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In copertina: particolare di una replica di scure bassomedievale (Foto G. Sartori, E. Zanini).  
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# Organistrum. A case of medieval archaeo- lutherie.

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## Abstract

The reconstruction of the Organistrum presented a series of difficulties, due both to the small amount of available written data and to the uncertainties in the interpretation of the iconographical repertoire. Cross-disciplinary working on this subject and multiple attempts to build a well-functioning replica, according to the actual requirements of 12<sup>th</sup> century music, have led the author to a compelling and definitive synthesis of his research on an instrument largely neglected by musicians.

*La ricostruzione dell'Organistrum ha presentato una lunga serie di difficoltà, dovute all'esigua quantità di dati documentari e alle incertezze nell'interpretazione del repertorio iconografico. Letture multidisciplinari incrociate su questi materiali e molteplici tentativi di costruzione di un modello funzionante, confrontati puntualmente con le esigenze effettive della musica del secolo XII, hanno portato l'autore a una sintesi di decenni di ricerche su uno strumento rimasto finora poco considerato dai musicisti.*

**Parole chiave:** organistrum, archaeo-lutherie, musicology

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## 1. Introduction

This work demonstrates how decisive results can be achieved through an experimental procedure aiming to recreate musical instruments in the most reliable way<sup>1</sup>. If the luthier, following both scholar indications and his own practical experience, had not produced his instruments – even working by trial and error – there would be no effective, definitive acoustic test of the musicological hypotheses and speculations, given the great temporal distance from the models and the scarcity of documentation.

The *Organistrum* is depicted in many works of art, most dating back to the 12th century. It is rarely mentioned in written sources and disappears by the first half of the 13th century. Despite the brevity of its life, this instrument boasts a prominent role within the medieval Organology. This is due to the originality of its construction and to its prominent position among the sculptures of the famous *Portico de la Gloria* of Santiago de Compostela cathedral, one of the three most important shrines of Christianity.

## 2. Chronology and denomination

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<sup>1</sup> I thank dr. Annalisa Costa for assistance and precious advice in the editing of this paper.

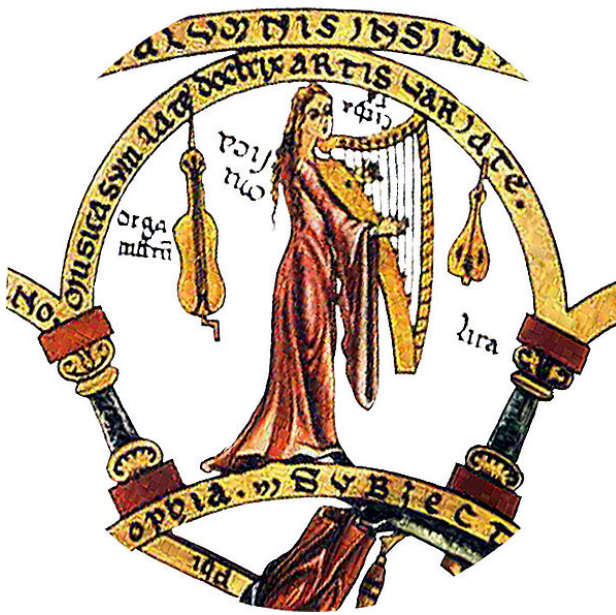


Figura 1: Organistrum from Hortus deliciarum Hohenburg Abbey, Alsace.

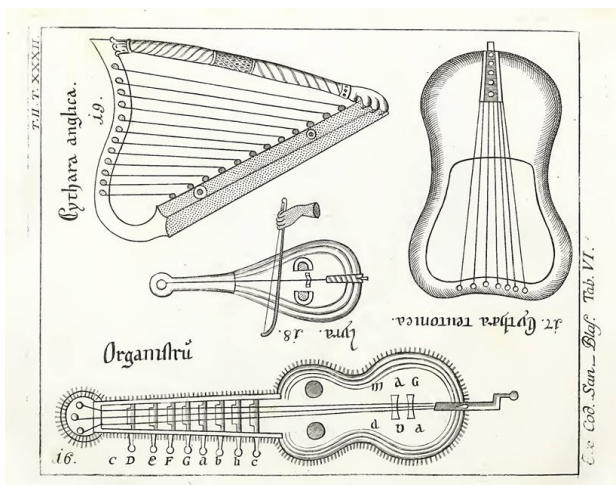


Figura 2: Organistrum from Martin Gerbert, De cantu et musica sacra, 1774.

Available documents, dating between the end of the 11th and the first half of the 13th century can be divided in two groups: manuals of music theory and drawings.

Many manuals of music theory propose a *mensura organistri* that corresponds to the Pythagorean C scale, but there are few specific references to the instrument itself. For example, an elementary description of the keyboard: “*Omnes voces organistri elevatione et depositione lignorum intenduntur ...*”. In many manuscripts the keys are called *plectra*. The name *magada* always indicates the bridge, as in the



Figura 3: Keyboard inspired by Gerbert's drawing.

monochord. The wheel is called *rota* or *rotula* (MEYER 1996, pp. 205-214).

A drawing of the instrument, accompanied by the caption *Organistrum*, in 12th century Herrad von Landsberg's *Hortus deliciarum* shows a figure eight sound box, three strings, a crank at the bottom (fig. 1).

