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DEFINING AN 18TH CENTURY LUTE, THE MANDORA & CALICHON: AN ORGANOLOGICAL STUDY ON THE INSTRUMENTS OF GREGOR FERDINAND WENGER

ABSTRACT

Questo studio analizza per la prima volta da una prospettiva organologica più completa, i concetti e i principi di progettazione sottostanti che hanno portato all'evoluzione della mandora e del calichon come strumenti distinti, rivelando metodi di produzione coerenti e applicati in modo creativo. L'indagine è corredata da testimonianze di crescente interesse sociale e musicale, provenienti dai risultati ottenuti sulla produzione del laboratorio di Gregor Ferdinand Wenger. Gli sviluppi di progettazione, le funzionalità strutturali, le caratteristiche decorative e i materiali scelti sono descritti da una posizione storicamente informata; vengono inoltre forniti preziosi dati relativi a misurazioni dirette. Tutto questo, insieme ad altre nuove conoscenze, andrà a beneficio di liutai, restauratori, conservatori, studiosi ed esecutori di musica antica.

PAROLE CHIAVE Gregor Ferdinand Wenger, mandora, calichon, 18th century lute

SUMMARY

This research study, for the first time, analyses from a more comprehensive organological perspective the underlying design concepts and principles, revealing consistent and creatively applied production methods that led to the evolution of the mandora and calichon as a distinct instrument. Combined with testimonies of growing social and musical interest, from the results obtained on the output of Gregor Ferdinand Wenger's workshop. Design developments, structural features, decorative characteristics and chosen materials are described from a historically informed position, as well as valuable measurement data provided. All this, together with other new insights, will benefit lute-makers, restorers, conservators, scholars and early-music performers.

KEYWORDS Gregor Ferdinand Wenger, mandora, calichon, 18th century lute

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1. Introduction

The mandora and calichon[1] are two types of 18th century lute that are not yet fully explored in today's lute revival landscape. Although in recent decades there has been increased interest on the part of performers[2] and excellent musicological research has been conducted, in particular by Prof. Dieter Kirsch and Dr. Pietro Prosser (see bibliography). The detailed organology of these historical instruments has not yet been taken into observation, so it reflects the current situation. Therefore, the attempt in being able to contribute to the deepening of this particular topic as a first reference, having to deal with many different aspects and factors linked through historical design, form, technology, use and social history that embodies any type of cultural heritage object. Combined with the long period over which all this took place, indicated that it was important to develop an analytical method with an interpretive process that would lead to a reproducible protocol, which could eventually serve as a future model for critical discussion.

So, knowing that Coalescence in this case results in an object specific to its time and for a comprehensive understanding it is necessary to adopt a holistic approach rather than any singular view, this will be more than a simple technical description on the variations of current day technical measurements. However precise these are, they do not allow for a complete understanding since the craftsman's 'techniká' and 'conceptum' should both be considered during any analysis of creative work. In this the social setting, philosophy and humanistic ideas of the period had a direct influence. Ultimately, in carrying out this analysis, historical and modern sources were studied in order to choose points of reference and parameters that reflect technical and humanistic viewpoints as well as acknowledging human fallibility, manufacturing tolerances and otherwise deliberate skilful interventions, which are proposed through documentary drawings, photographs and schematizations of the hypotheses. All this, accompanied by a comprehensive review of documented

1. In this article the nomenclatures 'mandora' and 'calichon' are used in accordance with the principles found in the oldest Bohemian reference from a printed treatise entitled «Clavis ad thesaurum magnae artis musicae...» printed in Prague in 1701 and drafted by the Jesuit Tomáš Baltazar Janovka (1669 – 1741), organist at the Tyn Church in Prague. Further information on the topic can be found later, see: 3. The Mandora & Calichon Instead, for other discussions on terminology, see also, PROSSER, *Calichon e Mandora*, pp. 1-16. KIRSCH, *Zur Frühgeschichte*, pp. 87-99.
2. PROSSER, *Raucous? Penetrating*, pp. 79-117, of which in this work he explains the following, «The members of the lute family known as calichon (galizona, calchedon, gallichona, etc.) and mandora are now commonly used in the historically informed practice of music of the late baroque and classical periods. Research has advanced considerably since the 1970s through the systematic collection and interpretation of documents, sources, and iconography. In spite of this, many lutenists approach the calichon and mandora in a way that is still too simplistic and utilitarian, especially with regard to tuning, but even more so with regard to their ideal sound. The present study, focusing on the calichon (more widespread than the mandora in modern musical practice), seeks to open the way to an investigation of its sound qualities by rereading the documents already known and proposing new ideas about the origin of the calichon».

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historical musical and lexicographic testimonies, which represents a broad essential spectrum of the reality in which all this happened. The final goal of this work is to be able to provide an overall image that shows all this more clearly.

2. Sources

There are several European historical sources that describe the instruments of the lute family, printed treatises in which some parts are dedicated to their characteristics, development and social context. However, only two of these have direct references to its construction techniques and principles, which can give us insights for any hypothetical definition. One of them dates back to the very early phase of these printed treatises, written by the physician, astrologer and astronomer Henri Arnault de Zwolle around 1450, who however was excluded due to the general lack of important information on various main parts.[3] On the contrary, the other printed treatise has been of great use, as it provides profound details on this very specific subject.

Mersenne's «Harmonie Universelle» was first published in 1635 in Latin and a second version in French the following year, describing the instruments of his period of which the lute formed a substantial part.[4] Although his treatise falls outside the time frame proposed for this research study, the works of Lundberg[5] and Dr. Kirsch[6] recall that the lutes in use in his specific period

3. LIPPI, *Il liuto pre-rinascimentale*, p. 23, the author in the paragraph on the reconstruction of de Zwolle's instrument, «L'atteggiamento del ricostruttore di fronte ad un documento storico», writes: «sforzarsi di capire la razionalità che sta dietro al progetto (in specie per i dettagli più astrusi)». «Strive to understand the rationality behind the project (especially for the more abstruse details)», emphasizing the deficiencies of this information.
4. MERSENNE, *Harmonie Universelle*, pp. 73-84, giving information about its construction, strings, fretting temperament, etc.
5. LUNDBERG, *The German Baroque Lute*, pp. 1-2, «First, the luthiers rebuilt Italian Renaissance lutes, particularly those in the narrow-shoulder Bologna form, into 11 course lutes. In the next stage some makers such as Joachim Tielke and Johann Christian Hoffmann, who were by then primarily violin makers, built completely new lutes that differ in subtle but significant ways from old Italian lutes. Thirdly, by the late seventeenth century some German makers came to prefer rebuilding the flatter, broader Italian lutes from the Magno Tieffenbrucker workshop, among others». Then on p. 3, «The second response chronologically was perhaphs the most adventuresome, if least succesful. This response began with the building of newly designed lutes based on the work of the early sixteenth century Italian Renaissance masters still favored by the French lutenist. These new lutes, such as those by Joachim Tielke (Figure 2), remained outwardly similar to the Renaissance models, reiterating to a certain degree the outlines themselves but without the underlying geometry». The author's claim about the absence of similair underlying geometry is not fully explored in his work. For this reason he makes some distinction as an example between the air cavity and the outline of the body and also the number of bars placed on the soundboard, but on this last important argument no detailed explanation is given as to how this came about in the 18th century, probably imagining a similar arrangement to the old Italian instruments.
6. KIRSCH, *The Long Lives*, p. 160, «Extant instruments by makers in the Habsburg empire

were explicitly used as an example for the construction of new ones by luthiers in the 18th century. Therefore the importance that must be given to this printed treatise and this particularly with regard to the paragraphs concerning the body structure, because its construction principles have direct influence on all the other parts, as it is always the essential remaining part of these older instruments when they have not yet been opened for modification:

> Sixiefmement on barre la table en la diuifant en huit parties efgales, a fin de coller fes fix barres fur la 2,3,4,5,6, &7, partie, ear le manche commence fur la huitiefme partie au defaut de la table. Quant à la Rofe, elle doit tellement eftre fituée que fon milieu fe rencontre E [...] fur la 5. partie, fur la quelle la 4. barre eft collée. Mais l'on vfe encore de deux ou trois autres petites barres que l'on metà cofté, lors que la tableeft foible: or toutes les barres trauerfent la table, & aboutiffent aux écliffes d'vn cofté & d'autre. Elles font de mefme matiere que la table, quoy qu'on les puiffe faire d'autre bois, & ont vne ou deux lignes d'efpaiffeur, (lignes d'espaisseur) _ & peuuent auoir iufques à vn demy poulce. Lors qu'elles font collées fouz la table, on l'applique fur les bords des écliffes, fur lef quels on la colle. Mais il faut remarquer que les Fateurs adiouftent encore d'autres petites barres plus bas que la premiere des grandes, ou en d'autres endroits felon la foibleffe des differentes tables, ou fuiuant les experiences qu'ils ont faites, pour donner vne meilleure harmonieaux Luths. Quant au cheualer, auquel l'on attache toutes les chordes, on le met entre la premiere & la feconde partie de la table, car apres auoir diuifé ces deux parties en trois autres parties efgales, on colle ledit cheualet fur la feconde partie qui fe rencontre en montant [...] Mais il faut remarquer que le manche ou la touche doiuent eftre demefme longueur que l'interualle, qui eft depuis le commencement de la table iufques au milieu de la rofe: c'eft à dire que le manche doit auoir cinq parties, &la table huit, afin qu'elle faffe la proportion de la Sexte mineure auec ledit manche, & qu'il ne fe rencontre rien dans le Luth qui ne foit harmonique...

Mersenne's relevant text has been studied and quoted elsewhere,[7] but the following translated interpretation is generally accepted:

> The soundboard is divided into 8 equal parts, measured from the end of the body to the neck-attachment point and 6 bars in total are placed on the 2nd, 3rd, 4th, 5th, 6th and 7th part. The 8th part is where the neck begins.
>
> The rose centre falls on the 5th division line, upon which the 4th bar is glued and 2 or 3 small bars are placed on either side of it.
>
> All the bars span the width of the soundboard and their ends are glued to the rib's internal surfaces at the points of contact.
>
> The bars are made of the same material of the soundboard, although one

and sources like Ernst Gottlieb Baron's treatise are proof that the Bolognese shape also served as a model for building new instruments». Confirming that luthiers in the 18th century Habsburg Empire used old Italian lutes as examples, those that had a high reputation in Mersenne's time.

7. LIPPI, *La costruzione del Liuto*, pp. 25-38, proposes a translation and interpretation of Mersenne's work, with reference to the lute construction principles.

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> may make them of some other type of wood and they are one or two 'lines' of thickness and they can be up to half an inch high.
>
> Note that some makers apply additional small bars under the first large bar, the one on the 2nd division line, according to the weakness of each soundboard or to personal experience, in order to create more 'harmonious' lutes.
>
> The distance from the end of the body up to the 2nd division line, upon which the 1st bar is glued, is divided into 3 equal parts and the bridge is glued upon that second part, going upwards.
>
> The neck ought to be as long as the distance measured from the end of the body up to the 5th division line which falls upon the rose centre. Meaning that the neck has 5 parts, and the soundboard has 8 parts, as such it retains the Minor Sixth ratio, and therefore there is nothing in the lute that is not harmonious.

As we can observe, this is more than just a technical description, the humanist philosophy and ideas current in Mersenne's period are a direct influence on them. This is evident in his last sentence when he refers to the relationship between the lengths of the neck and the body, suggesting that the parts of an instrument ought to be in mathematical, geometrical and symbiotic relationship to achieve harmony. When we relate this principle to his entire description of the arrangement of the bars, the rose and the bridge, this becomes even more evident as everything is correlated to a single reference point. To the total length of the body, from its lower edge up to the neck-attachment point. However, there is an ambiguity in Mersenne's writings that gives rise to persistent misunderstanding and confusion. The expression, «on barre la table en la diuifant en huit parties efgales», is not entirely justifiable when he provides the following precise reference point, «ear le manche commence fur la huitiefme partie au defaut de la table». Physically the soundboard ends on the surface of the neck, in conjuction with the fingerboard and with this extend partly beyond the length of the body. So technically speaking we are not dividing the entire soundboard into equal parts. For this reason a more effective interpretation would be, 'divides that portion of the soundboard equal to the body'.[8]

At this point it becomes clear that it is necessary to present a third treatise, which certainly does not describe the principles of construction, but emphasizes this humanistic character with relevance to the period of this research study.

The «Historisch-theoretisch und practische Untersuchung des Instruments der Lauten» written by Ernst Gottlieb Baron at Nuremberg in 1727, in which he states the following:[9]

8. Having clarified this principle, note that the author has used the same syntactic ambiguity. However, for the sake of the synthes described, clear schematizations are provided, as well as all the size tables showing dimensional data and calculations made thereon (Appendices I - III). The actual body dimensions were used as a reference for the analysis of the barring layouts whilst taking into account the implied Humanistic conceptions.
9. BARON, *Historisch-theoretisch*, the original treaty kept in the Bavarian State Library of Munich, has been digitized and made available online, where the next sentence can be

> Ob ſich gleich alles dieſes ſo verhalten mag, ſo iſt doch ſolches zu dem Wohle klange nur ein Accidens, dieweil das ganke Haupt≥Weſen wohl auf einen Meiſter antommet, der die mathematiſdsen Proportionen, welche darzu gehörig, wohl innen habe, damit ſich die Cavitåten, Höhe, Zieffe, Länge und Breite recht egal gegen einander verhalten, welche Egalité denn Urſche iſt, daß ein Inſtrument, es mag von Italiånifchen, Zeutſchen oder Franköfifchen u. holke fenn, wohl klinge.

For this a translation made by Douglas Alton Smith is proposed:[10]

> Although all this may well be true, it is nonetheless merely incidental for a good sound, for the essence depends entirely on the luthier. He knows the appropriate mathematical proportions, so that the cavities, height, depth, length and width fit together uniformly. This uniformity (egalite) is the reason that an instrument, whether it be of Italian, German, or French wood, sounds good.

With all this it is certainly clear that according to their historical humanistic views, a harmonious coherence of instrument parts is not only desirable, but also lies at the basis of their 'zeitgeist'.[11] So the real question is how we apply this concept practically, and more importantly how should we interpret our own current observations in this regard? About this, the pioneering and singular work on the topic of the construction principles of the body structure by Friedemann Hellwig, provides data on the study of nine different lute family instruments, made in the period 1600 to late 1720's. For what was taken as an example, the main criticism leveled at Hellwig's otherwise excellent work is that it offers only the results of his research but gives no tolerance parameters for his interpretations. Even though scale drawings with scale references of every soundboard are included, we can only examine his conclusions by checking the drawings with compasses which he invites readers to do, so the results of the study of his entire work are not given here as interested parties may do so themselves. Hellwig suggests, based on his sample investigations, that the barring layouts present on the soundboards are potentially based on an equal division into eight, seven, nine or five parts and this always with reference to the body part only. So from the lower edge up to the neck-attachment point, wherein he also introduces a second reference point to apply this, namely to the inner edge of the upper block.[12]

found on p. 126.

10. SMITH, *Study of the Lute*, proposes the translation of Baron's complete book into the English language, in which the interested sentence can be found at p. 75.
11. SÖHNE, *On the Geometry*, pp. 35-54, carries out a complete study on the geometry, archeometry and proportions of the instruments of the lute family, using de Zwolle's treatise and three original Renaissance instruments, in which he points out the factor of coherence between the various parts that make up the instrument. Producing a particular study on the tenor lute by Vvendelio Venere of 1582 from the Sammlung alter Musikinstrumente in Vienna (Inv. n. C36.), in which the equal division in eight parts described by Mersenne is shown overlaid directly on to the body only, thus related to that portion equal to the body of the soundboard.
12. HELLWIG, *On the Construction*, p. 131, with reference to the distribution of the bars from

What stands out overall are the important issues taken into consideration, those of human error and applied skill or deliberate adjustments that can happen during the manufacturing process. These might occur during the marking out of the barring itself, when gluing the bars in place or when fitting the soundboard during final assembly of the instrument. Manufacturing discrepancies may well arise from the use of worn tools, tiredness, lack of care or experience of generally accepted working tolerances, inaccuracy or to the conscious, deliberately applied interventions of the maker.[13] What 'is' likely is that these observed discrepancies from any initial theoretical hypothesis are the result of more than one incident giving rise to accumulated or apparent multiple errors. So, ultimately, this assisted me in being able to conduct my analysis, to choose reference points and parameters that reflected technical aspects and humanistic viewpoints as well as recognition of human fallibility and manufacturing tolerances, all consistent with the principles of both Mersenne's treatise and Hellwig's work as follows.

The different hypothetical equal division methods for the barring layout and placing of the rose center and bridge, always corresponds to the range of the 'body' only, referenced from its lower edge to the inner edge of the upper block or at maximum up to the neck attachment point.

The center of the rose is the 'primary' reference point used initially for these various hypothetical methods of equal division, and in this case always with reference to the total length of the body. Before, if necessary, applying any further hypothetical equal subdivision method for the actual placement of the bar positions, which in this case will end up at the inner edge of the upper block, so that for these there are always five equal parts, from the lower edge up to the rose centre. In this way the center of the rose relative to the total

the soundboard of the instrument by Magnus Tieffenbrucker made in 1609 at Venice, he writes «The belly is divided into eight equal parts from the bottom edge to (in this case) the lower edge of the top block (here we see the prick of a needle or compass)». About which he states the following later in his final conclusion on p. 144, about these types of specific cases. «In 1786 Antonio Bagatella was awarded a prize by the Academy of Padua for his geometrical construction of the outline of the violin. (he declared that he followed the principles of the great Italian masters). Since then many more such attempts have been made; yet they seem of little value as they do not take into account traces found in the instruments, whereas the present article tries to make full use of these». Affirming the fact that theoretical elaborations regarding the technical practice contained in treatises of the time are not always 'standard de facto', this with testimony to Mersenne's writings, which he also provides as an example in his article.

13. HELLWIG, *On the Construction*, pp. 129-145, the results are the most accurate on the instruments from the late Renaissance (1599-c.1650), giving a maximum of about 4-5 mm of discrepancy on the assertions made about his hypothetical theoretical bar placements and this with reference to one or more bars on the same instrument. Instead the discrepancies increase in the particular case of Sebastian Schelle's instrument of 1728, up to 7-9 mm, both in the placement of the rose centre as all the bars, commenting on p. 139, «… inaccuracy is a widespread feature of Baroque lute making…». However,he offers only three examples of that particular period in the article to support his statement, so we must assume that he researched many other instruments of that same period in order to justify the comment.

length of the body:

- Coincides with the 5th division line in an equal division of 8 or 9 parts.
- Coincides with the 3rd division line in an equal division of 5 parts.
- Coincides with the 4th division line in a 7 parts division.

Accuracy variations of up to +/- 5-7 mm were allowed in the actual placement of the bars positions and/or the center of the rose compared to the hypothetical equal division or subdivision method used. Instead, a discrepancy of +/- 10 mm or more indicated that this interpretation was invalid.

All components, which are in a symbiotic relationship by a geometric and/or mathematical proportion, must represent a single whole in which one can 'move' from one point to another without experiencing any interruption, within the limits of the set parameters.

In addition to all this, it is important that there are multiple correlations in the instruments studied within the historical period concerned, so that a gradual or complete development can be made visible. Therefore the need to have this condition, requires having information of a continuous nature and with this the choice to take into consideration the instruments of Gregor Ferdinand Wenger's[14] workshop. Precisely because many recognize him as the mandora maker 'par excellence', since he is the author from whom the largest group of mandora's have survived today. In total sixteen instruments of the lute family are documented from his workshop, fourteen mandoras, one calichon and one lute, from which the earliest dates back to 1714 and the latest to 1757, so fully inherent to our historical period of interest. Ten of these instruments were studied, six of which this author examined personally, one of those during restoration and the other four were reviewed from the data gathered by curators, conservators or restorers. At the end of this article the main measurements for nine instruments are included in Appendice I, together with the calculations made in Appendices II-III, with the aim of giving a critical reading.

