the violin, is a melodic instrument. Performing on these instruments was given a special impetus by the exploitation of their technical and expressive possibilities by 18th-century Italian musician-interpreters. We could mention here the works of Giovanni Battista Sammartini and Bernardo Porta who, although they were not cellists, they knew how to adapt their works to the nature of the instrument for which they were composed[20].

[18] William Pleeth (1916 – 1999), renowned British cellist and eminent professor.

[19] Kahn & Averill Publishers, 2001.

[20] Valeriu Bărbuceanu (1999, pp. 281-282) summarizes the history of the cello in the work entitled *Dicționar de instrumente muzicale* [Dictionary of Musical Instruments] as follows:
"The origin of the word *violoncello* derives from the generic term *viole* → *violone* → *violoncino* → *violoncello*. Italian luthiers in the early 17th century made many refinements to the type *basse de viole*, resulting in a new instrument called *violoncino*. Among them, G.P. Maggini, A. Amati and N. Amati, who after 1640, developed a new model with outstanding tonal qualities. The definitive form of the cello known today was given by A. Stradivarius. The instruments created at that time were more solid and much simplified in terms of construction, free of the exaggerated burden of ornaments applied to the instrument. Their wide, rich harmonic sound became brilliant, capturing the attention of composers of the time.
The first virtuoso performers were D. Gabrielli, G. B. Bononcini, G. Jacchini etc. France was the first country to establish a cello school due to J. B. Stück – known as Franciscello –, composer and virtuoso of the instrument. Some historians dispute him in favour of M. Berteau. The first teaching methods appeared in Italy due to S. Lanzetti and M. Corette in France. There

James Cervetto junior goes much further in terms of cello technique. His works, composed in the manner of Tartini's violin sonatas are interesting in terms of instrumental technique.

Alongside Cervetto, Italian musicians who cultivated cello performance include Quirino Gasparini, Joannini di Violoncello, Francesco Zappa, Gianbattista Cirri, Bernardo Aliprandi, Carlo Graziani, Camillo Barni, Ferdinando and Valentino Bertoja brothers and Filippo Lolli.

While all the above-mentioned have striven to contribute to the development of cello performance and musical composition for this instrument, Italy would make a marked contribution in this field through Luigi Boccherini, an artist who has surpassed his countrymen in every respect.

In Vienna, the cello made its way as an orchestral instrument around 1680, and then in 1709 in Dresden, in the royal orchestra. It was also around this time that the instrument began to be used in various parts of Germany, which is the only explanation for the appearance of J.S. Bach's brilliant *Suites for solo cello* (1717-1724).

The following is a list of many German musicians who have contributed to the spread and development of cello performance and have given impetus to instrumental creation: Johann Sebald Triemer, Riedel Silezianul, Caspar Cristelli, Johann Baptist Baumgartner, Wenzel Himmelbauer, Philipp and Wolfgang Schindloker, Franz Joseph Weigl, Anton Filtz, Johann Georg Schetky, Friedrich Shrodel, Johann Jager, Franz Xaver Huber, Friedrich Ernst, Johann Conrad, Peter Ritter, Johann Furst, Ludwig Simon, Joseph Reicha, Maximilian Willman, Bernard Romberg, Karl Siegmund Schonrbeck, Joseph Alexander, Philipp Emmanuel Bach.

In France, among those to be mentioned are Philippe Pierre and Pierre de Saint Sevin (also known as the Abbe brothers), then Jean Baptiste Cupis, Louis Auguste Joseph, Joseph, Bonaventure Tillare, Jean Pierre and Jean Louis Duport, Frederich Rousseau, Charles Henri Blainville, Claude Domergue, Pierre Fracois Olivier Aubert, Pierre Cardon, Pierre Francois Levasseur, Nicolas Joseph Platel, Jean Marie Raoul etc.

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are no didactic works specifically devoted to the cello before the 18th century, and those that do exist are of little value and serve as mere references to instrumental technique.
The first cello manual belongs to Michel Corrette (1741, Paris), entitled *Méthode thèoretique et pratique pour apprendre en peu de temps le violoncelle dans sa perfection* (*The Theoretical and Practical Method for Learning How to Play the Cello Perfectly in a Short Time*). In England, R. Crome prints in London – *The Compleat Tutor for the Violoncello*, in 1765. J. Triemer, B. Linicke, K.Fr. Abel were among the first virtuosos in Germany. It seems that Ch. F. Abel was dedicated J.S. Bach's *Solo Cello Suites*, written in Köthen between 1717 and 1723. Moreover, the cellist B. Baumgarten published a cello method in Hague in 1775. Such schools also appeared in other European countries, including Romania, where D.Gh. Dinicu conceived *Metodă de violoncel* (A cello method) in 1930, appreciated in Romania and abroad." (Bărbuceanu, 1999, pp. 281-282)

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Taking a leap over time, we are faced today with the legitimate question: "*Quo vadis* the performance and compositional creation dedicated to it?" It is with joy, pride and hope that we answer that the future is in good hands, both nationally and internationally, as long as musical art endures...

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