Another drawing, in Martin Gerbert's *De cantu et musica sacra* (1774), was copied by the author from a 13th-century manuscript in the Library of Saint Blasien (fig. 2). It is impossible to compare the copy with the original, lost in a fire. Anyway, both the name of the instrument and the Pythagorean C scale are clearly indicated in the drawing. The word *magada* appears besides the wheel and the bridge. We can observe the figure eight soundbox, three strings, crank, wheel, a keyboard mechanism clearly depicted. It has been demonstrated that a rotational movement of the keys with tangents acting from under the strings does not work properly (BONO 1989). If, on the other hand, the keys are crafted as levers acting from above, the keyboard works perfectly (fig. 3). This idea is confirmed by miniatures in two manuscripts. The earliest one is from Cod. Sal. X,16, Hildegard of Bingen, *Liber Scivias*, late 12th century to c. 1220 in

Universitätsbibliothek Heidelberg (fig. 4). The second one is from a copy of Rudolf von Ems, *Weltchronik* (1340) (fig. 5): a single musician is pulling the keys toward himself.



Figura 4: Cod. Sal. X, 16, detail of f. 177r, Hildegard of Bingen, *Liber Scivias*, late 12th century, c. 1220, Univeritätsbibliothek, Heidelberg.

### 3. Other Depictions

We know many other depictions of the *Organistrum* scattered across Northern France, Spain, Northern Italy and England, all of which belong to the 12th century. I do not intend to represent the entire serie, already well described by several authors (Christian Rault, Antonio Poves, Aleys Wykington). I would like to focus on the five



Figura 5: *Organistrum* from Rudolf von Ems, *Weltchronik*, 1340.

depictions I consider the most significant, listed in chronological order and named according to the place in which they are kept: *Boscherville* and *Vercelli* belonging to the first half of the 12th century; *Hunterian Psalter*, *Toro*, *Santiago de Compostela* to the second half.

**Boscherville** (fig. 6). The sculpture comes from the destroyed cloister of 11th-12th Saint George's Abbey in Boscherville, France. The sound box of the instrument, less than 5 inches long, is made up of two oval parts connected by two lobes. We can observe three strings, fingerboard with six keys, crank, a hole in the place of the wheel.

**Vercelli** (fig. 7). A 18th century engraving, now in the Civic Museum of Vercelli, northern Italy, shows a mosaic of the no longer existing basilica of Santa Maria Maggiore, representing King David with ten players. The mosaic is dated between 1140 and 1148. The instrument looks long and slender, with three strings, a crank, a wheel, six keys along the fingerboard.

**Hunterian psalter** (fig. 8). This image is part of a large miniature contained in the so-called *Hunterian Psalter*, about 1170, at the University Library of Glasgow. King David is surrounded by players of various instruments. The lower part of the *Organistrum* sound box has circular shape, the





Figura 6: Organistrum, Boscherville.



Figura 8: Organistrum, from Hunterian psalter.



Figura 7: Organistrum, Vercelli.

upper part is oval, the two parts are connected by lobes. The keys are not clearly depicted.

**Toro** (fig. 9). This sculpture is located on the northern portal of the Collegiate Church of S. Maria la Mayor at Toro, Spain. It is part of the group of the 24 elders of the Apocalypse, sculpted in the second half of the 12th century. We can count the exact number of keys on the keyboard: 10 within the half of the *diapason*. The two parts of the sound box are circular. We can also observe a very sturdy key box, eye-catching decorations and elaborate sound holes.

**Santiago de Compostela** (fig. 10). The instrument occupies the top of the *Portico de la Gloria*, completed in 1188 by *magister Mateus*. It is

played by two of the 24 elders of the Apocalypse. Twelve keys are placed within the half of the *diapason*, leading many to think they may belong to a chromatic keyboard.

The *Organistrum* is depicted in instrumental groups either related to the parade of King David (Old Testament) or to the group of the 24 elders of the Apocalypse (New Testament). On this aspect I would love to mention a significant opinion:

*“At any rate, the Organistrum was not conceived as a relative or a surrogate of the organ for the embellishment of sound within the temple. For instance, the presence of an organistrum amidst the twentyfour elders of the Apocalypse of the Gate of Glory...and the collegiate church at Toro (Zamora), does not mean that such instrument conducts any kind of concert, but that it symbolically represents the study of the language of sound, mathematical speculation and cosmological order, and the approach to the divine essence. The elders are not making music, but rather preparing themselves – some of them are tuning their instruments – both intellectually and spiritually to face the advent of a new order of things” (DE CASTELLET 2014).*

It is largely accepted that the *Organistrum* originated from an instrument used to measure the pitch of sounds. Nevertheless, some have considered the possibility that it evolved into a



Figura 9: Organistrum from the Collegiate of Toro, Spain.



Figura 10: Organistrum from Portico de la Gloria, Santiago de Compostela (photo Alejandro Gangui).

proper musical instrument. In order to consider this possibility, it is necessary to identify its musical function.

