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ORGANISTRUM IN SANTIAGO DE COMPOSTELA: SYMPHONIA COELESTIS

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ABSTRACT

The famous Portico of the Glory in the Cathedral of Santiago de Compostela (Galicia), dedicated to St. James, recently also examined in an interesting archaeoastronomical perspective (Vilas Estevéz and Gonzalez-Garcia, 2016), has been built following an iconographic project inspired by St. John's book of Apocalypse (Moralejo, 1988). At the top of the main arch, in the middle of the 24 venerable men's row around Christ's throne, there is a peculiar musical instrument - equipped with a wheel - played by two of them. The particular position, the extremely accurate details and the peculiarity of the instrument underline the importance of an object whose origins, symbolism and actual musical role (Lopez-Caló, 1988) have never been completely explained.

The most intriguing features are: a) 12 interval division of the octave; b) wheel used to produce sound; c) general shape and decorations. In this article we introduce a possible interpretation of Symphonia (the so-called Organistrum) as a sampler of cosmological and astronomical knowledge typical of European culture from the ninth to the twelfth century (Eastwood, 1987; McCluskey, 1998). Close relationship between astronomy and music in platonic-pythagorean doctrines is confirmed through detailed analysis of astronomical texts in manuscripts copied in Benedictine scriptoria from Carolingian Renaissance onwards (Eastwood, 2007).

Beyond general reference to Plato's Timaeus, through Macrobius and Calcidius commentaries (Martello, 2011), the main suggestions for our study come from interesting diagrams (Eastwood and Grasshoff, 2004) found in these manuscripts (e.g.: clm 14436, f.61r, Munich Bayerische Staatsbibliothek).

KEYWORDS: Symphonia Organistrum, Cathedral of Santiago de Compostela, musical instrument, cosmology

1. INTRODUCTION

Probably at the end of the 11th century a wheel and a keyboard were added to a large-size bowed Lyre, like those painted in San Millà de la Cogolla Beatus manuscript (Figure 1). The playing position

had to be changed, in order to allow two musicians to operate properly on the same instrument (Figure 2). In some sculptures no keyboard is actually visible (e.g. Ahedo de Butron, Soria, Spain).



Figure 1. *Beatus de la Cogolla*, chapter XV, 2–3.



Figure 2. Upper: Capital from Boscherville Abbey, France; Lower: Ms. Hunter 229 f. 21v (Glasgow University Library).

Since this object does appear only in sacred contexts, many authors conclude that it was devoted to accompany early polyphony such as *Organum parallelum*. Unfortunately, there are reasons to reject this idea:

1. *Organum parallelum* had been described since the ninth century in texts as *Musica enchiriadis*, *Scholica enchiriadis* (late ninth-century), *Micrologus* (eleventh-century), *Winchester Troper*

(eleventh-century). No instrumental accompaniment was needed of course, since natural consonances as Octave, Fifth and Fourth are easily tuned by ear.

2. Whether you want to accompany simple polyphonies like those, you don't need such a complex instrument as the "two men lyre". A large-size bowed Lyre would work better. The instrument painted in the quoted manu-

script from San Millan had two long strings passing over the fingerboard (tuned a fifth or a fourth apart, we guess), while the middle one ends under the fingerboard, acting as a drone (possibly an octave above the bass string).

Much more likely the “two men Lyre” had been invented in order to play and accompany the *two voices* polyphonies becoming popular in monasteries during the 11th and 12th centuries, such as *organum per motum contrarium*, *Organum floridum* or *melismatum* and free organum to be found in several manuscripts as *Ad organum faciendum* (about 1100), *S. Martial de Limoges music collection*, *Codex Calixtinus* (*Santiago de Compostela*), *Magnus liber organi* (*Paris*).

After that, we note that the instrument was quickly dropped out, due both to the increasing complexity of thirteenth-century polyphonic music and to the developing of Organs (Ferrari Barassi, 1979; Ferrari Barassi, 1983). Then simpler instruments derived from it, played by one musician, were adopted.

2. SANTIAGO DE COMPOSTELA GATE OF GLORY

The Gate of Glory is the main door of Saint James Cathedral in Santiago de Compostela, has been sculpted by an artist known as *Magister Mateus* and opened in 1188 (Figure 3). The instrument at the top of the gate is famous for excellent workmanship and beautiful decorations.