14. To date no detailed archive research has been done concerning the life of Gregor Ferdinand Wenger. However, by studying the specialised Luthier Dictionary LÜTGENDORFF, *Die Geigen und Lautenmacher*, we know that Wenger was a native of Vienna and born before 1680, but whether he trained and worked there is not known. We do know that on the 23rd October 1701 Wenger married Maria Nigrius of Sünchig(en) the widow of the Augsburger luthier Jakob Philipp Fichtl (c.1670 Füssen? – 1700 Augsburg), thus acquiring his workshop at that time. Interestingly J.P.Fichtl had married Maria Nigrius only four years earlier, she being the widow of Hans Georg Edlinger (1666 Augsburg – 1696 Augsburg), who himself had taken over his own father's workshop, that of Thomas Edlinger I (c.1630 Groß-Kirchheim/Kärnten -1690 Augsburg), a mere six years previously. This means that Wenger apparently worked in the Augsburger workshop of the Edlinger family until his death on the 4th January of 1767. Therefore, a deeper study of any possible connections between the works of Edlinger and Wenger could be very interesting.

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3. The Mandora & Calichon

As we will see, in the history of both musical and lexicographic testimonies, our two entities will be related to an infinite number of terminological variants, so much so as to generate an apparently inextricable situation. To try to get out of this state of confusion, it will be necessary, to use an analytical terminology, to eliminate some variables, in order to find the solution to this 'system of equations'. To arrive at a solution, allow us to continue in the mathematical metaphor, it seems to us that the only way is to establish two 'fictitious solutions', the terms mandora and calichon. Which initially will have the pure meaning of a point of reference within the sea of terminological variants, but during the presentation of the various sources they will take on their own identity, thereby automatically defining affinities and differences. [15] Having said this, we present the earliest and first large group of sources of datable information found in a very short period of time, from 1692 to 1701, in the regions historically called Bohemia and Moravia,[16] naming instruments with the designation mandora and calichon. For the above reason, it seems quite natural to us to place in these historical regions, if not the origin of these instruments, then at least the area of their first intensive diffusion and this with particular reference to the Jesuit monasteries.[17] Where we find four different types of sources, chronicles of musical executions, musical manuscripts, a musical lexicon and the inventories of the monastery itself.

One of the first of these is the inventory of the Catholic parochial church of Pruské, Moravia, under the rubric 'Instrumentae', where a calichon (8. Galitson No 1) is mentioned in 1692 next to a theorbo and a cittern.[18] Another early example in Moravia again, is at the Hradisko convent near Olomouc, where there are chronicles on musical executions that testify numerous times the use of the name calichon. Written in diaries between the years 1693-1701 by the vice-prior Ambroz Malder, in which at a certain point an 'alumnus musicus' is even documented. That is, a student inside the convent, namely Jindrich Starikovsky, who sang as a tenor and played the first trumpet, the violin, the flute, the obeo and our instrument.[19] In any case, in these early sources we can observe that the instrument with the denomination calichon is often mentioned together with large groups of plucked instruments. Making it appear that the use of this type of configuration was very widespread during the performance of religious ceremonies and solemn celebrations in the parochial

15. PROSSER, *Calichon e Mandora*, pp. 15-16.
16. Bohemia is a historical region that occupied the central and western part of today's Czech Republic, with the historical capital of Prague and bordered with the current regions of Bavaria and Saxony to the north and west and with Lower Austria and Upper Austria to the south. Instead, historical Moravia covered the eastern part of the current Czech Republic and a small part in the modern Slovak Republic, with the historical capital Brno and bordered to the west with historic Bohemia and to the south with current Lower Austria.
17. PROSSER, *Calichon e Mandora*, p. 25.
18. *Ibid.*, p. 22.
19. *Ibid.*, p. 68.

churches, the monasteries and the residences of ecclesiastical dignitaries.[20] Furthermore, within these ecclesiastical environments, its player was almost always an integral part of the 'social tissue' of the convent, to which this instrument belonged, therefore mostly musically educated people with amateur ambitions. According to the general picture, in these territories the instrument was used exclusively as an antagonist of the lute and above all of the theorbo in the practice of the basso continuo, already in the last decade of the 17th century. On the other hand, the very first source in these areas in which an instrument called mandora is indicated, is the musical lexicon edited by the Bohemian Jesuit, organist at the Tyn church in Prague, Tomáš Baltazar Janovka.[21] The dictionary, «Clavis ad thesaurum magnae artis musicae...» printed in 1701, must have been considered of no small importance, given that it was still reprinted some fifteen years later. It contains information that is fundamental to the argument, because for the first time we find a description of the instrument cited as calichon, after its first appearances, as well as for the mandora. From a purely organological point of view they are described in a surprisingly precise way. There are two types of calichon (Galizona), one with six-courses and the other with eight- courses, a characteristic that will remain unchanged throughout the century, from which the strings can all be double, apart from the first, or all single. Tuned in a very low register according to the scheme for the six-course variant, a-e-c-G-D-C, and the eight-course variant, a-e-c-G-D-C/C♯-B/B♭-A/A♭, describing also the detuning of the three last courses which must however be consistent with the key in which the piece is written. This tuning register suggests that the vibrating length of the strings must have been quite long. Thereafter the instrument with the term mandora (Mandoræ) is described as having a tuning a minor fourth higher than the calichon, so their vibrating length of the strings would result much shorter. Also, here he describes two types, a six-course variant, d'-a-f-c-G-F and an eight-course variant, d'-a-f-c-G-F/F♯-E/E♭-D/D♭, giving completely symmetrical rules for the last three courses as for the other instrument. However, compared to the calichon, he does not write about single strings hereby, but describes in detail the doubling of the strings for a six-course version only, corresponding to the following table 1:

20. *Ibid.*, p. 68, writing about this «Durante la celebrazione, erano utilizzati gruppi di liuti soprattutto per l'esecuzione di musica strumentale (*Sonata*) o vocale (*Aria seu Cantus*) dopo il *Communio*: in tale occasione ad una viola da gamba ed un violino si potevano unire fino a sei liuti». «During the celebration, groups of lutes were used above all for the performance of instrumental music (*Sonata*) or vocal music (*Aria seu Cantus*) after the *Communio*: on this occasion up to six lutes could be combined with a viola da gamba and a violin».
21. Nowadays several scholars have studied and published an exposition on the work of Janovka, concerning his section on the mandora and the calichon. PROSSER, *Calichon e Mandora*, pp. 17-21. KIRSCH, *Zur Frühgeschichte*, pp. 89-93. REBUFFA, *Il Liuto*, pp. 399-401.

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Table 1. *Doubling string for a six-course mandora*

COURSE	TYPE	DOUBLING
first	single	
second	double	unison
third	double	unison
fourth	double	octave
fifth	double	octave
sixth	double	octave

Wanting to add a further statement to this last object, at the Moravské Muzeum in Brno, a musical manuscript is preserved which can be dated very close to the date of the Treaty of Janovka, both for the type of writing and for the musical content, CZ-Bm Ms. Inv. 4081/A 27.750.[22] Titled, «Fundamenta Mandoræ», which gives two tuning schemes that correspond correctly to his six- and eight-course tunings for the mandora, also tuned in D_4, therefore confirming his information. According to the more limited sources of information available on this particular instrument, in this early documentable period, we can observe that it was used in a similar way to the other in the same environmental contexts. Instead, for the latest indications in this earliest and first large group of sources, we must move further forward in time, until we find another inventory that catalogs the music and instruments owned by the Osek monastery, near Prague. From which its drafting dates back to the mid-eighteenth century, but refers to the state of the assets in the decade 1720-1730.[23] Where we find under the title 'Consignatio Instrumentorum pro Choro figurali', a calichon (Galizona 1.) named without further description however. In addition, a final reference to the mandora in another musical manuscript also kept in the Moravské Muzeum in Brno, CZ-Bm Ms. Inv. 4081/A 20.545,[24] shows for the very first time the mutual natural influences that our two entities will undergo, which are inherent to cultural heritage objects covering a certain period in history and across different geographical regions, since the indicative tuning here is now in E_4. Being a relatively late manuscript, dated around 1750 ca., we can conclude that this change in the tuning derives from an event beyond the borders of the territories considered so far, as all this will become clearer when we relate it to the immigration from both our instruments. For this reason, we must go beyond the line traced by the Danube to enter the historical Duchy of Styria [25] and return back towards the beginning of the century, to find here the first and only reference to an instrument named with a variant of the Slavic term «Galizona» (Galizone), in a copy manuscript preserved at the 'Benediktinerstift' in Kremsmünster.[26]

22. PROSSER, *Calichon e Mandora*, p. 41. Indicated in his work as Bm 03, RISM B/VII, s.51.
23. *Ibid.*, p. 22.
24. *Ibid.*, p. 44. Indicated in his work as Bm 02, RISM B/VII, s.51.
25. This area is today called Upper Austria and Lower Austria.
26. *Ibid.*, pp. 24-25. Indicated in his work as KR 21 and at the monastery C 7, 652, containing

Which should not be surprising given the very frequent musical contacts and exchanges of musicians that take place between Moravian and Bohemian monasteries and the north-eastern regions of Styria.[27] These exchanges certainly had a direct cultural influence on both instruments, as we will notice from the first copy manuscripts that we expose here. All of which can be dated to around 1730 and come from the areas bordering our first two historical regions, today called Lower Austria and Upper Austria, where this factor is clearly visible because one and the other assume a tuning in D_4 or in E_4, with reference to the mandora.[28] The same cultural matrix can be found in the entire collection of manuscripts, again preserved at the Kremsmünster monastery, dating from around 1710 to 1750 c.a.[29] If up to now the mandora has always been a six- or eight-course variant, here in this geographical location we find for a single time a nine-course variant, the maximum extension with which it is documented and of which very few original instruments have survived.[30] Now that we know all this, we provide a complete list of the tunings from 'Austrian' sources for the eight- and nine-course variant,[31] as this will give already a clearer picture of the changes taking place in our instruments (table 2).

a *Missa Praesentationis à 16* attributed on the title page to Felice Sances, indicating a calichon for which a tuning in A_3 is assumed.

27. *Ibid.*, p. 25.

28. *Ibid.*, pp. 43-44. Brno, State Archive, CZ-Bsa296E6k139, RISM B/VII s.52, tuning in d', indicated in his work as BA 01. Bratislavia, Univerzitná Knižnica, Ms 1092, tuning in e', indicated in his work as Bru 01. Stift Schlierbach, A-SB Ms. 1732, tuning in e', indicated in his work as SB 01. Hamburg, Staatsbibliothek Preusischer Kulturbesitz, D-Hs ND VI 3242, RISM B/VII s.130, tuning in d', indicated in his work as Hs 01.

29. *Ibid.*, pp. 45-50. Their respective manuscripts are indicated as follows in his work, KR 01 in e', KR 02 in e', KR 03 in d', KR 04 in e', KR 05 in d', KR 07 in e', KR 08 in d', KR 09 in d', KR 10 in d', KR 11 in d', KR 12 in d', KR 13 in e', KR 14 in e', KR 15 in d', KR 16 in d', KR 17A in e', KR 17B in e', KR 17C in e', KR 17D in e', KR 17E in e', KR 17F in e', KR 18A in d', KR 18B in d', KR 18C in d', KR 18D in e', KR 18E in d', KR 18F in d', KR 18G in d', KR 18H in d', KR 19A in d', KR 19B in d', KR 19C in d', KR 20A in e', KR 20B in d', KR 20C in d', KR 20D in d' and KR 20E in e'. At the Kremsmünster, monastery, they can be found under Fasc. 50, from Nr. 168 to Nr. 183.

30. KIRSCH – MARTIUS, *Die Lauten*, pp. 64-71, an 9 course instrument by Daniel Achatius Stadlmann from Vienna of 1720, at the Kremsmünster monastery, Inv. Nr. 6, is displayed in the general catalog. KIRSCH, *Die mandora*, p. 78, indicate an 9 course instrument by Jacob Weiß from Salzburg of 1726, at the Schloßmuseum Linz, Inv. Nr. Mu 63, but upon further investigation this results to be a 6 course instrument and is therefore excluded. From personal study work carried out at the Brussels Musical Instrument Museum, Johannes Jauck from Graz of 1746, Inv. Nr. 251, a 9-course instrument with 'theorbo' extension for the last 3 courses.

31. KIRSCH, *Die mandora*, pp. 78-79.

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Table 2. *Tunings from Austrian sources*

TUNINGS IN E'	TUNINGS IN D'
e'-h-g-d-A-E-D-C	d'-a-f-c-G-F-E-D
e'-h-g-d-A-E-D-C♯	d'-a-f-c-G-F-E♭-D
e'-h-g-d-A-F-E-C	d'-a-f-d-c-G-F-E-D
e'-h-g-d-A-E-D♯-H	d'-a-f-d-c-G-F♯-E-D
e'-h-g-d-A-E-D-H	
e'-h-g-d-A-E-C♯-H	
e'-h-g-d-A-G♯-Fis-E	
e'-h-g-d-A-G-F-E	
e'-h-g-d-A-G-F♯-D	
e'-h-g-d-A-G-F-E-D	
e'-h-g-d-A-G♯-F♯-E-D♯	

This list allows us to see, to the extent that this is truly a reflection of reality, that the majority use of the tuning in E_4 is strongly expressed, a trend that will strengthen until the end of the century and which will also be found elsewhere as we will see afterwards. In fact, one of the last sources that we introduce in this part, from which the tuning can be explicitly obtained and is currently located in Trentino,[32] in Villa Lagarina, but most likely comes from Salzburg. Is the important music manuscript entitled «Rudimenta Mandoræ: oder Schlag=Fundamenta», written in the year 1756 by a certain 'Andrea Mayr', who is according to Prof. Dieter Kirsch,[33] the lute and violin maker at the Salzburg court, Andreas Ferdinand Mayr, as reported on the labels inside his instruments.[34] Where we find a fairly precise presentation of a mandora with the indication of a tuning only in E_4 at this point. Here we find also two other interesting observations, the first of which is a description of our instrument.

32. PROSSER, *Calichon e Mandora*, pp. 80-82. Indicated in his work as, VLMarzani and at Villa Lagarina under c. IV. Trentino, Italy, was a territory that take part of the Habsburg Empire at the time.

33. KIRSCH, *Die mandora*, p. 100.

34. LÜTGENDORFF, *Die Geigen und Lautenmacher*, Andreas Ferdinandus Mayr - Hof=Laut= und Geigenmacher – in Salßburg An. 17.., born towards the end of the 17th century in Vienna and deceased in 1764 in Salzburg, was employed at the Salzburg's court as a lute and violinmaker since 1720 and was probably J. Schorn's successor. In addition, the figure of the luthier-musician is also documented at other courts in historic Europe, an excellent example of this being the Bassano family at the English court in the sixteenth and seventeenth centuries. See further in, LASOCKI, *The Anglo-Venetian Bassano Family*, pp. 112-132.

> Zuwissen 1mò: d[aß] die Mandora ein Instrument seÿe, welches in 6 Chören bestehet, deren | die erste 3 Bass, die übrige 3 aber discant saithen genannt warden […]
>
> NB: die 3 Bass warden mit den daumb, die 3 discant saiten aber mit den zeig=| mittel= und ringfinger geschlagen; d[as] übrige wird die übung Clar an dag geben.[35]

About which Dr. Pietro Prosser comments as follows: «It should be noted that here we speak alternately of «Chören» or «Saiten», an indication that may suggest a simple oversight, but which suggests the hypothesis that both double courses and single strings could be used, as has been seen possible already for the calichon».[36] Given the uniqueness with which this statement currently presents itself, it seems rather difficult to follow this line of thought, yet in the subsequent and definitive geographical distribution we will encounter similar situations of apparent inattention in other historical texts, which will then allow us to delve deeper into this aspect. On the other hand, the last observation constitutes the very essence of this musical manuscript, because it is directly related to the social context in which it was written and therefore serves as the first reference that takes us out of the religious environment in our discussion. This combined with the importance of its relationship to the method it contains as described on the title page, documents the now more widespread use of the mandora:

> Rudimenta Mandoræ: |oder |Schlag=Fundamenta |worinnen die kürzest = aber sehr nutzliche unterweisung für einen Scholaren, | welcher | in der Mandora unterwiesen zuwerden verlanget, sovohl behuff des | Discipuls: | als sauch | zur erleichterung der mühe und arbeith eines | Lehrmeisters | auf die gründlichist = und leichteste arth mit beÿgesezte | Exemplen dargethan wird | von Mir
>
> Andrea Mayr, M[anu pro]pria.
> a[nn]o 1756»[37]

35. PROSSER, *Calichon e Mandora*, p. 51. Translation by Dr. Pietro Prosser, «Da sapere per primo: che la Mandora è uno strumento, che consta di 6 cori, dei quali i primi 3 vengono chiamati Bass, gli altri 3 invece corde discant […] NB. I 3 bassi vengono pizzicati con il pollice, i 3 corde discant invece con l'indice, il medio e l'anulare, il rimanente lo porrà l'esercizio, chiaramente, vicino al ponticello». Author's translation, «First to know: that the Mandora is an instrument, consisting of 6 courses, of which the first 3 are called Bass, the other 3 instead discant strings […] NB. the 3 basses are plucked with the thumb, the 3 discant strings instead with the index, middle and ring fingers, the rest will be covered by the exercise, clearly, near the bridge».
36. PROSSER, *Calichon e Mandora*, p. 51. «È da notare che qui si parla alternativamente di «Chören» o «Saiten», indicazione che può far pensare ad una semplice svista, ma che suggerisce l'ipotesi che si potessero usare sia ordini doppi, sia corde singole. 232 Come d'altra parte si è visto possibile già per il calichon».
37. *Ibid.*, p. 81. Translation by Dr. Pietro Prosser, «Rudimenta Mandorae: ovvero fondamenti di tocco, in cui viene esposto da me nella piu facile ed accurata maniera un insegnamento per uno scolaro che voglia istruirsi nella mandora. Il piu breve, ma assai utile, sia per vantaggio del discepolo, sia come alleggerimento della fatica e del lavoro del Maestro |

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Mayr himself even clarifies, at the end of his preface, to which specific audience he is referring to: «allen hochgeneigten Music liebhabern»,[38] that is «all highly inclined Music lovers». Given where he is at the time of writing, we can imagine that one of these so-called 'students' could also have been part of the nobility of that period. Now, according to the general picture that we have managed to draw so far, our two instruments would have had their first development in the areas considered up to now. Presumably coming from the historical regions of Bohemia and Moravia to cross the border with modern Austria as early as 1685, based on a final testimony that we provide on the basis of an invoice paid for a repair, on an instrument named with a variant of the term calichon and once more from the Kremsmünster monastery:[39] «Vor reparirung eines zerprochenen Galishon - [fi] 24 [kr]». A unique testimony that could further support the hypothesis in connection with their origins in the first two indicated regions, can be found in the manuscript of James Talbot, deposited between 1689 and 1711 by Dean Henry Aldrich, at the Christ Church Library of Oxford, as Music Ms. 1187.[40] Which actually describes a calichon (colachon), indicating Janovka's tuning in A_3 and gives measurements of an instrument played by the Moravian player Gottfried Finger,[41] thus providing information that once again relates to the specific regions of the earliest and first major documented period, which might not be a coincidence at all. In all this, the instruments found their natural environment mainly in ecclesiastical settings primarily for the practice of the basso continuo, and then most likely spread through the solo and chamber repertoire in the form of tablatures elsewhere in more mundane contexts, as we have seen in the example from Mayr's manuscript. Eventually creating a reaction that manifested itself as a

Andrea Mayr, di propria mano nell'anno 1756». Author's translation, «Rudimenta Mandorae: or fundamentals of touch, in which I explain in the easiest and most accurate way a teaching for a student who wants to learn the mandora. The shortest, but very useful, both for the advantage of the disciple and as a relief from the fatigue and work of the Master |Andrea Mayr, by his own hand during the year 1756».

38. *Ibid.*, p. 82. Translation by Dr. Pietro Prosser, «tutti gli amatori di musica ben disposti».

39. *Ibid.*, pp. 24-25, A-KR, Archiv. Dr. Pietro Prosser also presents two other 'Rechnung', one from 1735 which says, «ein garitschon repariert und besaith - [fi] 24 [kr]» and another from 1739 where we encounter the term, «Galizon» accompanied by «2 Mandoræ».