#### 4. The music

The *Organistrum* is always depicted and described in the context of sacred music, in sources of the 11<sup>th</sup>-13<sup>th</sup> centuries. Ecclesiastical composers were experiencing new forms of polyphony: *organum melismaticum* or *floridum* (Saint Martial de Limoges and *Magnus liber organi de Notre Dame*), *discantus*, *clausula* and *conductus* (*Codex Calixtinus* and *Magnus liber organi de Notre Dame*).

Sacred music of the time theorizes and employs the Pythagorean diatonic scale only. The series of bells and the keyboard of *Romanesque organ* do not include *fictae* other than *Bb*. The keyboard of *Romanesque organ*, for example, covers the compass of two octaves starting from C and it is made up of rods that the musician must extract to open the

orifices of the pipes and reposition to close them (FERRANDO 2015). By this system, it is possible to perform a simple melody, such as a Gregorian chant, possibly accompanied by a drone sound, or perhaps, according to Julien Ferrando's experience, even a more articulated *vox organalis* (repertoire of Saint Martial de Limoges). The analogy between the Romanesque organ and the *Organistrum* is quite evident: the relative slowness, due to the system of operation of the keys, the diatonic scale, the exclusive use in the ecclesiastical sphere, and the action of two operators.

My opinion is that the *Organistrum*, as well as the *Romanesque organ*, can play an important role performing the *vox principalis in organum melismaticum*, providing a solid anchor to the complex ornamental part. Then, the instrument was gradually abandoned by the half of the 13<sup>th</sup> century, probably because of the larger diffusion of pipe organs in churches.



Figura 11: Carving the soundbox in a cedar trunk.

## 5. Medieval lutherie

We have no direct information about medieval luthiers. We do not know their social role, neither any of their names, they were not gathered in any specific society. Maybe they were grouped into the Guild of the *lignarii* (cabinet-makers).

Specialized in several crafts, ranging from the preparation of parchment and leathers, to cabinet-making and carpentry, many artisans were housed in monasteries and cathedrals. Some resided permanently at the ecclesiastical institutions, while others stopped only for that time necessary to carry out particular works. The sculptors made the statues and all the stone ornaments of the portals and capitals. Observing the accuracy of the representation of musical instruments, in particular those of Chartres, Santiago de Compostela, Notre Dame de Paris, Toro, and Orense, one might think that the sculptor and the luthier were the same person. Furthermore, the surviving medieval instruments are carved in a single piece of wood. The medieval luthier proceeds by shaping the wooden block on the external part first, then by emptying the sound box, reaching the desired thickness through long, patient work. Then he continues by smoothing the external surface, perhaps decorating it with motifs in bas-relief, and finally closing the sound box with a skin or with a wooden soundboard. The sound box can be hollowed either by leaving the front open or by leaving the bottom open, as in medieval harps, *clarsach* of the British Isles, Norwegian *langeleik* and some types of psalteries from eastern Europe.

I built four replicas of the *Organistrum*. The first one, inspired by the miniature of *Hunterian psalter*, is carved out of a single piece of white poplar using gauges and mallet and covered with a spruce soundboard. In my first replica of the Compostela instrument I hollowed out a trunk of red willow, and subsequently glued the spruce soundboard to it. For the second replica of the Compostela *Organistrum* I carved the body out of a cedar trunk, then glued the back of cypress (fig. 11). In none of these instruments I put the sound post, according to the majority of scholar's opinions on the subject. The wood has been selected on the base of its acoustic and mechanical characteristics only, since no specific information are available in literature. Information about glue and varnish is lacking too, so I used natural hide glue and two coats of linseed oil to protect the wood, taking

these recipes from the oldest known craftsmen's tradition.

### 5.1 - The wheel

The *Organistrum* is the earliest wheel-instrument, being the ancestor of *Symphonia* and *Hurdy gurdy*. From the latter we get the idea of a wooden wheel whose edge is covered with rosin. We cannot be sure that 12<sup>th</sup> century *Organistrum* wheel was exactly the same, but we don't have enough evidence of the contrary to change our opinion. The wooden wheel is fixed directly on a wooden axle and the wheel causes the strings to vibrate via smooth onward rotation.

### 5.2 - The nut

In Gerbert's drawing, the pegbox is easily recognizable: the nut is visible between the pegbox and the keyboard, just like in a figure eight viella. The same feature is found in Vercelli and Hunterian psalter pictures. In the sculptures of Toro, Compostela and Orense (Galicia, Spain, early 13<sup>th</sup> century, by disciples of *magister Mateus*) the keyboard is contained in a rectangular box hiding the tangents, the nut, and the mechanism. Determining the exact position of the nut in these



Figura 12: Organistrum, Orense.

specimens is problematic. In Orense cathedral the distance between the outer edge and the first key would be sufficient to accommodate the nut (fig. 12). In Toro and Compostela instruments, on the contrary, the first key is too close to the end of the box to be considered a proper key (figg. 9 and 10): what appears to be the first key is the nut. Then, the proper keys in Toro instrument are 9 and not 10, in Compostela 11 and not 12.

5.3 - The keyboard

In all depictions, the key row ends within the middle of the *diapason*, suggesting that the musical scale was limited to one octave only. The space between the keys is always approximately the same, suggesting that none of these images can be considered absolutely reliable, though the logical division of the keyboard must be the diatonic one, counting no more than 7 or 8 keys.