Figure 3. Full representation of the Gate of Glory.

The shape of the sound box is an “8” made of two identical circles connected by two little lobes. The outline between the sound box and the keyboard is a broken line. The two little instruments sculpted at both sides of it have the same shape but different proportions. The musicians are holding the instrument on their knees, looking at each other (Figure 4): the first is turning the crank with his right hand and his left hand is on the middle of the sound box. The second musician is handling the keys with both hands, thumbs outward. No one knows which was

the mechanism of the keyboard. A widely adopted solution is to make keys that you can lift up and drop down. Some authors suggest that the keys were turned, but all attempts to make instruments with revolving keys have been rather unsuccessful.



Figure 4. The two musicians with the “double instrument”.

3. SYMBOLISM

The Gate of Glory is crowded by statues bearing different kinds of stringed instruments (Moraeljo, 1988). At the very top of the gate two of them are playing a beautifully carved and decorated instrument, the so-called *Organistrum*. This curious object has been largely studied and several reconstructions have been proposed and carried out by scholars and luthiers during the past 40 years, nevertheless some aspects are still uncertain, such as its symbolic significance and its peculiar musical role (Luengo, 1988).

Its special location is the first sign of its importance. On the opposite side of Saint James shrine, illuminated magically by an architectural device (Villas Estévez and González-García, 2016), the statues of the extrados of the Gate of Glory represent the 24 elders of the Apocalypse. They can be symbols of Time (24), Music (musical instruments) and Divine symphony (they are heavenly creatures) (Lopez-Caló, 1988).

The two performers at the top are very close to Christ’s head, a position usually occupied by angels (Figure 5). Compared to the other musicians they look to be the only two actually playing their instrument, the most complex of all. Closer observation of its features sheds more light on its deep symbolic significance. A turning object, the wheel, creates the sound from strings stretched over a sound box made of two equal circles, to which an unusual keyboard is added, equipped with 11 keys, so that

the octave is divided into 12 parts. One needs to refer to theological, philosophical, mathematical and musical theory of the age to give a reasonable interpretation of all these unusual features. Medieval Lat-

in Platonism, for example, mainly related to the Chartres cathedral school, and well-connected with Paris and Santiago, brings to us interesting suggestions (Albertazzi, 2010).



Figure 5. Christ's head and the two central Elders.

4. COSMOS ACCORDING TO PLATO

In *Timaeus* Plato says that, at the beginning of creation, making the World Soul, the Demiurge mixed three abstract elements: Being, Sameness and Difference. Having divided this compound into the right proportions of a Pythagorean diatonic musical scale he finally gave the World Soul the shape of two circles one inside the other and put them into the material World, thus creating both the Sphere of fixed stars and the plane of the planetary orbits. Circular motions of planets and stars were thus connected in perfect harmony, like the strings of a well-tuned

Lyre or the pipes of a well-cut Pan flute (Martello, 2011).

5. THE INSTRUMENT: STRUCTURE AND DECORATIONS

The first circular part of the sound box, the Circle of Sameness, contains the wheel, symbol of planetary motion, the Circle of Difference; this is the origin: the invisible World Soul. Then the other circle is added, the visible world, symbol of Cosmos, with its charming beauty. Finally we find the keyboard, with 11 keys dividing the octave in parts, the symbol of human mind, which divides and measures in order to understand natural phenomena (Figure 6).



Figure 6. Symphonia coelestis.

Therefore, the widespread philosophical principle “*Veritas est adaequatio intellectus et rei*” (“Truth is an adjustment between intellect and things”) is well described here, as we observe that the vibrating string-length (rectilinear thought) is equal to the circumference of each circle of the sound box (nature and the ideal world). Further suggestions come from the analysis of instrument decorations. A long line of dots runs all around the outline of it. They are symbols of the stars. From left to right: first circle, the idea of the stars in the abstract world; second circle, the visible stars; keyboard, our knowledge of the stars (straightened).

The large *rosette* in the middle represents the Visible World, a circular figure divided in four equal sections by two perpendicular axes. Each section is occupied by five lobes of leaves and twigs (these leaves are similar to those sculpted all around the 24 Elders). The division into four sections may refer to the four elements of the material world.