40. BAINES, *James Talbot's Manuscript*, p.9.

41. GILL, *Mandores*, p. 136, «The Talbot MS. contains important evidence. The measurements of Mr Finger's *Colachon* are recorded in it, and this is interesting in view of the lack of other English references to the instrument. It was a remarkable instrument, with an overall length of 122 cm., a string length of 97-98 cm., a fingerboard length of 44.5 cm. and a body measuring 58.5 x 33.5 cm. In spite of the long neck only seven frets were fitted (there is room for twelve). It had six single strings and clearly was not a colasione in the generally accepted sense. It in fact comes closer in general design to the long-neck lutes of the 15th century discussed recently by Kimbel and Lupus. The string length is consistent with the tuning given by Talbot, A' or C D G c e a» See also, PROSSER, *Raucous? Penetrating*, p. 96. «British scholar James Talbot was faced with the same bibliographic problem when describing a colachon belonging to the Moravian (naturalized English) Gottfried Finger (c.1695):21 although the measurements and tuning described are unequivocally those of a six-course bass calichon in A (with the alternative tunings of the sixth course given by Janovka)».

cultural influence that mutually imposed a change in both their realities. The motivation that caused this reaction is not yet clear, but what is most striking is that this mutually changing influence is not documented or cannot 'be' documented in the geographical area where the mandora and the calichon have flourished the most, in current Germany. Where the majority of our testimonies are preserved today and all are centered on a period beginning no earlier than the first decade of the eighteenth century. Once it 'arrived' there, the calichon in particular lost the typically Slavic designation of «Galizona» and variants, to take on the phonetically similar one, but graphically consistent either with the German spelling (Gallischona) or with a spelling of clear French influence (Gallichona, Gallichone, Calchedon). Furthermore, we also note that both the respective tuning and the use of this instrument changes essentially,[42] and as mentioned earlier, this 'transition' of change in the calichon is immediately notable. Here the information is mainly divided into four groups, tablature, Opera, German musical lexica and compositions for large ensembles, both instrumental and vocal, most of which is concentrated in the more south-eastern part of current Germany, except from one exceptional example. This is the very first German musical lexicon in which we find a reference to the term calichon, written by Johann Mattheson in his «Neu-eröffnete Orchester» of 1713 in Hamburg, in which he writes in favor of the instrument compared to the lute in the context of the basso continuo.[43]

> […] Was | einer in Ca mmer=Music mit dem General- | Bass auff der Laute praestiren kan / mag wol gut | seyn / wenn manns nur hörete.
>
> […] What can be achieved with the basso continuo on the lute in chamber music could well be good, if only it could be heard.
>
> Wir wollen dem *prompten Calichon* (welches | ein kleines Lauten=mäßiges mit 5. Einfachen | Sayten bezogenes / und fast wie die Viola di | Gamba gesti mmtes Instrument / (D. G. c. f. a. | d.) endlich permittiren / daß er dann und wann / | doch in Gesellschafft des herrschenden Clavi- | res / ein Sti mmchen accompagniren dürffe.
>
> Finally, we want to allow the prompt *Calichon* (which is a small lute-shaped instrument with 5. simple strings and tuned almost like the viola da gamba (D. G. c, f. a. | d.), which can from time to time accompany a little voice in company of the dominant harpsichord.

The only explanation we can give regarding the distance of this source compared to the other places of most of the testimonies that will come, is the

42. PROSSER, *Calichon e Mandora*, pp. 26-38, this is further clarified in the chapter on German sources, *«Was uns die Quellen erzählen…»: Le fonti in Germania*.

43. *Ibid*., the author set forth Mattheson's facts in several parts of his work, p. 34 «Quello che si può realizzare con il basso continuo al liuto nella musica da camera, potrebbe ben essere buono, se solo si sentisse». (MATTHESON, *Orchester* 1713, p. 277) and pp. 34-35 «Vogliamo permettere infine al pronto *Calichon* (che è un piccolo strumento a forma di liuto con 5. Corde semplici e accordato quasi come la viola da gamba (D. G. c, f. a. | d.), che possa di quando in quando accompagnare una vocina in compagnia del dominante clavicembalo». (*Ibid*., p. 279)

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presence of this instrument by musicians in that city. Which may have been the determining factor, since we find also information on its use in relation to the opera, «L'inganno fedele, oder Der getreue Betrug» by Reinhard Keiser, performed in Hamburg in October 1714.[44] As well as having some surviving instruments from the famous luthier Joachim Tielke, which brings up a very interesting fact about this when we evaluate their dating. Nowadays these exhibit some modifications, but due to their characteristics we can perfectly assign them to the description of our two entities, whose dates are 1689,[45] 1702[46] and 1718[47] respectively. Of course two of them precede Mattheson's print by a long time, but if we take into account the fact that Keiser's predecessor in Hamburg is a certain Johann Sigismund Kusser,[48] who coincidentally is of Moravian origin, everything would be explained why in his lexicon the term calichon is given in round character used for foreign words of Latin origin.

Given also the authority of his person, his book must have received wide acclaim, so much so that it was reported in two subsequent lexicons. The organist Joseph Friedrich Bernhard Caspar Majer reports his passage in 1732, in a completely identical way in his «Museum Musicum Theoretico Practicum...».[49] As also the «Musicus Autodidactus», printed in Erfurt in 1738 and attributed to Johann Philipp Eisel, describes a calichon.

> Der Calichon ist auch ein mit 6. Saiten bezogenes Instrument, welches der Lauten ziemlich nahe ko mmt, und mit 6. einfachen Saiten bezogen ist, welche ins D. G. C. E. A. D. wie auf die Viola da Gamba gesti mmet werden: doch gebrauchet man dieselben gar seiten»[50]
>
> The Calichon is also an instrument equipped with 6 strings, which is similar to the lute, and is equipped with 6 simple strings, which are tuned D. G. C. E. A. D. as on the viola da gamba: actually, it is used very rarely»

This observable tendency of the specific tuning indicator in all German musical lexicons, together with all musical manuscripts used for the calichon in this part,[51] in which their voice indicates a $F_3 - D_1$ and $G_3 - D_1$ range

44. PROSSER, *Calichon e Mandora*, p. 37, Reinhard Keiser, Teuchern 1674 – Hamburg 1739, from about 1697 he became the chief composer at the «Oper am Gänsemarkt» in Hamburg.
45. HELLWIG – HELLWIG, Hg., *Joachim Tielke*, p. 116, TieWV 52 (GH 50) - Mandora (Colascione?), 1689, Stockholm, Schweden, Musikmuseet, Inv.-Nr. M2680.
46. *Ibid.*, p. 120, TieWV 124 (GH 105) – Mandora, 1702, Kopenhagen, Dänemark, Musikhistorisk Museum og Carl Claudius' Samling, Inv.-Nr. C 93.
47. *Ibid.*, p. 140, TieWV 163 – Mandora (Colascione?), um 1718, Zürich, Schweiz, Privatbesitz.
48. PROSSER, *Calichon e Mandora*, pp. 36-37, Jean Sigismond Kusser, Bratislava 1660 – Dublino 1727, worked at the «Oper am Gänsemarkt» in Hamburg.
49. *Ibid.*, pp. 35-36. Joseph Friedrich Bernhard Caspar Majer, Schwäbisch Hall 1689 – 1768.
50. *Ibid.*, p. 36, translation by Dr. Pietro Prosser, «Anche il Calichon è uno strumento munito di 6 corde, che si avvicina al liuto, ed è munito di 6 corde semplici, le quale sono accordate D. G. C. E. A. D. come sulla viola da gamba: veramente, si usa assai raramente». Johann Philipp Eisel, Erfurt 1698 – post 1756.
51. *Ibid.*, p. 27, contains a table with manuscripts, that have a specific instrumental desig-

respectively, are very important. Because it allows us to assume that all variants of the term calichon in 'Germany' are always synonymous with a tuning in D_4, for which the tuning formulated by Janovka in A_3 never appears, as if it apparently never transpired here. In all these sources it presents itself always and only as a conformation of six vibrating elements, which according to the only direct indications we have in all lexicons are always single. Since the collections of musical manuscripts do not give direct information on the doubling of the strings and, if so, according to what customs it was implemented. The cities and composers to which a large group of these directly refer are, Johann Paul Schiffelholz active in Eichstätt and Ingolstadt,[52] the sacred cantatas of the period of stay in Frankfurt am Main by Georg Philipp Telemann[53] and others such as Johann Christoph Bodinus,[54] Johann Balthasar Köning[55] and a certain Bruckmann, like Giuseppe Antonio Brescianello[56] in Munich. The dating considered here places them in an interval covering approximately the years 1710-1760, therefore a period chronologically complementary to the information we were able to collect in the first areas and where we now observe the subsequent tuning for the denomination calichon, d'-a-f-c-G-D, with the two next scordaturas, d'-a-f-c-G-E♭ and d'-a-f-c-G-F. All in all, it would seem that the center of maximum diffusion of our two entities in this particular historical reality was concentrated around the

nation, without direct designation or with different instrumental destination and are preserved at: Amberg, Staats und Stadtarchiv, Ms. 39, RISM B/VII 5, in his work AM 01. Augsburg, Staats und Stadt Bibliothek, Ms. Tonkunst Schl. 290, RISM B/VII 7, in his work As 01. Brussels, Conservatoire, Ms. Littera S. NO.15.132, RISM B/VII 56, in his work Bc 02. Donaueschingen, Fürstenberfgische Hofbibliothek, Ms. mus. 1272/1, RISM B/VII 87, in his work DO 01 and Ms. mus. 1272/2, RISM B/VII 87, in his work DO 02. Darmstadt, Universitäts- und Landesbibliothek, Mus. Ms. 1033/72, in his work DS 01. Regensburg, Proske'sche Musikbibliothek, Ms. Mus. A.R. 778/779 [Fasc. A], RISM B/VII 299, in his work Rp 01A.

Metten, Archiv der Benediktiner.Abtei, MS. mus. Pract. Nr. 90, RISM B/VII 207, in his work MT 01. MS. mus. Pract. Nr. 91, RISM B/VII 207, in his work MT 02. MS. mus. Pract. Nr. 91.b, RISM B/VII 208, in his work MT 03. Graz, Steierm, Landesarchiv, Hs. 1869, RISM B/VII 128, in his work GI 01. Dresden, Sächsische Landesbibliothek, Musikabteilung, Ms. Mus. 1-V-50 [Fasc. A-B-C], RISM B/VII 92-88, in his work Dlb 01A-01B-01C. Ms. Mus. 2-V-4, Ms. Mus. 2-V-5, Ms. Mus. 2-V-7, RISM B/VII 88, in his work Dlb 02, Dlb 03 and Dlb 04. Ms. Mus. 2364-V-1, Ms. Mus. 2364-V-2 [Fasc. A-S], RISM B/VII 88, in his work Dlv 05, Dlb 06(A-S). Ms. Mus. 2701-V-1, Ms. Mus. 2701-V-1a, RISM B/VII 88, in his work Dlb 07, Dlb 08. Ms. Mus. 2806-V-1, Ms. Mus. 2806-V-2, Ms. Mus. 2806-V-2a (II), Ms. Mus. 2806-V-2a (III), Ms. Mus. 2806-V-2a (IV), Ms. Mus. 2806-V-2a (V), Ms. Mus. 2806-V-2a (VI), Ms. Mus. 2806-V-3,1, Ms. Mus. 2806-V-3,2, Ms. Mus. 2806-V-4, Ms. Mus. 2806-V-6, RISM B/VII 88, in his work Dlb 09, Dlb 10, Dlb 11,II, Dlb 11,III, Dlb 11,IV, Dlb 11,V, Dlb 11,VI, Dlb 12,1, Dlb 12,2, Dlb 13, Dlb 14. Ms. Mus 3065-V3, RISM B/VII 374, in his work Dlb 15. Ms. Mus. 2392-O-18, Ms. Mus. 2392-O-22, in his work Dlb 16, Dlb 17. Universitätsbibliothek Frankfurt am Main, cantates, in his work FTelemann.

52. *Ibid.*, pp. 61-62, Johann Paul Schiffelholz, Heideck 1685 – 1758.
53. *Ibid.*, p. 33, and pp. 69-70, Georg Philipp Telemann, Magdeburg 1681 – Hamburg 1767, works at Franfurt am Main in the liturgical year's of 1716-1717 and 1756-1757.
54. *Ibid.*, p. 33, Johann Christoph Bodinus, Rippersroda 1690 – Frankfurt am Main 1727.
55. *Ibid.*, p. 33, Johann Balthasar Köning, Waltershausen 1691 – Frankfurt am Main 1758.
56. *Ibid.*, pp. 61-62, Giuseppe Antonio Brescianello, Bologna 1690 ca. – Stuttgart 1758.

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Duchy of Bavaria, with its historical capital Munich, which consisted of the modern regions of Upper Bavaria, Lower Bavaria, Upper Palatinate and until 1779 also Innviertel, now a small part of modern Upper Austria.[57] An opinion that could strengthen this last comment is also due to the presence of the only three surviving examples of paintings depicting a calichon/mandora, made by Peter Jacob Horemans who was appointed painter to the court of Bavaria in 1769.[58] Which excellently display the construction details found in the preserved instruments of today, six-courses, a bowl back composed of 9/11 ribs, a pegbox decorated on the back with a perforated floral motif and the external counterclasp of the bowl back decorated at the ends. The existence of these instruments in this historic region and capital city can therewith be further demonstrated by the majority of surviving musical manuscripts who originate from there. As well as the more amateur use of our instruments that is becoming further evident and is taking place in ecclesiastic environments, as before, but more than ever also in theater and especially domestic environments. Where they are placed in relation to solo music to be read in tablature, thus finding additional evidence of their more 'lute-like' use, which derives mainly from transcriptions made of different music, which were then exchanged between music enthusiasts and also through musical education held on our two instruments. As Sebastian Pemler testifies with the entries in his diary written on 28 January 1749: «überseze einige teutsche tänz auf die mandor» and on the 10th of February in the same year, «Seze Menuets auß der Violin in die Mandora».[59] In contrast, chamber music generally has a higher artistic level, because creating a composition for multiple instruments required a more trained musician, that is why the name of the author who made the arrangement is often also stated. The surprising thing about this kind of music is that it is limited to four places with clear predominance of the Catholic clergy, such as the Prince-Bishopric of Eichstätt, the Bavarian court, Metten and the Weyarn monasterie.[60] Where the ensembles show an astonishing diversity: Duo's with two mandores; vocals and mandora; violin or transverse flute and Mandora; harpsichord and mandora and Trio's with violin, cello, mandora; transverse flute, viola, mandora; violin, bassoon, mandora as Quartets with violin, transverse flute, cello, mandora; transverse flute, bassoon, cello, mandora, up to groups of 15 instruments.[61] Finally, as we

57. VISSCHER, *Bavariae*, ca. 1715, historical map, http://digital.bib-bvb.de/webclient/DeliveryManager?custom_att_2=simple_viewer&pid=225694.

58. RIEDER, *Die Instrumentenstilleben*, pp. 45, 50, 68, Abb. 1 *Bildnis eines Hofmusikers mit Instrumentenstilleben*, 1762 [65: 80 cm], Bayerisches Nationalmuseum München, MU 280. P. 72, Abb. 5 *Bildnis eines Hofmusikers mit Instrumentenstilleben*, 1762, Bayerisches Nationalmuseum München, MU 281. P. 75, Abb. 8 *Der Violinist Johann Georg Holzbogen*, 1774 [90,1: 76 cm], Bayerische Staatsgemäldesammlungen, Inv-Nr. 4332, Bayerisches Nationalmuseum München (aus der Herzog-Max-Burg).

59. KIRSCH, *Mandora und Gallichon*, p. 70, 28 January 1749 «translate some German dance on the Mandor» and the 10th of February «Seze Minuet from the Violin into the Mandora».

60. *Ibid.*, p. 72.

61. *Ibid.*, p. 64.

approach the end of the century, we come across one of the last largest collections of manuscripts, where this chamber music in particular can be found, and as already mentioned in the city of the ancient music tradition, Eichstätt. Their dating dates back to the last decade of the century and for some unknown reason we find here a surprising homogeneity with that described by Janovka in 1701. Since the comparison with the parts in normal notation in the manuscripts containing two parts with the designation mandora shows that in this latter environment one instrument was again tuned in D_4 and one tuned in a peculiar way, a minor third lower in H_3.[62] So to speak, this latter reference to the very first tuning found for this instrument, along with the comment on the specific bold font used in Mattheson's script in connection with the word 'calichon' and, as we will see, the characteristics of Wenger's oldest and first documented instrument from 1714. Could then also confirm a demonstration that the first contact with our two entities in this geographical area comes from the two first mentioned historical regions. Even so, we see that a major lack of more in-depth information certainly contributes to the current situation in which these instruments find themselves today, which is sometimes conflictingly confusing. A condition that certainly does not improve when we note that the application of these nomenclatures has historically also been used interchangeably. Of which several examples exist, such as a manuscript from 1735 and now kept in Karlsruhe, D-KA Don Mus. ms. 1271/1, with the title «Gallischon: o Mandorbuch». Another manuscript in the Saxon State and University Library of Dresden, D-Dl Mus.2-V-7, for a duet, which on the title page reports the Mandora but on the individual parts indicates a «Galichono». As well the print «Florilegium omnis fere generis cantionum» of Adrian Denss, Cologne 1594, in the Bavarian State Library in Munich, 2 Mus. Pr93, bears a pasted-on title plate on which a librarian has written the following words, «testudinis» (lute), with the footnote «heutiges Gallischon oder Mandora».[63] With this it seems quite clear that from some point on, in this lattest region both nomenclatures were adopted for the instrument, about which another notation in Sebastian Pelmer's diary may give us a final insight, when he suggest to play two different lutes, meaning the «Mandor» and the «Gallichon».[64] So this can effectively imply that both names belonged to two different instruments, but from which point of view this happened is not clear today. The only two hypotheses we have about this are the difference between the use of double courses and single strings and/or depending on the size of the instrument, namely with the tuning in D_4 or in E_4. In order to get out of this now and to be able to give an interpretation in this work, it was decided to give the physical factor leadership and in doing so we continue to follow the principles that were first mentioned by Janovka. That the calichon should be physically the largest instrument and the mandora the smallest, since the difference in tuning is related to the string lengths and

62. PROSSER, *Calichon e Mandora*, p. 52.
63. KIRSCH, *Mandora und Gallichon*, p. 55, «today's Gallischon or Mandora».
64. *Ibid.*, p. 55.

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therefore their overall size, thus allowing us to interpret the original surviving instruments as follows. The first largest group are the smaller instruments with a total string-length between 650 mm and 750 mm, these are mandoras. Against that, the second smaller group are the larger instruments with a total string-length between 850 mm and 930 mm, those are calichons.[65] Having now reached to the conclusion of this paragraph, we first present two schematic tables of totalization data, that should further contextualize the information presented. One is based on the cataloging of only musical manuscripts by Dr. Pietro Prosser[66] and the other on the collection of information on a large group of original surviving instruments by Prof. Dieter Kirsch.[67] Knowing that these two works were made separately, to our surprise they have a very similar outcome, which leads us to deduce that a probable change occurred in the general situation of our instruments, from the 1740s onwards.

Table 3. *Musical manuscripts*

YEAR	TOTAL	GER.	AUS.	BO.
1690	1		1	
1700	4		2	2
1710	15	8	7	
1720	9	7	1	1
1730	11	10	1	
1740	58	16	42	
1750	17	14	2	1
1760	13	11	2	
1770	5		5	
1780				
1790	35	35		
1800	6	6		
Total	174	107	63	4

Table 4. *Original surviving instruments*

YEAR	TOTAL	GER.	AUS.	BO.
1690				
1700	2		2	
1710	2	2		
1720	4	1	3	
1730	8	5	3	
1740	23	13	9	1
1750	9	8	1	
1760	4	4		
1770	6	6		
1780				
1790				
1800				
Total	58	39	18	1

Finally, we provide references of indicative elements and data, in order to be able to relate the surviving original instruments with certain different tunings, which are inextricably linked to the pitch 'standards' that have always been associated with specific musical situations or instruments, in different

65. The fact that the original surviving instruments fall into these two groups, comes from the information gathered in the author's personal database, which was created through research conducted in various museums in Europe. Otherwise, a public list of surviving original instruments can be found here: https://accordsnouveaux.ch/de/instrumente/mandora-galizona-colascione.