Then, the fact that Toro and Compostela sculptures show more than 8 keys presents us with a dilemma. They are either unfaithful depictions or the keyboards of those instruments included one or more *fictae*. They could be, on the contrary, approximate representations of the real instruments in which the row of the keys in the diatonic sequence exceeds the middle of the string. For example, did the Toro artist divide the octave in 9 intervals, following the original? Therefore we should suppose the presence of one *ficta*: probably

F# in a C scale, but the introduction of F# in sacred music at the age is not proved at all. If, on the contrary, a D4 final key was added in the real instrument, it very slightly exceeded the strict half diapason measure. In the case of Santiago de Compostela, being a chromatic scale totally anachronistic, a row of 11 keys in a diatonic range would imply that two tones and a semitone went largely beyond the middle of the string. This is problematic. The only way to build the keyboard of Compostela *Organistrum*, both respecting a diatonic sequence and keeping eleven keys within the half of the *diapason*, is by shifting back a semitone step the middle string nut and to tune the strings in octaves, A2 the outer strings, A3 the middle one, as in fig. 13.

The keys have hurdy-gurdy-like tangents and vertical movement (as clearly witnessed by Toro sculpture in which the left hand of the musician evidently raises the second key above the others (fig. 9). In Orense (fig. 12) the square section bars sticking out of the bottom of their housing are visible. The key's vertical movement is also deduced from the lower end of the sixth bar, slightly raised up).

Keys 3\*, 4, 6, 8\*, 9, 11 touch only the outer strings to play the notes of the lower octave: B3 C3 D3 E3 F3 G3. No key, and no need, for Bb in the first octave, since it is not foreseen by the Guidonian *Gamut*. Key 1 acts on the central string passing under the nuts of the lateral strings to play Bb 3. Keys 2, 3\*, 5,

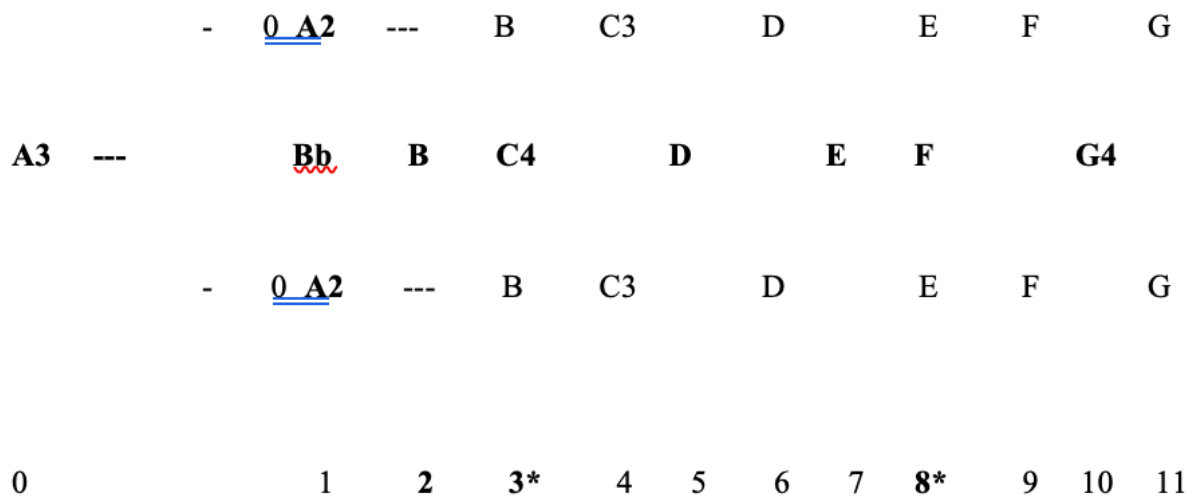


Figura 13: Scheme of diatonic keyboard with 11 keys within the half of the diapason.



Figura 14: A replica based on the scheme in fig. 13.

7, 8\*, 10 touch the treble string to play the notes of the highest octave: B3 C4 D4 E4 F4 G4. Keys 3\* and 8\* are the only ones enabled to act alternatively on the central string or on the side ones, after 90° rotation of the bar, to get B on the bass and F on the treble (fig. 14).

The scale starts at A2, the lowest note of the repertoire (cod. Pluteus, c.LXX r.), i.e. *vox principalis* of *melismatic Organa* in *Magnus Liber Organi* de Notre Dame. The *vox principalis* highest note is generally D4, and only in very rare cases F4 (code Pluteus, c.LXVII r. And LXXXIII, r./v.), while A4 appears only in non-melismatic compositions (i.e. code Pluteus, LXXXVIII r.).

This instrument works quite well, provided that the musician who turns the crank raise the middle string away when playing the notes of the first octave and the outer strings when playing the second octave. This way the musicians can use all the sounds of an average two octaves diatonic scale distinctly, but here is a significant variation in the

volume of the notes between the first and second octave, where the latter is weaker. The musicians can play 34 consonant double stops, 13 of which are thirds, fourths, fifths and sixths, 7 octaves and 21 consonances beyond the octave (tenths, elevenths, twelfths, thirteenth). The 13 double stops within the octave are: on G3 (minor third, major third, fourth, fifth, sixth); on F3 (major third, fourth, fifth, major sixth); on E3 (fourth and fifth); on D3 (fifth); on C3 (major sixth). Double stops can be used efficiently only performing all strings at once (A drone).

Anyway, I consider the instrument in Compostela as unique, while Gerbert's drawing offers us the best suggestion: the three strings tuned in C, are touched simultaneously by each one of the eight keys. The result is an instrument that keeps a constant volume throughout the simple diatonic scale. In another drawing (fig. 4) we see only two strings. The levers pressing the strings from above

against fixed bridges do work well (fig. 3) and allow a single man to play the instrument (figg. 4 – 5).

With regard to the number of keys in Toro and Compostela depictions, my last attempt to give an explanation is by considering them from an artistic/symbolic and theological point of view. The ten apparent keys of Toro instrument could indicate the ten Commandments, as clearly said for the ten strings of the psalterium (*Psalterium decachordum*) by St. Jerome in the *Epistola ad Dardanum*. Ten is also the *perfect number* for the Pythagoreans. The twelve apparent keys of Compostela *organistrum* could refer to the apostles of Jesus, the stars surrounding the head of the *Woman* in the book of Revelation, the tribes of Israel. They could also indicate the months of the year and the zodiacal constellations. Eventually, we should go a step beyond theology and consider astronomical science of the age. At the beginning of the 11<sup>th</sup> century, Abbo de Fleury (c. 940 - 1004) drew a grid to represent the planetary latitudes (EASTWOOD 1997). Alongside it, he placed the planetary musical scale, attributed to Pythagoras, described by Pliny the Elder in his *Naturalis historia*. Two titles introduce the scale: the word *DIAPASON* on the left and *ARMONIA* on the right. The distances between the Earth, the planets and the stars are designated by musical intervals: *semitonus*, *tonus* and *tria semitonia*. The unit of measurement of the scale is definitely the semitone: the octave that goes from the orbit of the Moon to the sphere of the fixed stars is divided in 12 semitones (fig. 15). A precise relationship between groups of twelve elements is established: 12 zodiac constellations (and 12 months), 12 degrees of planetary latitude, 12 semitones of the octave. The twelve keys of Compostela *Organistrum* could simply represent this new pattern of Celestial Harmony, a significant change from the traditional diatonic model derived from Plato's *Timaeus* (ILNITCHI 2002).

## 6. Summary

Cultivated monks measured the seven geometric intervals of the Pythagorean scale, corresponding to the heavenly scale model in Plato's *Timaeus*, using the monochord.

They decided to apply a wheel to it, in order to link in a *legato* the sounds of the scale using a system of keys, rather than shifting up and down a movable

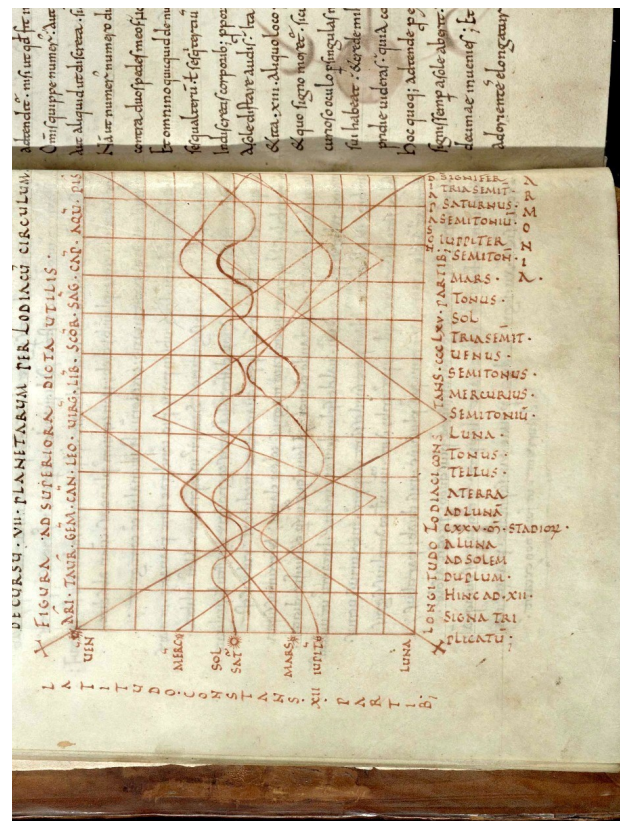


Figura 15: Planetary latitudes grid from MS R.15.32, p. 6, Trinity College, Cambridge.

bridge. To increase the volume they added one or two strings tuned in unison

Besides, the craftsmen had to improve their technique in order to achieve perfection in crafting the wheel. Failing that, the sound is graceless, annoying, and unbearable. The monks gave the instrument a figure eight shape so that the *Organistrum* could appear in the most iconic contexts of divine music: the procession of King David and the choir of the 24 elders of Apocalypse. It reaches its apotheosis in the *Portico de la Gloria* in Santiago de Compostela, where it occupies the apex of the entire composition. The Santiago instrument displays a complex decoration, which brings the symbolic character of the instrument to its highest degree of eloquence. Its 12 keys, arranged diatonically, are symbols of the celestial Harmony according to Pliny. The multi-millennial myth of the *Music of the spheres* is regenerated from time to time, from civilization to civilization, in new musical identifications. These creations are considered the echo of divine music, and one that substantiates and sustains the visible world and the invisible world, Heaven and Earth, the whole

Universe. During the 11th and 12th centuries, new experimentation in the field of polyphony took place: the *vox organalis* was no longer in *parallelum* and it was expanded in long *melismata*, the range of the upper part was raised by a fifth, therefore singing the ecclesiastical music required higher commitment and musical preparation. Using the *Organistrum* or the Romanesque organ was helpful to support the more complex texture of the new compositions, leading the performance of the *vox principalis*.