66. PROSSER, *Calichon e Mandora*, pp. 138-239.

67. KIRSCH, *La mandora*, p. 330.

historical geographical areas as time periods. By this we mean that a pitch 'standard' is a set of several concepts: frequency value, note name and 'standard'. The pitch itself combines two separate coordinates, a frequency value and a note name, so we can define both A-440 Hz and A-415 Hz as a pitch in this case. These in themselves only become 'standards' when placed in a musical context, which is simply an agreement between musicians at a given time and place, that a particular pitch will be used as a general tuning reference. For example, if one uses the equal temperament and decide that the 'standard' or referential pitch is set at A-440 Hz, the note lower than this will automatically be a G at the frequency of 392 Hz, or otherwise a G at the frequency of 369,72 Hz when set at A-415 Hz and so on,[68] so it becomes the 'determining height' of the frequency of the notes to which to tune the instrument. The main problem or situation we face with historical pitch 'standards' is that several can exist at the same time and in the same place and even two to three different ones were used in ensembles at the same moment, which was very common in the 18th century. The root of this last problem or situation, historically, was the confrontation of traditional local instruments with the influence of new imported instruments from abroad, so their interim solution was to use transposing systems on some of the parts of the music.[69] As such, the historical pitch 'standards' were directly associated with the use of specific instruments in explicit musical contexts. In the areas we examined some of them were called «Chorton», the 'standard' for organs and brass instruments, and «Cammerton» for woodwinds and other instruments. Where in reality they only refer to a characteristic musical function, with associated instruments, but not to a specific referential pitch, which may be different in other historical geographical areas such as time periods, when they refer to those same 'standards'.[70] For example, «Chorton» was generally about 415 Hz for Praetorius but around 466Hz for Bach and by the 1730s there were German musicians using the same 'standard' to mean a frequency value of about 440 Hz, hence the need for background information on place, time and also musical field.[71] A very thorough research on this reality was done by Dr. Bruce Haynes, who in this particular historical time period, in connection with the areas discussed, provides the following referential pitches that are applicable to our study subject. Each of which has its own pitch 'level', that is the approximate center of their frequency value, which can vary by about four commas from the lowest to the highest extremes and what have been observed as intervariation between the studied historical instruments. Before giving an example of their use, one last physical consideration must also be kept in mind and that is that with a consistent relationship between the working index near the breaking point of the type of material,[72] and the physical vibrating length

68. HAYNES, *A History*, p. xxxiv.
69. *Ibid.*, p. xxxv.
70. *Ibid.*, p. xxxvi.
71. *Ibid.*, pp. xli-xlii.
72. KIRSCH, *The Long Lives*, pp. 145-147, «The maximum string length for a certain frequency can be calculated according to the material properties of the string and the applied

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of the strings, different pitch 'levels' and with this tunings can be related or 'transposed' to the instrument, without any necessary retuning. This is why each schematic list of pitch 'levels', represents the 'determining height' with which the documented tunings, through the consistent physical calculation above and for which we have used a working index of 235 m.Hz,[73] can be related to different vibrating lengths of the strings and therefore instruments. Hereby underlining once again the need to have the necessary background information described earlier to do so. With that we recall that the most documented tuning practice used for the top string of both instruments was in: E_4, D_4 and A_3, with the following less common notes also appearing in G_4, C_4 and H_3, which were always accompanied by the tuning intervals of a 4-ma.3-4-4-4.[74] So in reviewing all of this, the calichon described in the manuscript by James Talbot,[75] which had an indicated string length of 97-98 cm with a relative tuning of A_3, would therefore have been used at a referential pitch of approximately 480 Hz, according to our schematic list of pitch 'level' A+2, with 495 Hz value. A much approximately documented pitch 'level' for organs in these historic regions around the years 1700-1730 according to Haynes' work.[76] Additionally, the nine-course mandora by Daniel Achatius Stadlmann,[77] which is still in the possession of the Kremsmünster monastery, along with the associated music manuscripts that reflect a tuning in D_4 or E_4.[78] Can indicate that this instrument with a 73 cm string length was used at an average referential pitch of 480 Hz, according to our schematic list of pitch 'level' A+2, with 495 Hz value, when tuned to D_4 or a rough pitch reference of 430 Hz

> tensile force. According to many lute instruction books, the first string should be tuned just below the breaking point. Thus, for the tension just below the breaking point, an utilisation of 85-95% of the maximum tension is assumed. This limit can be described as the maximum working index. Using the Taylor's theorem, this index can be calculated. […] From this theorem, as Segerman has shown, the breaking index can be derived as a material constant. This means that strings of a certain material and length will always break at the same frequency, regardless of their diameter. […] Using this index, the maximum possible length for a string can be calculated using the experimentally determined tension and frequency at which a string of a material with a known density breaks. For gut, a density of 1350kg/m3 is assumed in most cases. Various – and not always consistent – statements can be found about the breaking strength to be determined experimentally. In most cases, gut strings of are assumed to have a maximum tensile strength of 340N/mm2. […] Since the breaking index is the product of length and frequency, it can be deduced that a string one metre long – regardless of diameter – breaks at a frequency of about 261 Hz. The maximum working index (WI) is defined as between 85-95% of the breaking index. For the following calculations, an index of 240 m.Hz (92% of the breaking index) is assumed. In order to calculate the maximum string length of a lute, the maximum working index is divided by the frequency of the highest string. The result will be the maximum length in meters».

73. A working index of 235 m.Hz, is the distance of an average semitone of 25 Hz from the breaking index of 261 Hz.
74. KIRSCH, *Mandora und Gallichon*, p. 65.
75. See n. 41.
76. HAYNES, *A History*, pp. 183-228, *Chapter 5, Germany, 1700-1730: Cammerton, Chorton, Cornetton.*
77. See n. 30.
78. See n. 29.

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when compared to our schematic list of pitch 'level' A+0, with 440 Hz value, when tuned to E_4, dependent on the musical context associated with it.

Table 6. *Schematic list of pitch level*

Pitch level	Hz value for A	Frequency range for A	String-length range
A+2	495 Hz	480-508	+1,7 cm-1,4 cm

Top string tuning	Frequence	String-length
G_4	441,81 Hz	53,1 cm
E_4	370,49 Hz	63,4 cm
D_4	330,68 Hz	71 cm
C_4	295,15 Hz	79,6 cm
H_3	277,3 Hz	84,7 cm
A_3	247,5 Hz	94,9 cm

Pitch level	Hz value for A	Frequency range for A	String-length range
A+1	464 Hz	453-479	+1,3 cm-1,9 cm

Top string tuning	Frequence	String-length
G_4	413,38 Hz	56,8 cm
E_4	347,61 Hz	67,6 cm
D_4	309,68 Hz	75,8 cm
C_4	275,9 Hz	85,1 cm
H_3	260,41 Hz	90,2 cm
A_3	232 Hz	101,2 cm

Pitch level	Hz value for A	Frequency range for A	String-length range
A+0	440 Hz	428-452	+1,6 cm-1,8 cm

Top string tuning	Frequence	String-length
G_4	392 Hz	59,9 cm
E_4	329,63 Hz	71,2 cm
D_4	293,66 Hz	80 cm
C_4	261,63 Hz	89,8 cm

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H_3	246,94 Hz	95,1 cm
A_3	220 Hz	106,8 cm

Pitch level	Hz value for A	Frequency range for A	String-length range
A–1	413 Hz	409-427	+0,5 cm-2,3 cm

Top string tuning	Frequence	String-length
G_4	367,94 Hz	63,8 cm
E_4	309,4 Hz	75,9 cm
D_4	275,64 Hz	85,2 cm
C_4	245,57 Hz	95,6 cm
H_3	231,79 Hz	101,3 cm
A_3	206,5 Hz	113,8 cm

4. Gregor Ferdinand Wenger

In 18th century 'Germany', artisanal work was regulated through arts and crafts guilds, wherein the situation for musical instrument makers in general was not always as obvious as we make it seem.[79] Guilds were usually entities that functioned similar to chambers of commerce, each with its own category of associated profession. In this sense, each of them focused on equally maximizing the volume of commercial exchanges and therefore on the benefits deriving, from being able to support only those belonging to their own category within a given city. All this while ensuring the quality standards of workmanship with a regulation that also maintained a controlled number of operational workshops of its category within the same city, which was ensured with a continuation through an apprenticeship training system.[80] The exceptional fact is precisely this, that guilds of a certain category were founded only, if in a particular city, there was essentially a sufficient group of people who belonged to them and who therefore, in aggregate form, could confer them sufficient internal political power and economic resources. Thus, musical instrument makers being more often than not a small number, it was more common for them to join other groups of similar professions to create a section within one of the larger guilds.[81] When their amount was even

79. MARTIUS, *Leopold Widhalm*, pp. 43-47, KRICKEBERG, *Bemerkungen zur gesellschaftlichen Stellung der Geigen- und Lautenmacher im* Nürnberg des 18. *Jahrhunderts.* HELLWIG – HELLWIG, Hg., *Joachim Tielke*, pp. 31-37, *Zur Organisation der Werkstatt Tielke.* FONTANA *et al.*, Hg., *Martin und Johann,* pp. 20-37, FONTANA – HELLER, *Leipziger Instrumentalisten und Musikinstrumentenbauer im Umfeld der Werkstatt Hoffmann.*

80. BOUQUET, *Reconstructing a lute*, p. 91.

81. *Ibid.*, p. 93.

smaller, they worked as «Freimeisters»,[82] that is, as freelancers who depended exclusively on their ability to respond to market demands. As far as we know, only two specific guilds of musical instrument makers are documented, at least in 'Germany', that of Füssen in 1562 for lutes and that of Markneukirchen in 1677 for violins.[83] Whatever their legal position was, they were not able to perform all the operations necessary for their work because, some of these belonged to other professions and were therefore protected by other guilds. Which were also divided from the point of view of whether or not it was possible to use certain types of different materials and/or equipment, which were directly linked to each of these different professions.[84] This meant that parts of their instruments were often already worked out in broad terms when they arrived in their workshop and therefore, they essentially had to refine and assemble them according to the situation of need.[85] In any event, these three different legal positions can manifest themselves in the following ways. When working within a dedicated corporation, as in Füssen or Markneukirchen, one can essentially speak of a 'school'. In this sense one also finds a sort of aesthetic style in the work which is 'standardised' and can be identified as if all the instruments could come from the same single workshop. Instead, within a corporation of similar profession, perhaps certain aesthetic aspects resemble each other because they followed the fashion of the moment, but other details could be personalized because they acted as a signature for the work of one's own workshop, because no 'school' to a certain type of aesthetic style existed.[86] The most 'free' situation, so to speak, is when it was set up as a freelancer, were we can find an aesthetic style that becomes almost typical only of that particular maker.[87] Nonetheless, all these workshops simultaneously made different types of instruments, both bowed and plucked. The underlying impact that such a wide variation creates, is that it not only makes sense that a standardized way of building is no longer optional, but rather becomes necessary within their organization. Therefore, we will analyse precisely this last aspect, as it can give us a hypothetical definition through the uniform concepts and design principles underlying these instruments. Because these are not subject to the influence of any temporal aesthetic style, but rather to the spirit of the times regarding the philosophy of world conception, which was based on a determined kind of rational order and what reflected on

82. HELLWIG – HELLWIG, Hg., *Joachim Tielke*, p. 33.
83. *Ibid.*, p. 32.
84. BOUQUET, *Reconstructing a lute*, p. 93, «The other technique that belonged exclusively to the cabinet makers was the use of glue».
85. HELLWIG – HELLWIG, Hg., *Joachim Tielke*, p. 33, «Instrumentenmacher, die solche von den Tischlern beanspruchten Arbeiten selber verrichteten, wurden als «Bönhasen gejagt». «Instrument makers, who carried out the work required by the carpenters themselves, were hunted down as bunnies».
86. This is directly evident in the two final ends of the external counterclasp of the bowl back, which are decorated depending on the workshop in which the instrument was made, as well as to a lesser extent in the decorative tips of the bridge as parts of the peg-box.
87. HELLWIG – HELLWIG, Hg., *Joachim Tielke*, pp. 55-92, *Der Dekor der Instrumente*.

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everything they created, as documented by historical sources.[88] At that time, Gregor Ferdinand Wenger married the widow of the Augsburger luthier Jakob Philipp Fichtl on the 23rd October of 1701, with which he acquired his own workshop.[89] His legal position could have been comparable to the situation of the luthier Sixtus Rauwolf, a hundred years earlier in the same city, as part of a larger corporation with a similar profession, namely cabinet makers.[90] From whom, Like his colleagues Joachim Tielke in Hamburg,[91] the Hoffman family in Leipzig[92] and Sebastian Schelle with other Nuremberg workshops,[93] we have a large example of surviving instruments. Such as violins, pochettes, viola d'amore,[94] and conversions of old lute bodies into the current 11-course version in use at the time.[95] As also the types of instruments of interest to us in this study, a calichon from 1714, a 11-course lute from 1722 and a mandora

88. See: 2 Sources, especially with reference to the treatises of Mersenne and Baron, making mention to the concept of harmonious proportions.
89. See n. 14.
90. BOUQUET, *Reconstructing a lute*, p. 93, «There is no evidence of the existence of an equivalent guild in Augsburg, instead instrument makers were members of the guild of cabinet makers».
91. HELLWIG – HELLWIG, Hg., *Joachim Tielke*, pp. 99-393, *II. Beschreibendes Verzeichnis der Instrumente der Werkstatt Joachim Tielke,* showing lutes, mandoras, angéliques, guitars, Hamburg Cithrinchen, pochettes, violins, viola d'amore, viola da gambas and barytons.
92. FONTANA *et al.*, Hg., *Martin und Johann*, pp. 277-405, MARTIUS, *Katalog,* showing lutes, viola da gambas, violins, and conversions of old lute bodies into the current 11-course version in use at the time.
93. MARTIUS, *Leopold Widhalm*, pp. 114-177, *Darstellung einzelner Instrumente,* showing violins, viola da gambas, lutes, a mandora, a theorbo and also conversions of old lute bodies into the current 11-course version in use at the time.
94. In the Germanisches Nationalmuseum in Nürnberg, we have a violin from 1754 with Inv. N. MI239, visible at: http://objektkatalog.gnm.de/objekt/MI239. At the Musikinstrumenten-Museum in Berlin, they hold a viola d'amore from 1718 with Inv. N. 4141 and in the Cité de la Musique in Paris, there is a pochette from 1706 with Inv. N. D.OA.161.1, visible at: https://collectionsdumusee.philharmoniedeparis.fr/collectionsdumusee/doc/MUSEE/0158513/pochette-bateau.
95. BOUQUET, *Reconstructing a lute*, pp. 123-147, the author in his work shows a lute made by Sixtus Rauwolf in 1577, nowadays at the «Fuggermuseum im Schloss», in Babenhausen. Which bears four different labels attesting to different phases of renovation and repair, from which one documents the first renovation done on it by Gregor Ferdinand Wenger in 1705, to a 11-course version, as indicated on its label with the additional handwritten word «renofierd». Commenting on it all with the next argument, on p. 133, «The current neck is made of an unidentified wood veneered in ebony, and it has an arched ebony fingerboard which by its shape and style can also be attributed to Wenger».
KIRSCH, *The Long Lives*, p. 266, indicates a lute with a label which reads, «IN VENETIA (ms. 164?) // MARTINUS SELOS GERMANUS», preserved today at the Germanisches Nationalmuseum in Nürnberg with Inv. N. MINe262. Bearing a label from Gregor Ferdinand Wenger with a indicative date of 1709, attesting the transformation done to a 11-course version of the instrument, observed from the remaining fingerboard points and as reported on its label with the additional printed word «Reparavit». Commenting on it that it «shows that repairs and modifications were a big part of his business». This instrument is visible on the online catalog of the museum: http://objektkatalog.gnm.de/objekt/MINe262.

from 1726 (Figure 1).[96]

Figure 1. The calichon from 1714, the 11-course lute from 1722, the mandora from 1726.[97]

From this we can immediately see the range of his output, of instruments belonging to the lute family that have the same basic construction, but differ in their strings and tunings. The 11-course lute is an instrument that was already defined around 1650-70 and emerged from the earliest response in lute making to the changing needs of lutenists. That of adapting lutes to accommodate the ever-increasing number of bass strings required for the new music of the seventeenth century,[98] beginning with the 7-course lute around 1580 ca. and after,[99] so it reflects the continuation of an old tradition. With which the French began experimenting around 1610 on the 9- and 10-course lute, through changes in tunings, string lengths and added bass courses. This led to a renewed appreciation for old lutes made in the first half of the sixteenth century, as praised by Mersenne. Which with the addition of new, longer and wider necks, larger pegboxes and wider bridges could easily be adapted to

96. The calichon from 1714 is preserved in a restored state in a private collection in Italy, the 11-course lute from 1722 is part of a private collection in Swiss, also in a restored state and the mandora from 1726 is today in the collection of The Metropolitan Museum in New York with Inv. N. 89.4.3140, observable at: https://www.metmuseum.org/art/collection/search/502848.
97. Photograph of the 1722 lute by Paul Thomson and the 1726 mandora by Jonathan Santamaria Bouquet.
98. LUNDBERG, *The German Baroque Lute*, p. 2.
99. LOWE, *The Historical Development*, p. 12.

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their contemporary experimentation and use.[100] Ultimately, the 11-course lute is determined with an open tuning of min. 3-4-maj. 3-min. 3-4 intervals and a neck, which gives a length of at least 9 to 10 effectively mounted gut frets,[101] characteristics that will remain from then on until the lute's decline. This is also the case when the last two bass courses were eventually added around 1719 ca., by request from Silvius Leopold Weiss to the maker Thomas Edlinger in Prague, since the impetus for the 13-course lute was not technical but musical.[102] Here in 'Germany', as in France, everything related to the 11-course lute started also with the adaptation of old lutes and this only from 1660, after the end of the Thirty Years' War (1618-1648). In contrast to this first phenomenon, the exceptional 11-course lute from 1722 by Wenger belongs to what Lundberg calls the last stage of the German Baroque lute, namely with newly built instruments inspired by these old lutes.[103] Which this instrument is proof of, as Wenger puts no emphasis on his label of «renofierd» or «reparavit» and it contains no other documentable historical modification.[104] This is reinforced by the same features of performance techniques that are analogous to other instruments of his workshop and that the underlying concept and design principles are not only the same as these but also constitute a fundamental key in this research study.[105] This particular instrument with its vibrating string length of 76.4 cm, when we assume that it is tuned in the key of F_4, was being used at a referential pitch of approximately 392 Hz, according to the pitch 'level' A-2 in Haynes work.[106] A pitch indicated for the «Ordinari» lute by Ludwig Wenzel von Radolt, in his lute concert «Der Aller Treüesten Freindin» and named as «tief-Cammerton».[107] Like our two antagonist, the 11-course lute was used in both solo and chamber music, until it gradually fell into disuse from about 1750 ca. onwards. Instead, the mandora and calichon

100. LUNDBERG, *The German Baroque Lute*, p. 2.
101. LOWE, *The Historical Development*, pp. 11-25, The author makes a study of the experimental evolutionary period of the lute, starting from 1600 and this primarily in France. Demonstrating that lutes from the sixteenth century are modified to new needs and how this happens, especially in connection with the 11-course lute. Previously the lute had tuning intervals of a 4-ma.3-4-4-4 and a neck which gives a length to only 8 effectively mounted gut frets.
102. LUNDBERG, *Weiss's Lutes*, p. 37.
103. *Ibid.*, p. 5.
104. See n. 95. This instrument only bears a modern label by Hans Jordan from Markneukirchen of 1938, about which Paul Thomson writes in his restoration report that only the current bridge and pegbox could eventually be modern, excluding the fact of a possible modification to an 11-course lute by the latter.
105. See: 5 Construction, features and characteristics of the instruments, for a more in-depth analysis of similar performance techniques among the instruments from his workshop, especially regarding the technique of applying the veneer to the back of the neck, the rose pattern and the endclasp 'termini'.
106. HAYNES, *A History*, pp. li-liii, *o-2b A Terminology for Pitch Levels*, where the author explains his parameters and references to describe and decide the different pitch levels used in his work.
107. *Ibid.*, p. 24, provides pitch reference information, highlighted by historical documents and instruments, in this case on lutes.

always have tuning intervals of a 4-maj.3-4-4-4 and a reduction in the number of strings compared to the current lute of the time. At first glance, no further differences are noticeable in their basic construction, as the mandora also has the same characteristic neck as the lute, with only that of the 1714 calichon differing. Taking a closer look at this last peculiarity, we return once again to the first historical regions in which they were documented. By means of the «colachon» described in the Talbot manuscript, which gives measurements of what is a neck length that can accommodate approximately 12 effectively mounted gut fret, just like our calichon, and this together with the tuning in A_3 brings us right back to the treatise of Janovka.[108] Most likely, this 'type' of calichon is more closely related to the first documented tradition and therefore to the tuning practice used for the top string in A_3, from Janovka and H_3, C_4 in other special cases, such as the single and/or double string arrangements. Due to the fact that the total of four surviving instruments, the first three were established in the time period 1688-1714. With the exception of the last one from 1728, which can be logically explained if we know that it comes directly from the first historical region, where this 'original' tradition can continue longer. As also one and the other present this kind of neck with one of the described alternated string dispositions, which in relation to their long vibrating string length, can be associated with the mentioned tuning keys when applied to an approximately referential pitch going from 464 Hz to 500 Hz, according to our schematic list of pitch 'level' A+1 and A+2.[109] Referential pitches which are documented in this geographical area as time period on original organs in the work of Haynes.[110] Knowing this, the mandora of 1726 could have been tuned in E_4, with a calculated hypothetic string length of around 68 cm, since this instrument has a new bridge and soundboard in which the original rose by Wenger has been inserted in a too high position.[111] Now, before reviewing the materials, specific features and construction details of Wenger's instruments in any depth, we prefer to first analyse their underlying design concepts and principles. Because they can ultimately give us a more reliable hypothetical definition of what may lie beneath the apparent basic construction, for which we have already specified that the bowls or bodies are the most important parts to begin with (Drawing 1).