This change in polyphonic style finds an interesting parallel in the architectural language of sacred spaces, which breaks away from its former style, developing a new vertical momentum, bolder designs, more complex structures, and ornamentation.

## APPENDIX I

### 1. Iconographic data interpreted according to the ideologies of the time.

#### 1.1 - A peculiar shape

F.W. Galpin in *Old English instruments of music*, 1910 writes: “*The Organistrum was about five feet in length and the incurvations, retained, it may be, from its former use as a simple bowed instrument, afforded also a convenient method of supporting it securely by the knees*”.

The author refers to the shape of a bowed instrument (the *Giga*) often depicted in the same musical groups in which the *Organistrum* appears.

Christian Rault in his study “*Was the “medieval viol” a Giga?*” (RAULT 2003) observes:

“*Just as the shape, the way the instrument was held and the playing technique of the “eight shaped instrument” contrasted markedly with those of the medieval fiddle, so its musical function was also very different. The organistrum which originated in Benedictine abbeys is clearly associated with the religious practice of song.*

*The technical complexity of this instrument (which is both difficult to make and difficult to regulate) may explain why it needed to be simplified. The giga resembles an organistrum without its mechanical equipment: the handle, axle, wheel and keyboard. It is hardly a coincidence if this instrument devoid of mechanical artifacts made its first appearance in 1109 in the Cistercian community rather than among the Benedictines.”*

According to Galpin, the *Organistrum* borrows its shape from the *Giga* (fig. 16), according to Rault it is the opposite. Nevertheless, we must remember that in four depictions the *Organistrum* does not resemble a *Giga*, presenting a guitar-like outline: *Hortus deliciarum*, H. Von Bingen, Gerbert and Rudolf von Ems (figg. 1, 2, 4, 5). The figure eight shape has no lobes in the middle.

Anyway it is worth trying to better understand the origin of the peculiar shape linking the *Giga* and the *Organistrum*, keeping in mind that our modern way of thinking is deeply different from medieval culture.

The *Organistrum* and *Giga* probably never crossed the borders of religious communities and continued to be used for only barely over a century. Within this context, they had to play a peculiar function and took on a symbolic value in depictions. It is interesting to broaden the investigation beyond purely technical and structural elements, by turning our attention to the ideology, theology and spirituality that lively characterized that fermenting cultural environment. I have identified three main sources of reference: the Christian exegesis of the Bible, the school of Latin Platonism and the Jewish Kabbalah.

#### 1.2 - Christian exegesis.

The two parts of the sound box can be considered as a symbol of the two spheres of creation, spiritual and material, crossed by the cosmic sound – the *Vox Domini* – produced by the three strings on which the divine language is modulated. According to Christian numerology, the number 8 indicates the step that goes beyond the Creation, which consists of 7 days, and represents Regeneration and Resurrection. The “8” shape is also observed in the depictions of the Tree of Jesse, frequent in Christian art between the 11<sup>th</sup> and 15<sup>th</sup> century (fig. 17), which represents the flowing lineage from Jesse to Jesus. The connection between the two Testaments seems significant. The group of 24 elders of *Revelation*, indicating the 12 tribes of Israel and the 12 apostles of Christ, represents the ultimate fusion of the Old and the New Testament in the *canticum novum* of the heavenly Jerusalem. The two musicians playing the same instrument at the top of the arch seem to further underline this vision.

We must also take into due consideration the instrument's decoration. The soundboard of the Toro instrument is decorated with motifs that could



be defined as stellar, common to those of other instruments of the same portal. The keyboard lid is carved with circles intertwined around three flowers with four petals. In Compostela *Organistrum* we observe the large cross in the center of the second circle and the wicker braid along the keyboard, all framed by a necklace of headbands. The first symbol recalls the Gospel phrase: "I am the vine and you are the branches" (John, 15.5) while the intertwining suggests the image of "Jacob's Ladder" (Genesis, 28.12). Note that, while the decorative elements of the large rosette are common to other parts of the sculptures of the Portico, the wicker braid is found only in this detail. The keys are 12, like the 12 tribes of Israel, like the 12 apostles of Christ, like the 12 stars around the head of the Woman of the Revelation (Revelation, 12.1-2). The small circles carved all around the edge of the instrument could represent the stars of the firmament.



Figura 16: Giga from the cathedral of Angers, 12th century.

### 1.3 - Latin Platonism

The school of medieval *Latin Platonism* left a precise image of the universe, as borrowed from Plato's *Timaeus* mainly. The Cosmos revolves around a center, occupied by the Earth. The circular motion of planets and *firmamentum* produces a sound that cannot be perceived. The movement of the wheel, which draws a continuous sound from the strings (*the Being*), represents the rotation of the planets, *the circle of the Different*, which is inserted into the first circle of the sound box, *the circle of the Identical*. This constitutes a representation of the *Soul of the World*. The second circle of the sound box represents the material world, the beauty of Nature divided into four elements, the stars all around. The keyboard symbolizes our rational soul that rectifies and discerns. In the Compostela *Organistrum*, a row of small circles, representing the stars, is the pattern common to all perimeters of the instrument: *the abstract idea* of the stars in the first circle, *the material stars* in the second circle and our *knowledge of the stars* in the straight sides of the keyboard. It is perhaps not by chance that the instrument's *diapason* is equal to the circumference of each circle of the sound box, highlighting that our knowledge consists in *adaequatio rei et intellectus*.

The large rosette in the center is divided into four equal sectors by a pair of orthogonal axes. The sectors are occupied each by a five-lobed leaf. These leaves (microcosm) are the same, but smaller, than those in the band that surrounds the 24 elders (macrocosm). The partition into four zones can indicate either the four elements of matter or the four seasons of the year. This figure is built on a simple scheme, reminiscent of the diagrams of the seasons frequently drawn in the astronomical manuscripts of 9<sup>th</sup> – 12<sup>th</sup> centuries (Eastwood 2007). It is a reminder of the constant effort made by the monks to calculate the liturgical calendar and to mark the times of daily prayer throughout the four seasons (McCLUSKEY 1998). The decoration pattern that adorns the keyboard lid is relatively common in European art from the 9<sup>th</sup> to the 12<sup>th</sup> century. In the cathedral of Santiago, however, it is found only within this detail. It is a possible reference to *the golden chain*, according to the expression of *Somnium Scipionis* (1.14.14, 15): «*a summon deo usque ad ultimam rerum faecem una mutuis se vinculis religans et nusquam interrupta conexio*». The wicker braid consists of four interlaced strands that form eleven nodes, each one corresponding to a key of

the keyboard. It is significant that the twelfth key falls outside the weave (being the nut, not a key).

#### 1.4 - An extra suggestion: *Sefer Yetzirah*, the Book of Creation.

This book is certainly the oldest and most mysterious of the Kabbalah. It is a short text, between 1300 and 2500 words, known in different versions (KAPLAN 1997). The first commentaries of it date back to the 10<sup>th</sup> century. The content, concerning the process of creation of the world and man, revolves around the 10 (or 11) Sefirot, attributes or emanations of God. Man can return to his Creator by ascending through the Sefirot: their representation, arranged on a plane, is generally named the *Tree of life*. The similarity between this figure and the structures of both the *Organistrum* and the Giga is surprising. Going deeper into the description of the Tree of Life and its meaning reveal similarities and analogies that go far beyond simple appearance.

All the fundamental parts of the *Organistrum* structure can be identified in the outline of the Tree of Life (fig. 18). The Sefirot seem to correspond to the functional parts of the instrument: pure Will moves everything (the crank), Knowledge is the wheel, heart of the instrument, between Wisdom and Intellect. Love and Strength (the lobes) create the conjunction between the two circles. Beauty corresponds to the magnificent carved rosette, Foundation and Throne introduce the ladder of Angels (the decoration of the keyboard) and the material world outside. The first and the last of the Sefirot are the cause and the effect (Alpha and Omega in the Apocalypse), displayed in a relationship of reciprocity: they are the beginning and the end, the extremes of the spiritual dimension for which they define a unifying axis. The Sefirot are distributed along three main lines, corresponding to the three *mother letters*: *Aleph*, *Mem*, *Shin* (respectively Air, Water, Fire). There exists continuous interaction along the paths that connect one Sefirot to the other. These connections are represented by the letters of the Hebrew alphabet, and their sound. It is in fact sound that animates the essence – and only through sound we may encounter it, albeit episodically and in a non-rational way. It represents the divine word that creates and keeps the Universe alive, the divine sound that angelic creatures, messengers of the Unknowable, can bring to our world. The to and fro movement of consciousness between the



Figura 17: *Tree of Jesse* from *Vitae Sanctorum*, *Notre Dame de Citeaux*, Abbey, 12th century.

world of the Sefirot and the physical one is symbolized by the movement of the bow in the Giga. The divine word follows a spiral motion, a vortex, a tornado, this image being concretized in the *Organistrum* wheel. Moreover, the figure of the *supernal man* (symbolic being, according to Hildegard von Bingen (BALTRUSAITIS 1937-40)), can be represented by the arrangement of the Sefirot (fig. 19). This vision is realized in the *Portico de la Gloria*, where Christ represents the *supernal man* in the spiritual dimension and the *Organistrum* above his head the microcosm. The latter, in the hands of the two elders, is also an image of the living creature (Golem) which is animated by imitating the divine procedure.

Important phenomena of exchange, comparison, and communication at the level of theology, biblical



Figura 18: Comparing the structure of Organistrum with the Tree of life.