108. See n. 41.

109. Johann Schorn, Salzburg, 1688, string disposition: 6 single strings, string length: 887 mm, neck length: ca. 432 mm, body length: ca. 535 mm, Salzburger Museum Carolino Augusteum, Inv. N. B 6/2; Heinrich Kramer, Wien, 1704, string disposition: 8-courses, string length: 936 mm, neck length: ca. 486 mm, body length: ca. 530 mm, Grazer öffentliche sammlungen, Inv. N. KGW 355; Gregor Ferdinand Wenger, Augsburg, 1714, string disposition: 5-course, string length: 857 mm, neck length: 404 mm, body length: 564 mm, private collection Italy; Thomas Edlinger, Prag, 1728, string disposition: 6 single strings, string length: 895 mm, neck length: 473 mm, body length: 517 mm, Narodnì Muzeum, Prague, Inv. N. 1176E.

110. See n. 76.

111. See Appendix I for its principal measurements and Appendix II for a historically correct informed placement of the rose. After that, it is also evident that the grain of the original rose does not match the grain of the current soundboard.

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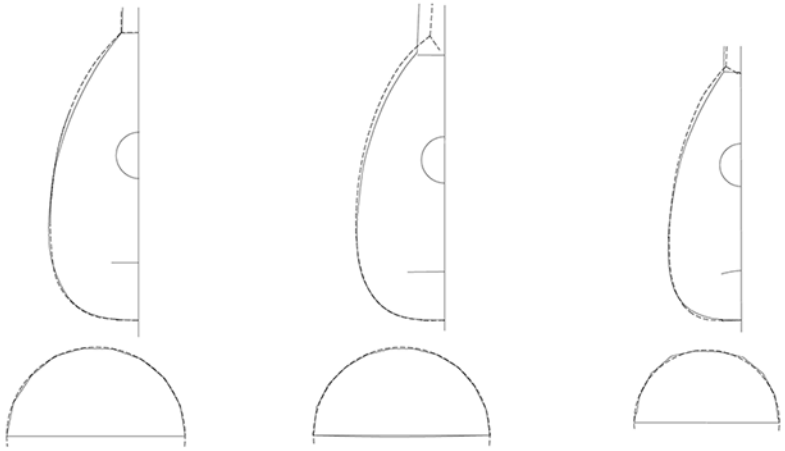
- In the upper section of Drawing 1: the full line represents half of the outline of the soundboard; the dashed line is the longitudinal cross-section of the bowl.
- In the lower section of Drawing 1: the full line is the lateral cross-section of the bowl taken at its widest point; the dashed line represents a semicircle with a radius half of the body width.

We can see from these patterns that the maker employed the same basic design concept with each (different) instrument. A semi-circle is the basis for the widest lateral cross-sections and the neck-joint areas are all slightly bulbous on all the instruments. The longitudinal sections with this bulbous portion mirror the designs of other German-made lutes dating from c.1660/70 onwards (i.e., after the Thirty Years War), perhaps influenced by Paduan and Venetian lutes that have this feature.[112]



Drawing 1. Longitudinal and lateral cross-sectional views and soundboard profiles of Wenger's three earliest instruments.

The evidence that Wenger used a basic, uniform design is even clearer when we examine the soundboard barring system (Figure 2).[113] If we inspect

112. See more about this fact of Paduan and Venetian influences in the lutes constructed in this period, in the work of LUNDBERG, *The German Baroque Lute*, see n. 5 above and on the specific longitudinal section of these bowls in LUNDBERG, *Historical Lute Construction*, p. 22, where he demonstrates this with drawing Figure 9. as an example of this Padovan style. Instead, for a very early example of a newly-built lute in this historical period in current Germany, with a body inspired by the Padovan-Venetian school see: HELLWIG – HELLWIG, Hg., *Joachim Tielke*, pp. 399-400. Gottfried Tielke, Königsberg, c.1670, body measurements: L. 51 cm/ W. 33.4 cm/ D. c.16 cm, Hamburg, Museum für Kunst und Gewerbe, Inv.N. 1983.264a.

113. For this purpose, a table was created which allowed a statistical cross-check of the correlations of the calculated theoretical positions of roses and bars for the different possi-

the barring of the two example instruments (Figure 2), we see that:

- The barring layout of the 1714 calichon has been modified by additions, but is otherwise original. Additions include four extra transverse bars and a flat 'bridge-plate' reinforcement on the underside of the soundboard beneath the bridge. A typical construction method linked to a more modern type of guitar bridge, of which this instrument bears a label by Georg Tiefenbrunner from Munich of 1904.
- The original barring layout on the 1722 lute is clearly visible, as seen from the remaining bars and relevant signs/marks on the soundboard. However, the layout has been changed by fitting two new bars and moving the first bar, (originally in front of the bridge) backwards towards the rear of the lute.[114]

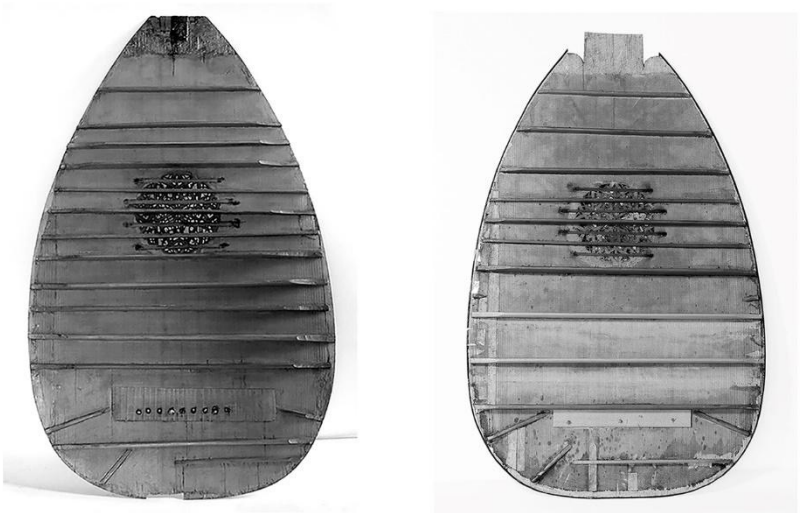


Figure 2. Inside views of the soundboards of the calichon of 1714 and the 11-course lute of 1722, showing actual barring.[115]

In 1635 Mersenne describes the applied principle of dividing a soundboard into equal parts as a basis for locating the rose and bar positions in the practice of lute making.[116] This principle was probably well known and widely practiced by instrument-makers, although workshop tradition, specific modifications and adjustments as well as manufacturing innacuracy, must have played a role in the resulting constructions.[117] Wenger was the heir to several

ble distribution regimes.

114. A possible author of this modification work could be Hans Jordan from Markneukirchen in 1938, see n. 104.
115. Photograph of the 1722 lute by Paul Thomson.
116. See: 2 Sources, especially with reference to the treatises of Mersenne and n. 4 above.
117. See: 2 Sources, especially with reference to the work of Hellwig and n. 13 above.

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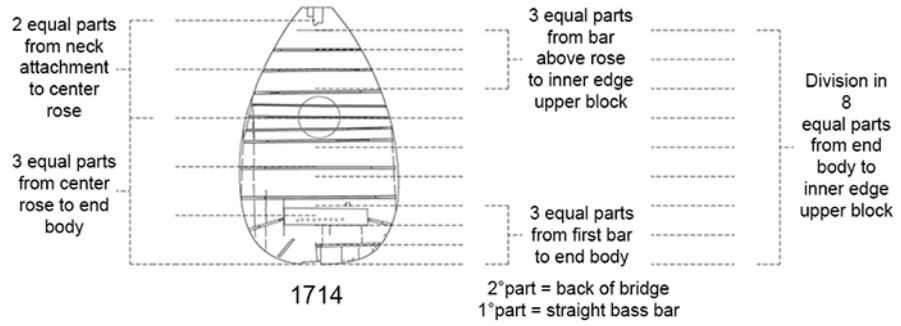
workshop traditions by marriage and was presumably well-versed in traditional instrument manufacturing practices.[118] From which the known barring layouts of other instruments appear to have the same basic pattern:

- They all have six principal transverse bars, distributed as three transverse bars placed below and three transverse bars placed above the rose.
- The 1714 and 1722 instruments have three smaller transverse bars across the rose, while all the others only have one.
- The actual placement of the bar positions was always based on dividing the soundboard centre-line into 8 equal parts with the rose falling on the 5thdivision line. Note however that he adopted two different datum points to make his division of eight as we describe later.
- The minor barring arrangement behind the bridge evolved during Wenger's working life. The first style we meet consists of two 'treble bars' and two straight 'bass bars', which have the same purpose as the previously commonly used 'j' bar system, as seen on the 1714 and 1722 instruments, later on we see a 'fan-bracing' type of barring layout in this area.

If we imagine the activity in a busy workshop producing many different types of instruments, it seems logical that a standardised method of layout and applying bars to multiple soundboards was adopted and Wenger's system seems to be exactly that.[119] However, we do know that in a dynamic working environment variable accuracy, manufacturing imprecision as well as in-production changes are all factors that we should consider in our more detailed analysis. With this in mind, we can begin to analyse the soundboard of the 1714 calichon (Drawing 2), where we observe the following:



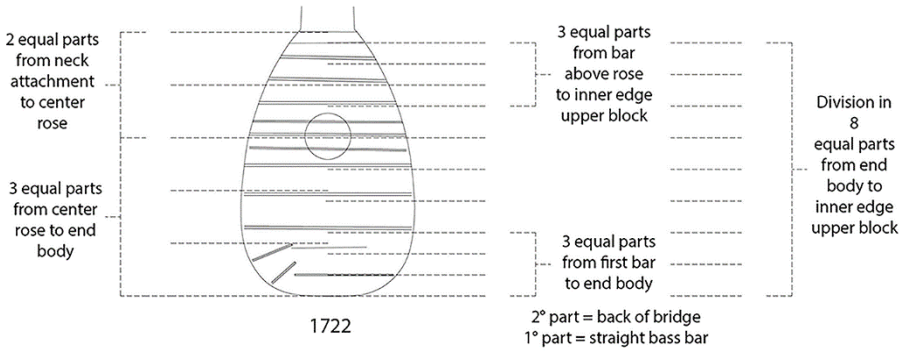
Drawing 2. The 1714 calichon barring, comparing theoretical layout and actual bar positions.

- Using the basic layout method, we divide the soundboard centre-line into eight equal parts, starting from the lower edge of the body to the

118. See n. 14.
119. See more about this in the introduction to this paragraph, about the legal organization of the musical instrument makers in 18th century Germany.

inner-edge of the upper-block and with the rose located on the 5th division line.
- We then divide the space between the 6th line (first bar above the rose) and the inner-edge of the top-block into three, providing the locations for two more bars.
- Next, we divide the space from the soundboard lower end to the 2nd line (bar in front of bridge) into 3, giving the locations for the back of the bridge and a straight bass bar.

The observant reader will notice that this theoretical layout scheme, although substantially corresponding, is not exactly identical to the real instrument. Firstly, the three main bars below the rose have evidently been individually moved upwards towards the upper block by about 14 mm. Which might be logical, given that it is only a 5-course calichon and that the bar in front of the bridge is 15 mm high, one could conclude that the manufacturer wanted to 'free up' the main soundboard area to increase its vibration potential. Secondly and most importantly, since this basic layout scheme is aligned to the inner-edge of the upper-block, we know that it is still a subdivision that needs to be closed as a whole with the body at the neck-attachment. However, on this calichon the rose and with it the bars, are too far behind this reference point and apparently out of place, so to understand why we must look at Wenger's lute of 1722 (Drawing 3).



Drawing 3. The 1722 lute barring, comparing theoretical layout and actual bar positions.

Just as with the 1714 calichon, Wenger used a theoretical layout scheme for the placing of the bars on this 1722 lute, based on an equal division of 8, measured from the lower edge of the body to the inner-edge of the upper-block, with the rose centre lying on the 5th division line. The obvious difference here is that the rose with this sits in a perfect 3/5th relationship between the neck-joint and the lower body edge. Meaning that in fact the neck joint, the rose and with it the bars are in perfect proportional relationship with the body as a whole. Which is a historical reliable 'harmonious' proportional relationship

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which agrees with the applied principles described by Mersenne and documented by Hellwig's work,[120] as also other contemporary makers.[121] So we can simply conclude that Wenger fitted this lute neck and it is original to this instrument.[122] However, we do observe some difference between the theoretical and the actual placement of all the transverse bars relative to the rose centre, as they are all slightly shifted upwards. One logical explanation for this apparent displacement suggests itself when characteristics of the soundboard are summarily considered. The thickness arching of 2.25-3.25 mm across its width, together with it being a relatively thick soundboard, suggests that the maker may have decided to place the bars further up in order to give more vibration potential to the 11-courses. This may seem an inappropriate adjustment, considering the relatively high total amount of tension on the strings, but the larger 11-course bridge already imparts an additional mass and stiffness locally that would theoretically balance out the forces at work. Now returning to the above stated historical reliability of these proportional relationships and therefore confirming that the neck-joint of the 1714 calichon is not where expected, neither in relation to the barring layout nor to the rose. We can deduce that the body of the 1714 calichon was originally constructed on a lute mould and that the proportions and layout, in relation to the neck-attachment, were altered precisely to create this unique instrument at the time. This phenomenon would fully reflect the reality documented and presented in the previous paragraph, where from the modest amount of musical and lexographic testimonies present in this phase, we can perfectly assume that the mandora and the calichon were not widely used instruments, and that the lute was still the most widespread instrument in this particular historical period and geographical area. This question becomes even more logical when we consider the fact that the two conversions of old lutes, documented by Wenger's work, are still to 11-course lutes.[123] Therefore, Wenger's workshop relied on existing lute moulds to make the few calichons and mandoras ordered.[124] Those moulds required the use of large upper-blocks, as we will

120. See: 2 Sources, especially with reference to the applied principles by Mersenne and Hellwig on p. 7.

121. This proportional relationship between the neck-attachment, barring layout, inner-edge of the upper-block and corresponding 3/5th rose position relative to total body length, can also be observed in the following instruments of the same period: Sebastian Schelle, Nürnberg, 1728. Nürnberg, Germanisches Nationalmuseum, Inv.Nr. MI 574; Martin Hoffmann, Leipzig, 169?. Nürnberg, Germanisches Nationalmuseum, Inv.Nr. MI 245; Johannes Seelos (?), Linz (?), 1699. Paris, Musée de la musique, Inv.Nr. E.540.

122. See n. 105.

123. See n. 95.

124. The probable use of existing lute moulds for the making of mandoras can also be observed in the work of Wenger's contemporary Johann Blasius Weigert from Linz. Two known instruments of his, one of which is an 11-course lute of 1721 (?) in the Germanisches Nationalmuseum with Inv.N. MIR898, http://objektkatalog.gnm.de/objekt/MIR898, and the other an 8-course mandora of 1743 in the Musée de la Musique, Inv.Nr. D.AD.32032, https://collectionsdumusee.philharmoniedeparis.fr/collectionsdumusee/doc/MUSEE/0130442/colachon, show comparatively close overall dimensions, proportions and number of ribs, such that they appear to have been made on the same mould.

see on both his lute and this calichon, where we find further evidence of this hypothesis when we look more closely at the upper-blocks (Figure 3).

Figure 3. Upper blocks of the calichon of 1714 and the lute of 1722.[125]

The 21 mm thick, large upper-block of the 1722 instrument is what one would normally expect to see on a lute. The smallest possible upper-block with lowest mass is usually desirable on an instrument. This offers least restriction to the vibrating soundboard. However, structural stability requires that it be large enough for secure attachment of the ribs, so sufficient gluing surface-area is required. The block must also anchor the neck, preventing in some way forward movement under string-tension. These are typical characteristics of a upper-block designed for a traditional large, old-style lute neck. On the other hand, on the calichon we see a large upper-block of 50 mm thickness, because it has a longer neck that has a greater tendency to pull forward under string-tension, which could seem plausible if it weren't for the large upper-block of 45.5 mm thickness on the 1726 mandora.[126] So, knowing the legal conditions of the corporations at the time, all instrument parts arrived at the workshop, already in a roughly processed form. This coincided with the observation of the complex organization of these workshops, where different types of instruments were built and therefore a standardized way of working was applied. Many units of measurement associated with certain parts of these instruments are therefore fixed up to a certain point.[127] This allows

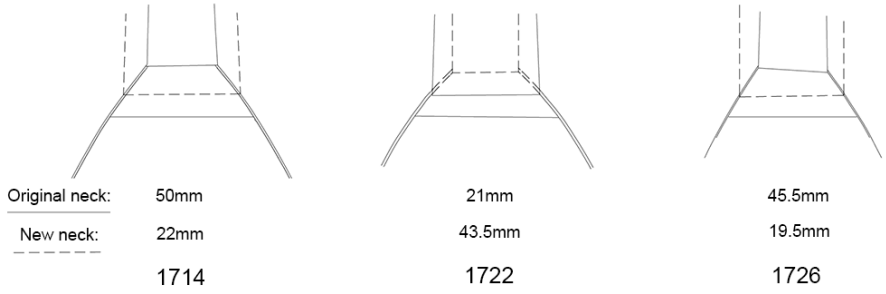
This could eventually be confirmed through a closer investigation.

125. Photograph of the 1722 lute by Paul Thomson.

126. The measurement of the upper-block of the 1726 mandora comes from a drawing made by Steward Pollens in 2004, which shows the interior of the instrument via an x-ray taken. Beyond this we can also see that the bars currently present on his soundboard are not at all representative of Wenger's work. Which are three transverse bars placed below and two transverse bars placed above the rose, all placed without any reference to its body. Furthermore, in the area below the bridge, there is no presence of any type of bars, which suggests that all this is rather a poor replacement of the soundboard, attributable to more modern 'practice'.

127. The fixed measurements in combination with the widest point of the lute neck circum-

us to reliably overlay the 11-course lute neck outline with its widest point on the upper-blocks of the calichon of 1714 and the mandora of 1726, noting that these three large upper-blocks were created on lute moulds and adapted to accommodate necks for different instruments (Drawing 4). In the case of the calichon body from 1714, the previously described equal division layout ultimately becomes one whole with the body, in addition to the fact that we can deduce that this mould would originally have been used for making lutes with a string length of ca. 780-800 mm. This meant that the lute mold from 1722 could have been used to make a calichon with a string length of approximately 850 mm and the mold used for the mandora from 1726 would originally have served to make a lute with a string length of ca. 650 mm.[128] This goes hand in hand with taking into account the typical characteristics of the necks of these instruments, which have a neck length of approximately 12 effectively mounted gut frets for the calichon and 9 to 10 for the lute. As such, the uniform results shown in Drawing 4 could more than support this hipothesia.