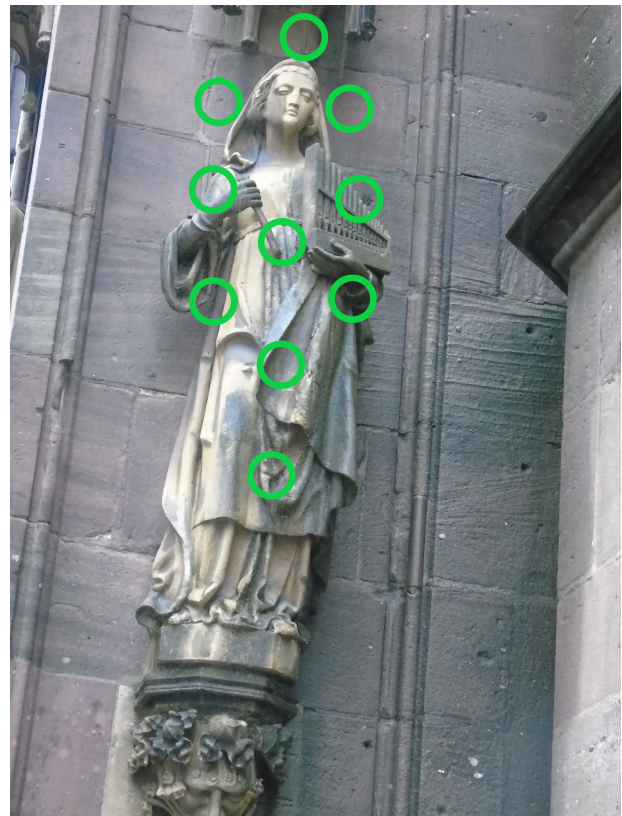


Figura 19: The Sefirot and the human body.

exegesis, and philosophy between Jews and Christians took place in the period and geographical area of our interest (*Dialogus*, 2014). The Jews were not persecuted, as being considered custodians of the old law in the original language. The catholic side was aware that there were uncertain passages in the latin version of the Bible and tried to compare them with the original hebrew text. At the beginning of the 12<sup>th</sup> century, such a desire led the Abbot of Citeaux, Etienne Harding, to consult directly with the Jewish scholar Rashi de Troyes. In Paris, André de Saint Victor uses a version of the Bible based directly on the Hebrew, called the *hebraica veritas*. Such is the way Jewish and Christian exegesis came into contact and can be compared (VAUCHEZ 2012). In the medieval *translatio studiorum*, knowledge circulated from Baghdad to Cordoba, to Toledo, from Toledo to Naples, to Paris. The philosophical and scientific heritage of classical Greece, Persia, and India was translated in Iraq and Abassid Syria between the 8<sup>th</sup> and 9<sup>th</sup> centuries, then exported to Spain and translated in Latin during the 11<sup>th</sup> and 12<sup>th</sup> centuries. The Jewish scholars carried out the translations of books from Arabic to Latin and passed them on to Christian monks. The Old

Testament constitutes a common ground, the reference to the same knowledge, a reserve of words, expressions and symbols, which, in a shared language, determines the fruition of the same biblical text.

## APPENDIX II

### Modern replicas of Organistrum: a survey

It is possible to divide the replicas into three groups, depending on tuning and keyboard.

#### *Diatonic*

The wooden keys, arranged diatonically, touch only one or two strings, leaving the others as drones. The result is a melodic instrument that has a fundamental characteristic common to many folk instruments: the drones, the tuning being octave and fifth, or fourth.

#### *Chromatic*



Figura 20: Detail of a polyphonic-chromatic keyboard.

The strings are tuned in octave and fifth, or fourth, for example: C3 – F3 or G3 – C4. Alternative tuning: two strings tuned a fifth above the bass (Kurt Reichmann). The keys, arranged along the degrees of a chromatic scale, touch all three strings simultaneously (RAULT 1985), they are plungers with tangents, in the majority of the instruments, or levers (Luengo in sitography, and my instruments, figg. 3 and 11).

This type of *Organistrum* is conceived to play only *organum parallelum* style. Surprisingly, the original repertoire does not require the use of a chromatic scale. Despite the instrument being limited to one octave only, some authors (RAULT 1985, Luengo in sitography) claim that a chromatic scale like this “allows to explore all the possibilities of the hexachord and to make transpositions”.

#### *Polyphonic-chromatic*

To expand the possibilities of a chromatic keyboard like the previous one, using the same tuning, each key should rotate 360°, bringing the tangents fixed on each bar to touch different strings every 90° (fig. 20). In the first position, the key acts on the first string, in the second position on the second string, in the third position on the third string. This allows the player to play two melodies simultaneously, acting on two keys at a time. It is possible to perform two parts polyphonies like 12th century *organa*, *conductus*, *motets*, contemporary to the instrument, not too fast. Being able to dispose of two almost complete chromatic octaves, you can

actually transpose the melodies. Anyway, not all double stops of the original compositions can be performed, and it is not possible to change pair of keys without hearing the sound of open strings during the passage, except in the fourth position of the keys, when two tangents act on the two higher strings and the bass is a fixed drone.

Unfortunately, despite all these efforts, the presence of *Organistrum* in performances and recordings of the last forty years remains absolutely marginal. Just consider the discography: were not mentioned in the sleeve notes, it would be difficult to even notice its presence. Its function is mostly reduced to the performance of drones, barely audible at the beginning and at the end of tracks. In live performances, the instrument is often exhibited in the center of improbable medieval orchestras as an unusual, hardly audible and definitely bizarre object.

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