Drawing 4. Showing how large upper-blocks, normally fitted on lute moulds, were size-adapted for different instruments. Solid lines indicate the existing necks and upper-blocks, dotted lines indicate alternative necks applied to the same upper-blocks.

Subsequently, our two entities become more popular in the 1730s, as evidenced by the increased number of original music manuscripts as instruments, which are shown in our two totalization tables previously presented. As we will see, Wenger, on the other hand, still used lute moulds on which to

ference are important for this topic, which provide a uniform standard. Of which HELLWIG – HELLWIG, Hg., *Joachim Tielke*, pp. 99-393, in the section *II. Beschreibendes Verzeichnis der Instrumente der Werkstatt Joachim Tielke,* displays the next minimum unit of measure of 96-98 mm and maximum of 106-109 mm; FONTANA *et al.*, Hg., *Martin und Johann,* pp. 277-405, MARTIUS, *Katalog,* displays a minimum of 96 mm and maximum of 104 mm; MARTIUS, *Leopold Widhalm*, pp. 114-177, *Darstellung einzelner Instrumente,* displays a minimum of 95 mm and maximum of 104 mm.

128. Along with this hypothetical small lute are two documented original ones; Sebastian schelle, Nürnberg, 1726, string disposition: 13-course, string length: 655 mm, Yale Collection, New Haven, Inv.N. 4559.1960, https://music.yale.edu/browse-collection/lute-45591960; Andreas Berr, Vienna, 1699, string disposition: 13-courses, originally 11-courses, string length: 650 mm, Museum of Fine Arts, Boston, Inv.N. 1986.7, https://collections.mfa.org/objects/51267/lute?ctx=7a549b3d-acb7-4360-b771-deabfc66da42&idx=66.

make his mandoras, but which, with the apparent beginning of some design changes, means that our instrument is entering a marked change and is now starting to be considered more in its own right. In the next decimal time period we have two instruments, one from 1733 and one from 1739.[129] We are leaving out the instrument of 1733 because there are aspects of its modifications that still require more research and further evaluation. In contrast, the preservation of the 1739 mandora is so good that its original design and construction features are fully accessible (Figure 4). According to some observations made in other places,[130] we could consider this mandora of 1739 as 'typical', because of the black lacquer on the bowl, which supports this view. Although, the typical characteristic of this black lacquer, can indeed be linked to the use of any particulate instrument in an ecclasiastic environment, this is not necessarily the norm for our two entities.[131] Be that as it may, by analysing the barring layout of the instrument of 1739, as well as noting its large thick upper-block (measured at 43-45 mm thick) we can see that this instrument was still made on a lute mould. However, we meet a distinctive feature in the barring layout of this instrument. Apparently, Wenger divided his soundboards into equal parts using two different datum points. For large body instruments with a total body-length (end of the body to the neck-attachment) of 500 mm or more, the equal division in 8 ends at the inner-edge of the upper-block. With its layout scheme that fits in with the entire body, due to the relation of the rose position in 3/5th to the neck-attachment. For smaller body instruments with an overall body-length of less than 500 mm, the equal division into 8 ends directly at the neck-attachment point. This means that on smaller instruments the rose is higher up the body than on the bigger instruments. Using either of the two datum points the rose is similarly placed on all his soundboards, an average proportional location of 3/5ths of the string-length, which suggests that the rose's position was optimised according to that criterion.[132]

129. The instrument of 1733 is part of a private collection in England and the one of 1739 is preserved at the «Castello Principesco», Merano, Italy, Inv.N. 6840.
130. Private correspondence. Name suppressed in the interests of privacy.
131. In the work by KIRSCH – MARTIUS, Hrsg., *Die Lauten*, pp. 24-31, is a lute by Jakob Langenwalder from Füssen of 1627 displayed in the general catalog, which underwent a conversion by Matthias Greimbl from Kremsmünster in 1678 into a 11-course version and still preserved at the Kremsmünster monastery with Inv. Nr. 4, with a bowl completely covered with this type of black lacquer.
132. This feature poses the following question: is the position of the centre of the rose only determined by this division of the 'soundboard' into equal parts, or is it connected and therefore a consequence of the overall geometric design of the body itself? This would be an interesting area for further study incorporating eventually historical units of measurement. Further calculations for these proportional locations can be found in Appendix III in this work.

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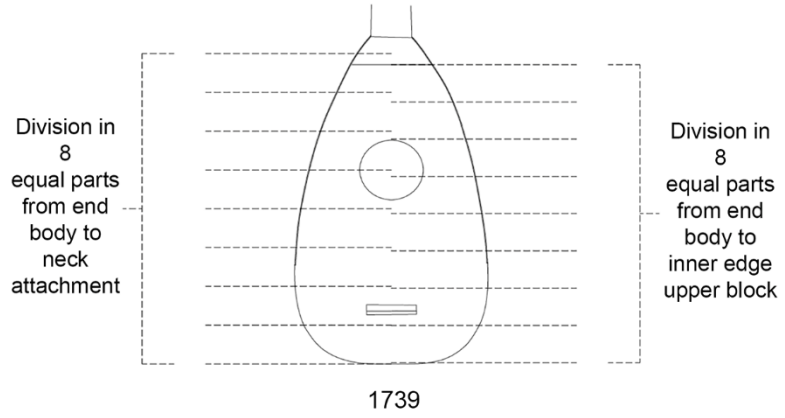
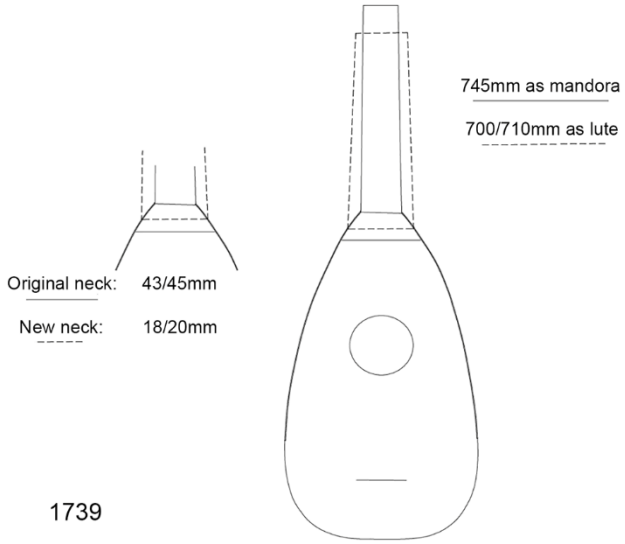
Figure 4. Composite views of the 1739 mandora with the black varnished bowl.

The 1739 mandora has a body length of 512 mm, so we initially expected the equal division in 8 to end at the inner-edge of the upper-block, but if we do that the 6th division (the first bar above the rose) is geometrically compromised by the rose itself (Drawing 5).[133] If we take the rose center as a reference, we can see that a 5/8th division falls exactly where an 11-course lute neck (similar to the 1722 instrument) would fit. This means that the equal division into 8 used on this 1739 example, actually ends at the neck-attachment point, the layout scheme used for smaller instruments. So we can conclude that this 1739 instrument was created on a lute mould as the total body-length would have been only 487 mm if made as a lute. The barring layout scheme confirms this, as it could be intended for a lute with a string-length of about 700-710 mm, when a similar lute neck to the 1722 lute is overlaid, for which the thick upper-block supports this theory (Drawing 6).

133. In addition, the position of the rose center goes also beyond our default parameter of 10 mm, with a calculable position of 292 mm in confront of its actual placement of 304 mm. Deriving from the total length of the body, 512 mm, having removed the thickness of the upper block of 45 mm, divided into 8 and multiplied by 5. See Appendixes I and II in this work for a critical discussion.



Drawing 5. The 1739 mandora soundboard comparing the equal division into 8 to the neck attachment (left) and to the inner-edge of the upper-block (right).



Drawing 6. The 1739 mandora with its current original neck (solid lines) overlaid with a 'new' lute neck (dotted line). Note how the upper-block changes to the same uniform results of the 1714 calichon and the 1726 mandora.

Moving on, the notable design development on this instrument is the new neck shape, especially when compared to the earlier mandora of 1726 (Figure 5), which provides a neck with design principles used in lute practice to date. That is, a neck 29 mm thick at the neck-attachment and because it has a large gluing surface, only one nail was used to secure the connection, just as on the 1722 instrument. From now on Wenger uses thinner necks with a flatter cross-section and an even thickness along its length on these instruments,

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comparable to that of historic guitars. They are typically only 22-26 mm thick at the body attachment and use three nails for extra support.[134]

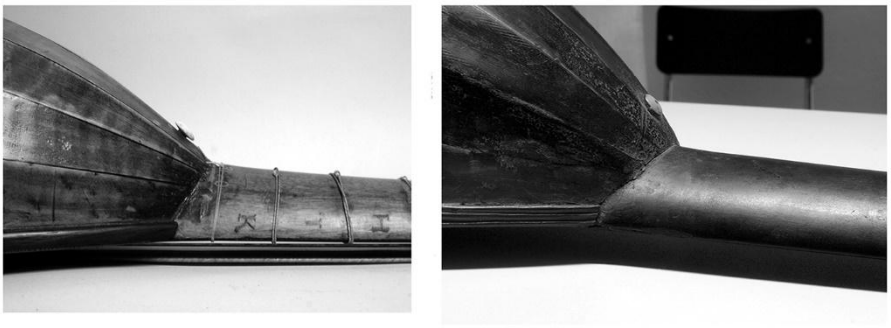


Figure 5. Thick to date neck on the mandora of 1726 and later, much thinner neck on the mandora of 1739.[135]

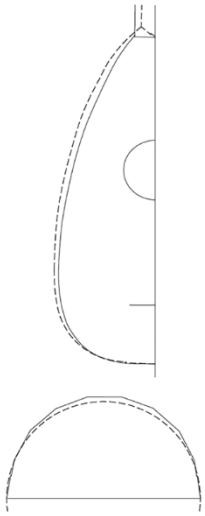
Finally, if we look at the cross-section of the 1739 mandora (Drawing 7), we see that it is still based on a semicircle, but is deeper than half the soundboard outline. This suggests that Wenger most likely used two styles of bowl designs, each with its own acoustic characteristics.

After this short phase we finally arrive at the period from which most of Wenger's surviving plucked instruments date, namely 1740 and beyond. A period of time that clearly indicates, in our two schematic lists of totalization dates, that a very large shift is taking place. Which most likely reflects the greatest growing social and musical interest of our two entities. As we will see, from 1740 onwards Wenger used specially designed moulds only for these precise instruments. These also contain a final new characteristic, that of an even clearer 'hump' towards the neck block, which can only be found on these later mandoras (Figure 6).[136]

134. The use of three nails in these early guitar-like thinner necks may seem excessive, but because they are thinner, the gluing surface-area of the neck to the body is reduced, resulting in a potentially weaker joint needing additional reinforcement. Chris Egerton also notes that a three-nail array is more stable than one or two, because of the triangular arrangement. A triangle is structurally more stable than any other geometric figure and in the case of a thin neck it would also help prevent any 'twisting' movement. See Appendix I for the principal measurements of these necks.

135. Photograph of the 1726 mandora by Jonathan Santamaria Bouquet.

136. This author observed the characteristically more pronounced 'hump' at the upper-block only on Wenger's mandoras from 1740 and onwards. Thereafter, this feature is more or less apparent, or even absent on mandoras by other contemporary makers. One might posit that mandoras from other makers (i.e., after 1740), that do not have these pronounced 'humps' at the upper-block, were made using moulds primarily intended for making lutes. Such a conclusion would require deeper study for verification. The only two other authors, so far, in which such a more pronounced 'bump' can be seen are Johannes Jauck, on his mandora of 1746 in the Brussels Musical Instrument Museum, Inv.N. 251, https://



Drawing 7. The 1739 mandora lateral and longitudinal cross-section, showing a more profound body depth compared with the other designs up to now.

Figure 6. Pronounced 'hump' on the bodies of later mandoras.

www.carmentis.be:443/eMP/eMuseumPlus?service=ExternalInterface&module=collection&objectId=109221&viewType=detailView. As also from Sympertus Niggel, on the mandora of 1747 in the «Museum der Stadt», Füssen, Inv.N. 4486 as the mandora of 1754 in the Germanisches Nationalmuseum Nürnberg with Inv.N. MIR895, http://objektkatalog.gnm.de/objekt/MIR895, whose work has incredible similarities to Wenger's.

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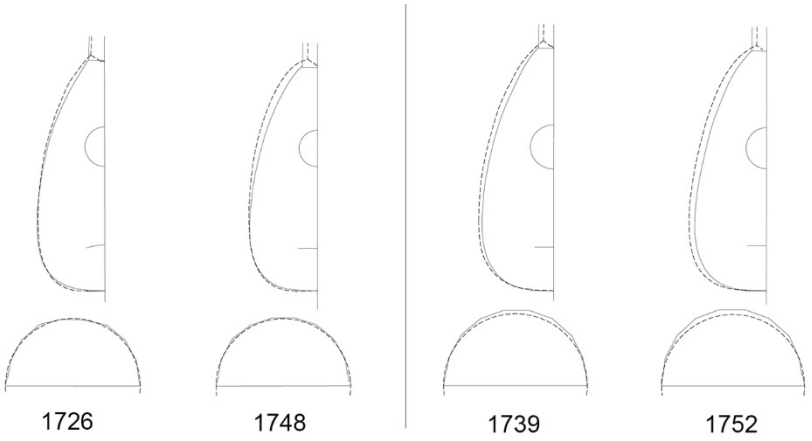
As we have seen, Wenger was already using these thinner necks that all these later instruments feature, but from now on accompanied by the more pronounced 'humps' mentioned.[137] To distinguish between old and new styles we can compare overview drawings of the instruments (Drawing 8).



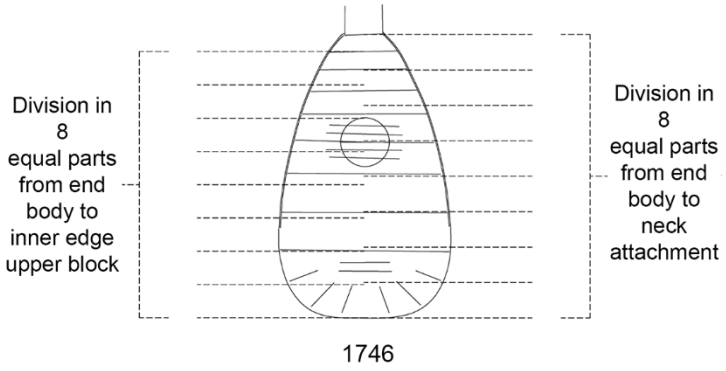
Drawing 8. Comparison of four body depths.

The two instruments on the left in Drawing 8, both have bowls that are the depth of a half soundboard outline. The other two, on the right in this drawing, have bowls that are deeper than a half soundboard outline. This is only a visual comparison of the external shapes, but we know that as well as the shape changes, he also reduced the thickness of the upper-blocks by about 1/3rd compared to those in his lutes (Figure 7). Thinner necks meant that thick, bulky upper-blocks were unnecessary.

137. The addition of a pronounced 'hump' can be considered either from an acoustical viewpoint, or as a helpful structural feature. Since the former is adding more air volume to the bowl and the latter allows re-definition of the neck shape i.e. the neck cross-section is determined by the shape of the upper-block, which in this case allows for a thinner, flatter neck that is easier to hold and play efficiently along its entire length. It is difficult to say which criteria was considered more important when implementing these design modifications, or which one led to the other. To this author the acoustic benefits seem to be the most desirable; since these instruments had fewer strings, the maker added more air volume to the bowl cavity to improve resonance without increasing the overall body size that would possibly sacrifice efficient sound projection. Chris Egerton notes that although the 'humped' blocks are much thinner they do still offer a large gluing surface area for the ribs, thus preserving overall structural strength and stability while optimising acoustic potential as the author suggests.

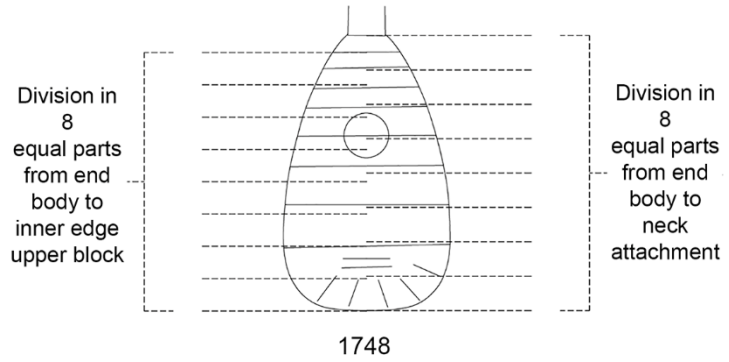
Figure 7. The upper-blocks of the 1746 and 1754 mandoras.[138]

In the mandoras from the 1740's onwards, all rose centres and thus the barring layouts, proportionately always relate to mandora neck attachments and no longer to lute-like neck attachments. Furthermore, the upper block would be more or less only 5 mm thick If you tried to place the 'usual' 11-course lute neck to it. Since Wenger's workshop was well equipped for lute making, we could probably assume that he continued to do so, at a less intensive pace. That may be a reason why we have only one surviving lute today. Because from now on the mandora will become a distinct instrument in itself, for which a separate product line is now being created in order to meet the greater demand, as documented and presented. This left the division of the 'soundboard' into 8 equal parts the same as before, but adapted to his new construction moulds (Drawings 9.1746 and 9.1748).



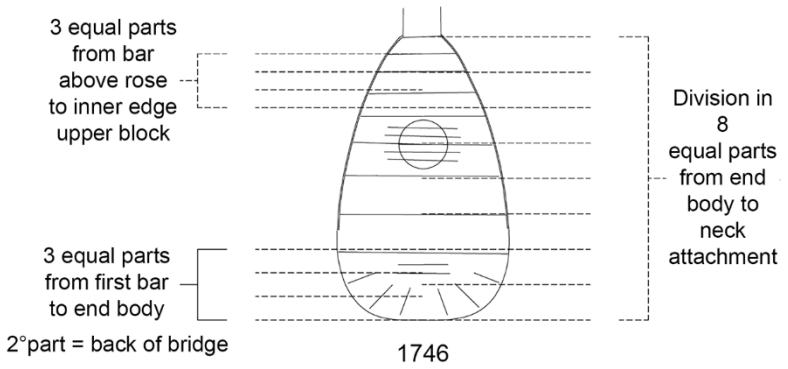
Drawing 9.1746. The 1746 mandora, comparison of the two division methods.

138. Photograph of the 1746 mandora by Sabina Kerkhoff and of the 1754 mandora by Enrico Allorto.

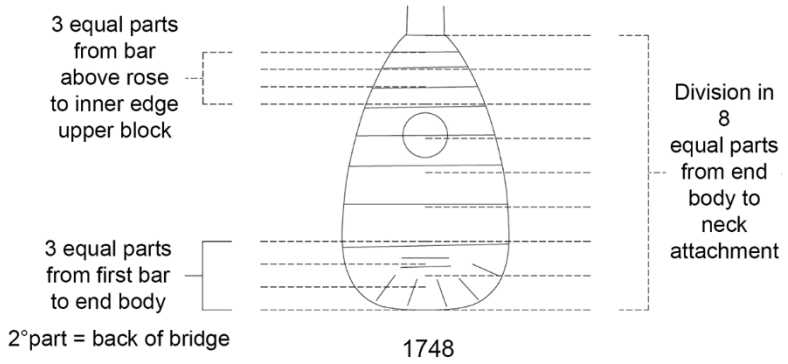


Drawing 9.1748. The 1748 mandora, comparison of the two division methods.

In the first two drawings (Drawings 9.1746 and 9.1748), we can see the difference in his reference points for the equal division into 8. The 1746 and 1748 mandoras have total body lengths of 488 mm and 472 mm. They are less than 500 mm long, so the equal layout divisions in 8 ends at the neck-attachment. If one tries to apply the other division method up to the inner edge of the upper-block, this basic concept is contradicted. The locations of the bridge and the bars above the rose also correspond when using the neck-attachment as reference point (Drawings 10.1746 and 10.1748).

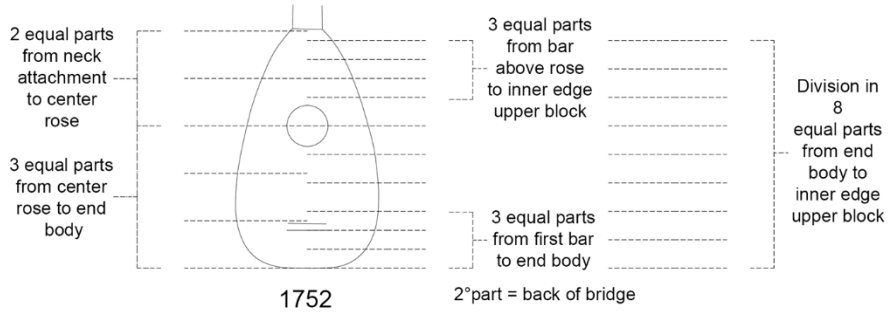


Drawing 10.1746. The 1746 mandora, comparison of the equal division in 8 with the actual bar placements.



Drawing 10.1748. The 1748 mandora, comparison of the equal division in 8 with the actual bar placements.

On instruments with a total body length of 500 mm or more, he applied his equal division in 8 for the placement of the bars to the inner-edge of the upper-block, with the rose position on the 5th division in a 3/5th relation to the neck attachment as a whole to the body. It seems he applied this method with the 1752 mandora, which has a total body length of 503 mm (Drawing 11). This author was unable to verify the actual internal layout because the instrument was 'closed' during examination, but by applying the correct geometric layout scheme, we can see that the bridge is also in the correct location.



Drawing 11. The 1752 mandora, verification of the equal division in 8 to the inner-edge of the upper-block, which allows the rose center and bridge position to be checked as correct. Other internal structures were not accessible.

5. Construction, features and characteristics of the instruments

This section discusses especially those instruments that the author examined personally. Some features merit detailed discussion; others are of a general nature or 'typical'.

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5.1 Soundboards: external view

Wenger's soundboards consist of two 'book-matched' pieces of fine quality spruce-wood (*picea abies*) with the closest annual rings adjacent to the centre-joints and larger rings at the outer edges. From naked-eye observation there seems to be no surface treatment such as varnish or sealant. Further analysis (for example by spectroscopy) may reveal surface layers not normally visible. Two soundboards had varnish coatings, but this was probably applied later, judging by the amount of wear visible beneath the varnish layers. The soundboard thicknesses seem typical for 18th century lutes and as with bowed-instruments of the period; they are thicker in the centre 'backbone' and gradually thin out towards the edges.[139] In the 17th century, the opposite was usually the case.[140]

5.2 Roses

The roses are carved directly into the soundboards and are reinforced internally with paper backings and miniature transverse support-bars. These small support-bars were applied using glue and a hot iron at their ends, which has left localised burn marks (Figure 8). There were no visible design stamps or drawings on the paper backings I examined, therefore it is difficult to say whether they were cut from the outside or the inside, because there are knife cuts on both sides. The most probable thing is that they were first carved from the inside, working on designs placed on the backing paper, until the design was eliminated, to then be defined on both sides.

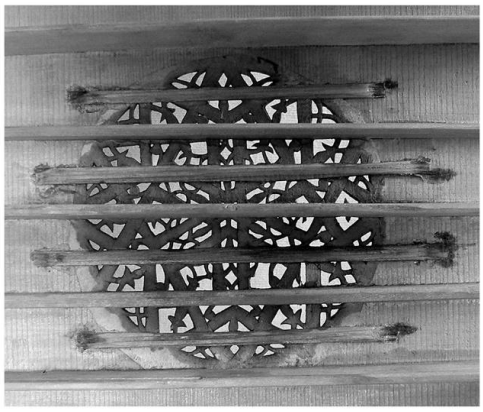

Figure 8. The 1714 calichon rose, internal view with paper backing and small support bars with scorched ends.

139. Enrico Allorto in his restoration report on the 1754 mandora highlights soundboard thicknesses of 1,7-1,8 mm in the center and 1,2-1,3 mm at the outer edge. Sabina Kerkhoff shows soundboard thicknesses on her drawing made of the 1746 mandora of 2,3 mm in the center and 1,8 mm at the outer edge.

140. LUNDBERG, *Historical Lute Construction*, p. 35, shows an example of a typical soundboard thickness for 17th century lutes in Figure 7, showing 1,4-1,5 mm in the center, 1,6-1,7 mm at the outer edge and 1,7-1,8 mm in the bridge area.

Wenger's roses usually have an outer incised borderline followed by an inner chip-carved ring, then the main rose. Lutes of the 17th century tend to have the chip-carved ring enclosed by two concentric incised lines. Two of Wenger's roses have no chip-carved border. A further comparison with 17th century roses is that Wenger's 'foliate' elements do not weave alternately above and below the geometric framework. Rose carvings of several contemporary makers such as Schelle, Tielke, Buchstetter and Weigert are similar in this. An exception is the mandora of 1746, which has its foliate components interweaving near the outer-edge of the rose only. The particular foliate components in the roses of the 1714 calichon, the 1722 lute and the 1726 mandora (Figure 9) are similar to those found on contemporary Augsburger instruments by Georg Aman and Johann Friedrich Storck.[141] Suggesting that Wenger may have used soundboards and other components sourced from the same supplier workshops in the Augsburg region.

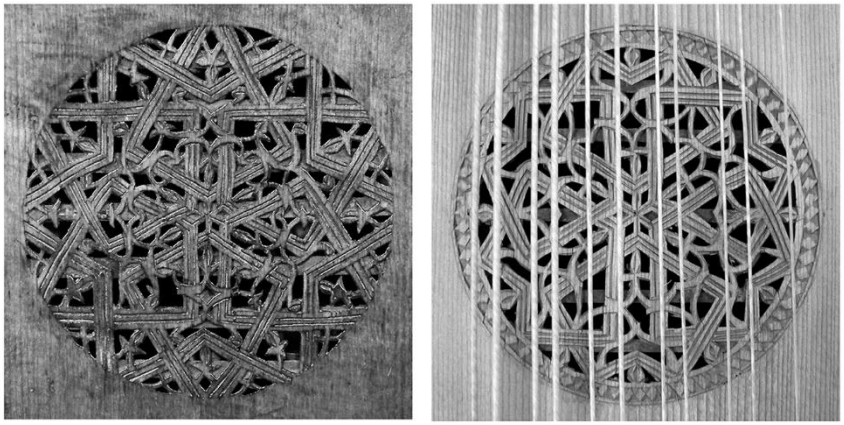

Figure 9. Roses of the calichon of 1714 an mandora of 1726, external views.[142]

5.3 Bridges

On the 1739 mandora and later, the original bridges are still attached.

The one on the 1722 lute, although similar in style to the others is probably a modern recreation.[143] All of them are stained dark-brown/black, which makes identification of the wood difficult, but they would most likely be maple or possibly pearwood, since these were commonly used woods. The tops are always veneered with an ebony strip about 1.2 mm thick, which is bordered

141. Georg Aman, Augsburg, 1733. Italy, private collection. Originally a mandora, but subsequently 'guitarised'. Johann Friedrich Storck, Augsburg, 1771. Basel, Historisches Museum, Inv.N. 1956.485. Originally a mandora, but subsequently 'guitarised'.
142. Photograph of the 1726 mandora by Jonathan Santamaria Bouquet.
143. See n. 104.

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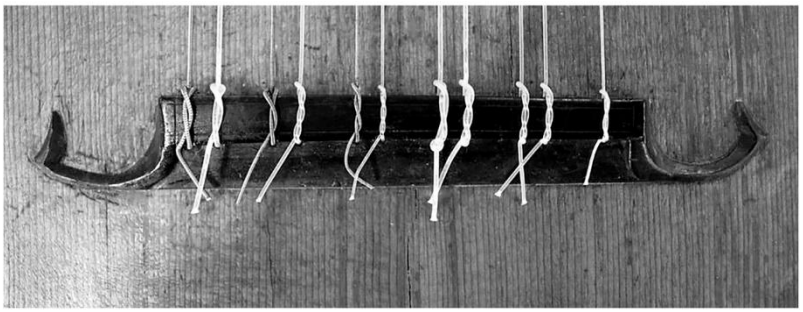
with a single incised line. Wenger's bridges display typical integral carved decorative terminals (Figure 10) as do many others in the period.[144]



1752

Figure 10. Typical Wenger bridge with integrally carved decorative terminals, on the 1752 mandora.

5.4 External rib 'bindings'

External moulded 'bindings' always protect the edges of Wenger's soundboards. They extend from the end-clasps ends up to the neck on both edges.[145] They are usually made of ebony, with the exception of those on the 1748 mandora, which are the same rosewood as used for the ribs. They were apparently glued on after the instruments were closed and are attached to the outside of the bowl 'and' the outer edge of the soundboard. It appears that very small ebony nails held the strips in place during gluing, or possibly metal pins that were later removed and the holes plugged with what looks like ebony or possibly a black filler material.

5.5 Fingerboard points

The fingerboard 'points' are mostly made of ebony, but there is one example that employs a black filler material. They all have this same characteristic; they extend out wider than the width of the neck at the body attachment giving the visual impression that the necks were originally wider and then later altered or cut down. This is certainly not the case, but a deliberate design feature. Which always corresponds more or less with the actual joint between the neck

144. During this period and particularly in Germany, Austria and the eastern European countries we find makers using two methods for creating the decorative elements at the ends of the bridge. One method is to carve the elements directly from the solid wood comprising the bridge and the other is to add separate pieces usually carved from ebony. Generally, a maker adopted one or the other method. Wenger created the end points by carving them in one piece with the bridge.

145. This is true of many other contemporary makers, so it can be considered typical of 18th century lute instruments and are mostly invariably found on both sides of the instrument.

and the body, but because the external rib bindings are glued to the outside of them, they give this image (Figure 11).

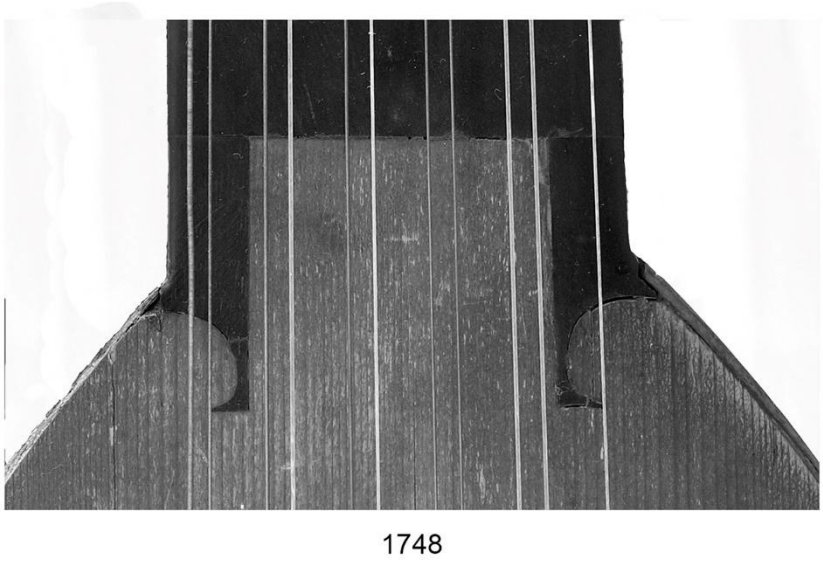


Figure 11. The 1748 mandora showing the unusual Wenger-style fingerboard 'points' that extend wider than the neck.

The mandora of 1754 is the only one with a decorative 'spade' motif, on the upper and lower parts of the soundboard, as seen on some 17th century lutes. Since there is only one example with this feature, it is probably not typical of Wenger's work.

5.6 Soundboards: internal view

Although I have discussed the concept behind the barring layouts, there are other interesting characteristics, such as the three different types of bars (Drawing 12).

We can see a 17th century influence in the first example, namely a continuous straight bar that has the same height and thickness over its entire length. This produces a soundboard that is flat across its width. This is only seen in the 1714 calichon, so it is probably more typical of his earlier work. The second example produces a soundboard that has a convex arching across its width of approximately 3.25 mm height maximum. Although these bars are similar to the 17th century example, the undersides curves longitudinally and are thus lower in height at the ends. These types of bars strengthen the thicker centre of a soundboard even more. Convex arching across the width of a soundboard makes it stiffer and this may be one reason why it is only seen on the lute of 1722. That instrument has 11-courses, so it must withstand more string-pulling force than instruments with fewer courses. Paul Thomson has reported this

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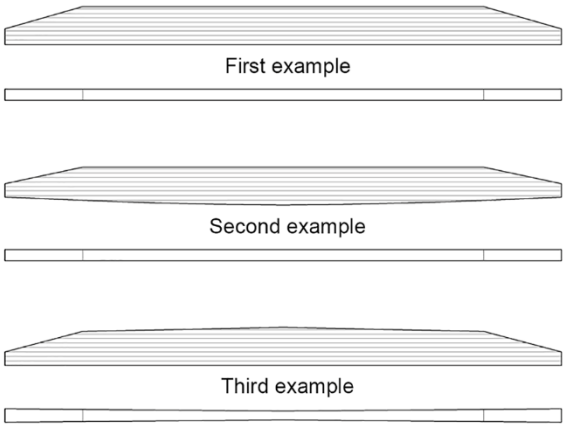
unusual convex soundboard shape on two other lutes from the period.[146]



Drawing 12. The three different bar shapes suggesting stylistic evolution over time.

It would be interesting to know if this structural feature was applied to 11-course lutes with a very broad body only, such as the 1722 instrument, or to other smaller lutes. This construction technique could have been applied when some of the bought-in soundboards were just to flexible to be used otherwise. The 1746 mandora and later have this third bar style. This is a more typical 18thcentury bar as used for lute instruments. These bars are no longer straight or of uniform thickness, but are highest and thinnest in the middle and become lower and wider towards their ends.

One idea suggested by these different bar types is that the barring layout behind the bridge with the two straight bars for the bass side, is associated with the earlier 17th century style. The 'fan-bracing' layout below the bridge with specially shaped bars is more like the 18th century style. Wenger's contemporaries used both of these styles. There is no detailed information yet about the internal structure of some earlier instruments. Accurately dating the changes in bar styles requires more data.

5.7 Bowls: external view

Nine ribs construction is standard, with the exception of the eleven-rib lute of 1722. As discussed, Wenger made use of two types of bowls in his work. One,

146. From the restoration report of Paul Thomson and somewhat elucidated by me:
- Andreas Jauch, Dresden, ?, New Haven, Yale Collection of Musical Instruments, Inv.Nr.4565.60. A presumably 17th century lute, converted to a 13-course instrument with a triple pegbox.
- Leopold Widhalm, Nürnberg, 1755. Nürnberg, GermanischesNationalmuseum, Inv. Nr. MIR 903. A 13-course lute with a double pegbox.

With the following comment by P. Thomson: «It is something that could easily be overlooked, or dismissed as distortion, so there may well be other surviving examples».

a semi-circle cross-section, that has a radius of half of the soundboard at its widest point, and the other that is somewhat deeper.

- Deployment of wood types is as follows:
- 'Flamed' maple, without fillets* between the ribs.
- 'Bird's-eye' maple, without the use of fillets between the ribs.
- 'Flamed' maple alternated with 'Bird's-eye' maple, without fillets between the ribs.
- Boxwood alternated with rosewood, without fillets between the ribs.
- Ebony alternated with ivory, without fillets between the ribs.

(*fillets are thin strips of contrasting wood about 1.5 mm thick, glued between the rib joints)

End-clasps are made of the same type of wood as used for the outermost ribs towards the soundboard. There are differences in the decorative ends of the end-clasps between his earlier and later periods. The initial style (Figure 12) only occurs on the first three instruments and his later design (seen in Figure 4) appears from the 1739 mandora onwards. This design variation is not apparently associated with specific instrument types. More likely it was an artistic design development perhaps coincident with the evolution in bar styles. In both styles, we encounter the use of a decorative inscribed line that follows the end clasp contour and which is accentuated by the varnish.[147] Wenger's varnishes are all amber-coloured in a narrow range of shades. All the instruments have two buttons of ivory/bone for attaching shoulder straps or support ribbons/cords. One is in the centre of the end-clasp and the second is fixed into the neck-block through the central rib, near the neck attachment.

1726

Figure 12. Wenger's early-style end-clasp decoration on the 1726 mandora.

147. This type of decorative incised line used on the outer end clasp, can also be found on an instrument of 1577 by Sixtus Rauwolf which is preserved in the Fuggermuseum in Babenhausen. Since G.F.Wenger refurbished it in 1705 he may have been influenced and inspired to apply this decorative feature to his own instruments, see n. 95 above. This was suggested to me during a personal conversation with Jonathan Santamaria Bouquet.

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5.8 Bowls: internal view

Apparently the upper-blocks and the inner end-clasp liners were usually made of spruce, judging from the few instruments of which the internal structures are known. The upper-blocks have either quartered or tangential grain pattern. We can see this on the faces of the blocks where the nail is located. The inner end-clasp liners are always cut on the quarter grain. We find a range of paper and parchment strips/pieces of various sizes and configurations glued in place for rib linings. These reinforce and support the ribs and their joints. There is no discernible pattern, but one consistent feature is a separate, distinct patch of paper glued centrally at the lower rib confluence near the inner end-clasp liner. Normally, no edge-linings, along the inside edges of the outer ribs, were used on these instruments. The only exception being the 1754 mandora, where they were deployed on the ebony ribs. Ebony can be a difficult wood to glue and the extra surface area provided by linings probably helped to ensure a good joint around the soundboard edge.

5.9 Necks

We see major differences in neck construction. This probably relates to costs and price ranges of instruments. The following summary starts from the simplest and quickest method:

- The neck and fingerboard consist of one piece of dyed-black wood, probably maple or beech.
- The neck consists of one piece of maple, with a separate ebony fingerboard glued on.
- The neck core consists of quarter-sawn spruce, veneered on its outer back surface with ebony and with a separate ebony fingerboard glued on.

We find an unusual feature with this last method. The neck's back veneer overlaps the edges of the fingerboard, indicating that it was applied after the fingerboard was already glued in place. It occurs on the 1722, 1739, 1752 and 1754 instruments. Were it seen only once it could be mistaken for a repair or re-veneering of the neck.[148] Since there are several examples, it seems that this method was employed with good reason and it may be that it was an efficient working procedure for neck construction. For example, the neck was fixed in place and properly aligned to the body with its finished fingerboard attached, and then application and trimming of the ebony neck veneer completed the

148. A reasonably reliable indicator of whether the veneer on the back of the neck is original or not, are the external moulded bindings on both sides of the body. They are always attached in such a way that the ends are glued against the neck and therefore extend slightly beyond the neck/body joint. Where the veneer on the back of the neck has been replaced, the external bindings end may have been cut or occluded and no longer visibly extend on to the neck. This is also often the case when the neck has been 'reset' or replaced, wherein these distinctive external binding elements may exhibit signs of compromise or alteration.

structure. As is typical for lute family instruments in the 18th century, all his fingerboards have a convex profile across their width which extends over their entire length. There is usually room for at least nine to ten effectively mounted gut frets.

5.10 Pegboxes

Pegbox constructions are related to the types of neck. The 1714 calichon pegbox is carved in one piece as part of the main neck, in a similar way to many bowed instruments. It is rarely seen on other lutes, so is excluded from the following summary. All other pegboxes were separately constructed units and attached to the necks, typically at an angle of about 82 degrees. Beginning with the simplest and quickest manufacturing method:

- Several separate pieces of a hardwood comprise the first type. One small upper block holds the upper pegbox cheeks together. A larger piece unites the lower cheeks. The third piece is a backplate that unites and stabilises the whole structure. Finally, the small «chanterelle» string rider is attached to the upper treble-side cheek. The pegbox tip is cut flat and perpendicular or at an acute angle. The finish is either completely dyed black, if the neck was treated thus, or varnished to match the bowl and back of the neck when they were both varnished. In this latter case, only the face of the pegbox was stained black to match the black fingerboard. These two kinds of finishes were used with this method of constructing the pegbox when the neck was not veneered.
- In this second method, it is difficult to see if the construction technique is consistent, because pegboxes were often dyed black, thus obscuring joints. I assume that the basic four-piece construction method was used. Ebony veneers appear on the face and back of the pegbox when the back of the neck was also veneered with ebony. Additionally, the pegbox is always fitted with a fancy moulded tip. (Figure 13) This more complex construction uses more manufacturing time, materials and processes thus increasing the cost of the finished product.

We always find decorative incised lines in the latter method, but not always in the first method. Incised lines when present appear as follows: a single incised line applied on the outer faces of the pegbox cheeks following their outline. The front and back of the pegboxes if incised always have a double line (Plate 13). A decorative wood back-plate pierced with foliate/floral design is a common feature of both types of pegbox. The design motifs are usually the same from the 1739 mandora onwards and occasionally used in mirror image. The 1726 mandora exceptionally has a different floral motif.

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Figure 13. The 1752 mandora pegbox with ebony veneer, pierced backplate, incised decorative lines and fancy moulded tip.

5.11 Pegs

We know that the pegs on all lute family instruments in this period were some types of hardwood dyed black. Ebony pegs were seldom used and only became common for plucked musical instruments from the mid-19th century. Modern luthiers should take this into account when creating historical replicas.

5.12 Labels

Wenger's labels are similar to the rectangular labels used by his contemporaries.

The labels are printed except for the two last date digits, which are handwritten. There are three different printing styles, with two different modes of text usage.

The first printing style is a simple Roman typography with the following text:

Gregori Ferdinand Wenger.
Lauten-und Geigen-Macher.
FecitAugustae. 17??

The two later styles have compact, narrow Gothic 'blackletter' typefaces that use the following text:

Gregori Ferdinand Wenger.
Lauten=und Geigen=Macher.
in Augspurg. 17??

The majority of his lute instruments have the first label style. The other two styles appear less frequently. It is not possible to state if label styles relate to specific periods, since all three appear in various instruments throughout his working life. The use of different labels could be due to factors that become evident during future research.

Summary and conclusions

This research study demonstrates the evolution of the mandora, in Wenger's workshop, from its initial derivative form, using existing lute moulds and adapting traditional construction methods, to a fully defined and purpose-built instrument. It describes the underlying design concepts, principles and changes in the manufacture of these instruments, with differentiation, connecting them to increased social and musical interest during the 18th century. The understanding of how an instrument-maker's workshop, in this historical period and geographical area, functioned has become somewhat clearer. Using notional time-periods we can summarize the manufacturing developments and creative design processes that occurred during Wenger's working lifetime:

The period from 1701 to 1730:

- Lutes were most probably the main output of his workshop using moulds and components designed for that purpose, but occasionally adapted and used for making mandoras or calichons as required.
- All the upper-blocks have large dimensions designed to accept an old lute-style neck for 11-courses.
- All the centre rose positions and with this the barring layouts are proportional related to old lute-style neck attachments for 11-courses.
- All the necks are in the early lute-style tradition.

The period from 1730 to 1740:

- Lutes were probably still the main output of his workshop.
- Upper neck-blocks still have large dimensions, potentially to accommodate an old lute-style neck for 11-courses.
- All the centre rose positions and with this the barring layouts still relate proportionally to old lute-style neck-attachments for 11-courses.
- Wenger starts to use thinner necks for mandoras that are more stylistically akin to the neck of a period guitar rather than the traditional heavier lute necks.

The period from 1740 onwards:

- The mandora acquires its own specific design considerations distinct from the lute. Newly made moulds incorporate a more pronounced 'hump' towards the upper-block.

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- He reduces the dimensions of the upper-blocks by about 1/3rd, specifically for mandora-style necks.
- Mandora centre rose positions and with this the barring layouts relate proportionally only to the mandora-style necks.

The research and conclusions offered here help to define the mandora and calichon based on Wenger's output. It seems reasonable to assume that other workshops used similar strategies of using and adapting lute components to make mandoras only adopting specific design features and manufacturing methods later, to meet changing needs and increased demands for the instruments. Future research on the workshop output and instruments of other makers may support these conclusions and will no doubt uncover new information that develops our understanding and allows us to authenticate, interpret and re-create these historical instruments with ever-growing confidence.[149]

Later on, to the end of the 18th century, these were being played less and less. The characteristic shape of the lute family instruments in general, were repurposed to the growing interest and demand for the guitar in the 19th century and used as a reference for the sonic possibilities of these. Introducing the practice of turning old lutes into guitars, for which their sound ideal was an important aspect in the discourse around the development of the guitar at the beginning of the 19th century.[150] For which Simon Molitor, in his introduction to the «Sonate für Guitare allein» from 1806, quoting Albrechtsberger, provides information on the use of the mandora in his time and stating the following from his invention. «Die Mandora hatte ehmals 15 saiten oder acht Chöre. Ihre Stimmung stimmt ganz mit jener unsrer | sechssaitigen Guitare überein, nur hat sie noch ein tiefes D und C»[151] Then he takes up the following passage: «Herr | Magistrath Jos v. Fauner in Wien (der einzige Mandorist, den ich hier kenne, dessen vorstreffliches Spiel | aber auch von diesem sechr schätzbaren Instrumente den vollkommensten Begriff gibt) das tiefe A und E allerdings übergreift; wenn er gleich das letztere bisweilen nach der Tonart mit sehr gutem Effekt ver- | stimmt».[152] Continuing by giving fur-

149. For example, there are surviving mandoras and lutes from the workshops of Joachim Tielke, Sebastian Schelle, Johannes Jauck and the Edlinger family.

150. KIRSCH, *The Long Lives*, pp. 275-278, *5.1.1 The Lute-guitar as one form among others*.

151. PROSSER, *Calichon e Mandora*, pp. 56-57. Translation by Dr. Pietro Prosser, «La mandora aveva all'epoca 15 corde o 8 ordini. La loro accordatura era perfettamente uguale a quella dell'odierna chitarra, solo che aveva ancora un D e un C bassi». Author's translation, «The mandora had 15 strings or 8 courses at the time. Their tuning was exactly the same as today's guitar, only it still had a low D and C». The same tuning, understood from the perspective of their tuning intervals.

152. *Ibid*., p. 57. Translation by Dr. Pietro Prosser, «Il Signor Magistrat Joseph von Fauner di Vienna (il solo suonatore di mandora che io qui conosca, il cui eccellente modo di suonare ma anche i cui pregiatissimi strumenti danno un buon esempio) diteggia certamente il A e l'E basso; se egli contemporaneamente scorda l'ultimo a seconda della tonalità, con grande effetto». Author's translation, «Mr. Magistrat Joseph von Fauner of Vienna (the only mandora player I know here, whose excellent playing but also whose very fine instruments set a good example) certainly fingers the low A and E; if he simultaneously

ther information on the tuning: «Uebrigens hat besagter Herr v. Fauner die doppelte besaitung wegen ihrer Unbequemlichkeit schon | vor längerer Zeit abgeschafft, kürzlich aber sein Instrument noch mit einer neuen Saite im baß vermehrt».[153] In these passages we can ultimately find the option of single strings for the mandora explicitly described, which leads us to think that the terminology used in an apparently interchangeable way, historically, would actually differ only because of the tuning? Furthermore, for the first time after the Kremsmünster example, we find another nine-element instrument. Yet, the most important, is one last very interesting statement for the history of the guitar, as Molitor credits the mandora with having suggested the addition of the sixth string to the guitar. In this way our two entities never seem to have truly become extinct, but are metaphorically introduced into the musical culture of the 19th century. Which however is another discussion and for which we highly recommend the reader to look further into the work, on this topic, of my colleague Dr. Sebastian Kirsch.[154]

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detune the last one according to the key, with great effect». Fine instruments, the mandoras of Mr. Fauner, sets a good example, for their guitars at the time.

153. *Ibid.*, p. 57. Translation by Dr. Pietro Prosser, «Inoltre, il detto Signor v. Fauner ha da molto tempo abbandonato la doppia incordatura, a causa della sua scomodità, da poco invece ha aggiunto al suo strumento ancora una nuova corda». Author's translation, «Furthermore, the said Lord v. Fauner abandoned double stringing a long time ago, due to its discomfort, but recently added yet another new string to his instrument».

154. KIRSCH, *The Long Lives*, pp. 274-373, 5 *The Lute-Shaped Guitar at the Beginning of the 19th Century.*

included Andreas Schlegel, Prof. Dieter Kirsch, Dr Pietro Prosser, Dr Frank Legl, Matthias Schneider and Markus Lutz.

APPENDIX I

Principal measurements of the instruments

Strings	Arrangement and string length.
Body	L=Length, W= width, D=depth.
Neck	L_1=total length, L_2=width at body, L_3=width at nut, T_1=thickness at body, T_2=thickness at nut.
Rose	D=diameter, C=distance from centre to lower edge of lute.
Bridge	P=positional distance from lower edge of lute, to front bridge.

Wenger 1714 – Calichon
Private collection, Italy

Strings	1×1,4×2 = 857 mm.
Body	L: 564 mm W: 352 mm D: 173 mm. (body primarily intended for lute)
Neck	L_1: 404.5 mm L_2: 69 mm L_3: 48 mm T_1: 34 mm T_2: 21.5 mm.
Rose	D: 91 mm C: 323 mm. (3+2 proportion of rose position to the original intended lute neck)
Bridge	P: 112 mm.

Wenger 1722 – Lute
Private collection, Switzerland

Information of the instrument obtained thanks to Paul Thomson and the owner.

Strings	2×1,9×2 = 764 mm.
Body	L: 513.5 mm W: 343 mm D: 172 mm. (body intended for lute)
Neck	L_1: 344.5 mm L_2: 105 mm L_3: 81.5 mm T_1: 29.5 mm T_2: 23 mm.
Rose	D: 91 mm C: 314 mm. (3+2 proportion of rose position to the lute neck)
Bridge	P: 94 mm.

Wenger 1726 – Mandora
Metropolitan Museum of Art, New York, Inv.N. 89.4.3140

Information of the instrument obtained thanks to Jonathan Santamaria Bouquet

Strings	1×1,5×2 = 674.5 mm. (arched bridge, not original)
Body	L: 486 mm W: 285 mm D: 141.5 mm. (body primarily intended for lute)
Neck	L_1: 288 mm L_2: 68 mm L_3: 54 mm T_1: 29 mm T_2: 18.5 mm.

Rose	D: 84 mm C: 304.5 mm. (rose position not original, inserted in new soundboard)
Bridge	P: 97.5 mm. (arched bridge, not original)

Wenger 1733 – Mandora
Private collection, Englandm

Information of the instrument obtained thanks to Chris Egerton

Strings	1×1,5×2 = 683 mm. (string-length not original, neck shortened or not original?)
Body	L: 543 mm W: 327.5 mm D: 165 mm. (body primarily intended for lute?)
Neck	L_1: 273 mm L_2: 72.5 mm L_3: 55 mm T_1: 25 mm T_2: 22.5 mm.
Rose	D: 87 mm C: 312 mm. (3+2 proportion of rose position to the original intended lute neck?)
Bridge	P: 134 mm. (bridge and bridge position not original, to high position)

Wenger 1739 – Mandora.
Castello Principesco, Merano, Inv.N. 6840

Strings	1×1,5×2 = 745 mm.
Body	L: 512 mm W: 304 mm D: 159 mm. (body primarily intended for lute)
Neck	L_1: 325.5 mm L_2: 64 mm L_3: 54.5 mm T_1: 22 mm T_2: 18.8 mm.
Rose	D: 93.5 mm C: 304 mm. (5+3 proportion of rose position to the original intended lute neck)
Bridge	P: 92 mm.

Wenger 1746 – Mandora
SchloßNymphenburg, München

Information of the instrument obtained thanks to Enrico Allorto

Strings	1×1,5×2 = 725 mm.
Body	L: 488 mm W: 296 mm. (body intended only as mandora)
Neck	L_1: 332 mm L_2: 65 mm L_3: 55 mm T_1: 23 mm T_2: 18.5 mm.
Rose	D: 84 mm C: 302.5 mm. (5+3 proportion of rose position to the mandora neck)
Bridge	P: 95 mm.

Wenger 1748 – Mandora
Deutsches Museum, Műnchen, Inv.N. 83/443,1-2

Strings	1×1,5×2 = 700 mm.
Body	L: 472 mm W: 286 mm D: 144 mm. (body intended only as mandora)
Neck	L_1: 317 mm L_2: 65.5 mm L_3: 53 mm T_1: 21.5 mm T_2: 16.7 mm.
Rose	D: 77 mm C: 300 mm. (5+3 proportion of rose position to the mandora neck)
Bridge	P: 90 mm.

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Wenger 1752 – Mandora
Historisches Museum, Basel, Inv.N. 1882/12

Strings	1×1,5×2 = 736 mm.
Body	L: 503 mm W: 302 mm D: 162 mm. (body intended only as mandora)
Neck	L_1: 327 mm L_2: 62.2 mm L_3: 52.2 mm T_1: 22.5 mm T_2: 18.4 mm.
Rose	D: 85 mm C: 300 mm. (3+2 proportion of rose position to the mandora neck)
Bridge	P: 94 mm.

Wenger 1754 – Mandora
Private collection, Italy
Information of the instrument obtained thanks to Enrico Allorto

Strings	1×1,5×2 = 673 mm. (not original, original neck shortened)
Body	L: 520 mm W: 320 mm D: 162 mm. (body intended only as mandora)
Neck	L_1: 255 mm L_2: 62 mm L_3: 53 mm T_1: 26 mm T_2: 21.5 mm.
Rose	D: 98 mm C: 314 mm. (3+2 proportion of rose position to the mandora neck)
Bridge	P: 102 mm. (bridge not original)

APPENDIX II

The position of the roses and bridges based on an equal division of 8

NB: Measurements of the 'internal' spaces of the instruments, detailed in Appendix I, were used for division when producing the following tables. In effect they are the dimensions of the moulds used for construction. Thus: the lower edge of the soundboard = lower edge of the mould. The inner-edge of the upper-block = where the block was attached to the mould during construction. The thickness of the ribs and end-clasp together was taken as 3 mm. A 14 mm notional thickness front to back was allowed for the bridge.

The measurements are presented as follows:

- Body: L=Length as it is and as it would be if using the mould as originally intended.
- Block: D=thickness as it is and as it would be if using the mould as originally intended.
- Mould: L=length without any block in place.
- Rose: C=distance to centre from lower end of lute.
- Bridge: P=distance to front of bridge from lower end of lute.

(i) These instruments have a body length of 500 mm or more, from the end of the soundboard to the neck or original intended neck-attachment. All are divided into 8 equal parts from the end of the soundboard to the inner-edge

of the upper-block, with the rose position in a relation of 3/5th in front of the neck-attachment or original intended one as a whole to the body.

Wenger 1714 – Calichon/Lute

Body	L: 564 mm as calichon or L: 539 mm with 11-course lute neck.
Block	D: 50 mm as calichon or D: 25 mm with 11-course lute neck.
Mould	L: 511 mm.
Rose	C: 319.3 mm. (322.3 mm incl. bowl thickness)
Bridge	P: 99.1 mm. (102.1 mm incl. bowl thickness)

Wenger 1722 – Lute

Body	L: 513.5 mm. Original 11-course lute.
Block	D: 21 mm.
Mould	L: 489.5 mm.
Rose	C: 305.9 mm. (308.9 mm incl. bowl thickness)
Bridge	P: 95.5 mm. (98.5 mm incl. bowl thickness)

Wenger 1733 – Mandora/Lute

Body	L: 543 mm as mandora or L: 518 mm with 11-course lute neck.
Block	D: 45.8 mm as mandora or D: 20.8 mm with 11-course lute neck.
Mould	L: 494.2 mm.
Rose	C: 308.8 mm. (311.8 mm with bowl thickness)
Bridge	P: 96.4 mm. (99.4 mm with bowl thickness)

Wenger 1752 – Mandora

Body	L: 503 mm.
Block	D: 25 mm. (Estimated calculated thickness of upper block)
Mould	L: 475 mm.
Rose	C: 296.8 mm. (299.8 mm incl. bowl thickness)
Bridge	P: 93,1 mm. (96,1 mm incl. bowl thickness)

Wenger 1754 – Mandora

Body	L: 520 mm.
Block	D: 32 mm.
Mould	L: 485 mm.
Rose	C: 303 mm. (306 mm incl. bowl thickness)
Bridge	P: 94.8 mm. (97.8 mm incl. bowl thickness)

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(ii) These following instruments have a body length of less than 500 mm from the end of the soundboard to the neck or original intended neck-attachment. All are divided into 8 equal parts from the end of the soundboard to the neck-attachment, as a whole to the body.

Wenger 1726 – Mandora/Lute

Body	L: 486 mm as mandora or L: 456 mm with 11-course lute neck.
Block	D: 45.5 mm as mandora or D: 19.5 mm with 11-course lute neck.
Mould	L: 453 mm end of the mould up to the originally intended lute-neck attachment.
Rose	C: 283 mm. (286 mm incl. bowl thickness)
Bridge	P: 89.5 mm. (92.5 mm incl. bowl thickness)

Wenger 1739 – Mandora/Lute

Body	L: 512 mm as mandora or L: 487 mm with 11-course lute neck.
Block	D: 43 mm as mandora or D: 18 mm with 11-course lute neck.
Mould	L: 484 mm end of the mould up to the originally intended lute-neck attachment.
Rose	C: 302.5 mm. (305.5 mm incl. bowl thickness)
Bridge	P: 94.6 mm. (97.6 mm incl. bowl thickness)

Wenger 1746 – Mandora

Body	L: 488 mm.
Block	D: 30 mm.
Mould	L: 485 mm end of the mould up to the mandora-neck attachment.
Rose	C: 303 mm. (306 mm incl. bowl thickness)
Bridge	P: 94.8 mm. (97.8 mm incl. bowl thickness)

Wenger 1748 – Mandora

Body	L: 472 mm.
Block	D: 28 mm.
Mould	L: 469 mm end of the mould up to the mandora-neck attachment.
Rose	C: 293 mm. (296 mm incl. bowl thickness)
Bridge	P: 92 mm. (95 mm incl. bowl thickness)

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APPENDIX III

The rose positions relative to the string-lengths

Comparison of the rose position relative to the string-length was done by dividing the string-length, (or original intended string-length for the mould) by the distance of the rose centre to the bridge (front edge). The measurements used to calculate these proportions are derived from the corresponding instrument measurement tables in appendices II.

Measurements are presented as follows:

- Strings: L=the total vibrating string length from bridge to nut.
- Rose: L=distance from bridge front to rose centre.
- Prop: Quotient of string length ÷ Rose distance from bridge.

(i) Instruments that have a body length of 500 mm or more, from the end of the soundboard to the neck or original intended neck-attachment, which are divided in 8 equal parts from the end of the soundboard to the inner-edge of the upper-block, with the rose position in a relation of 3/5th in front of the neck-attachment or original intended one as a whole to the body.

Wenger 1714 – Lute

Strings	L: 780 mm, as originally intended, as a lute.
Rose	L: 220.2 mm, front bridge to centre rose.
Prop.	3.54

Wenger 1722 – Lute

Strings	L: 759.5 mm.
Rose	L: 210.4 mm, front bridge to centre rose.
Prop.	3.6

Wenger 1733 – Lute

Strings	L: 765,1 mm, as originally intended, as a lute.
Rose	L: 212.4 mm, front bridge to centre rose.
Prop.	3.6

Wenger 1752 – Mandora

Strings	L: 735 mm.
Rose	L: 200.5 mm, front bridge to centre rose.
Prop.	3.66

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Wenger 1754 – Mandora

Strings	L: 749.2 mm.
Rose	L: 208.2 mm, front bridge to centre rose.
Prop.	3.59

(iii) Instruments that have a body length of less than 500 mm, from the end of the soundboard to the neck or original intended neck-attachment, which are divided into 8 equal parts from the end of the soundboard to the neck-attachment.

Wenger 1726 – Lute

Strings	L: 650 mm, as originally intended, as a lute.
Rose	L: 193.5 mm, front bridge to centre rose.
Prop.	3.35

Wenger 1739 – Lute

Strings	L: 700 mm, as originally intended, as a lute.
Rose	L: 207.9 mm, front bridge to centre rose.
Prop.	3.36

Wenger 1746 – Mandora

Strings	L: 722.8 mm.
Rose	L: 208.2 mm, front bridge to centre rose.
Prop.	3.47

Wenger 1748 – Mandora

Strings	L: 695 mm.
Rose	L: 201 mm, front bridge to centre rose.
Prop.	3.45

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