This figure recalls the diagrams of the seasons frequently drawn in glosses of 9th-12th century astronomical manuscripts. The main goal of any scholar was to calculate accurately the length of each season in order to obtain an exact and affordable calendar to establish with great accuracy both the dates of Christian feasts and the right hours for prayer in monas-

teries (McCluskey, 1998). Finally, *keyboard lid* decoration, unique among all other decorations sculpted in the Gate, shows a pattern that had been popular in some areas in northern Italy (Figure 7), Spain and Ireland between 9th and 12th centuries.



Figure 7. Decoration from S. Maria foris portam church in Lucca (Italy).

6. PLANETARY DIAGRAMS

Each knot of the interlace corresponds precisely to one of the 11 keys protruding out of the rectangular box. This division in fact is the most puzzling feature of all, as nobody could justify the introduction of a chromatic scale in 12th century, when only Guidonian hexachords were allowed. But we discovered that, curiously enough, both the unusual decoration and the division of the octave in 12 semitones could be related to diagrams of planetary latitudes, as well as musical scales, in contemporary astronomical manuscripts (Figure 8).

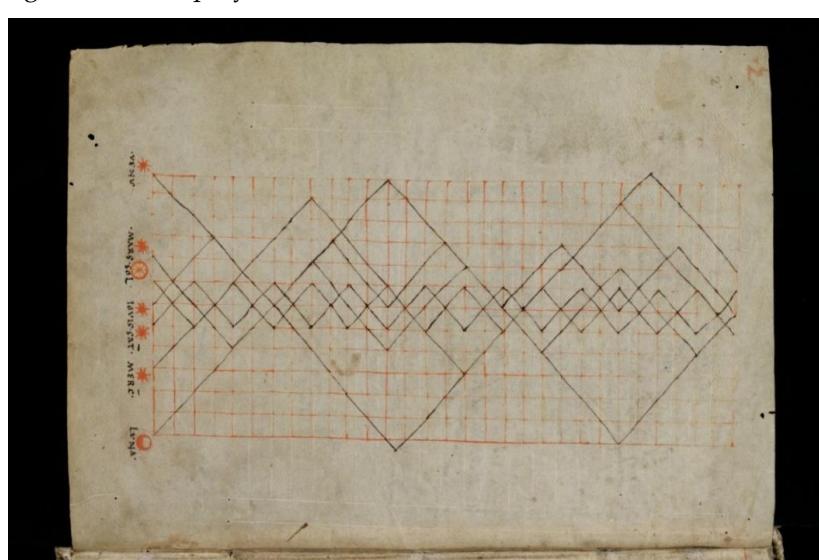


Figure 8. Planetary latitudes diagram from Cod. Sang. 250 (St. Gallen, Stiftsbibliothek).

Such diagrams were intended to describe planetary latitudes across the zodiacal band, divided vertically in 12 degrees. As usual the horizontal line of these grids was divided in 30 parts, but since the eleventh century we often find the number 12 signifying the 12 zodiacal signs. The Sun and Saturn were given a serpentine path within the two middle degrees of the zodiac, Jupiter had three degrees, Mars four, Mercury eight, the Moon covered the zodiacal band with its 12 degrees of latitude. Venus was as-

signed latitude of 14 degrees, one degree beyond the zodiac on each side (Eastwood, 1997).

Then, in a manuscript by Abbo de Fleury (about 940–1004) we find a horizontal column list of the Ptolemaic intervals between planetary orbits attached to planetary latitudes grid (Figure 9) (Eastwood and Grasshoff, 2004). Whether 14 semitones can be counted in total, the musical octave spanning from Moon to Saturn is divided into 12 semitones (semitone being the unit of measurement of the scale,

clearly enough). A keyboard with keys ranging about two full chromatic octaves demonstrates that this arrangement, despite the diatonic stiffness exhibited in sacred music, fits quite well into twelfth-century two voice polyphonic music, in original set-

tings, in *mutationes* and *permutationes*. The sixth key indicates the Tritonus, in the middle of the chromatic scale: musician's right hand is dangerously operating just aside.

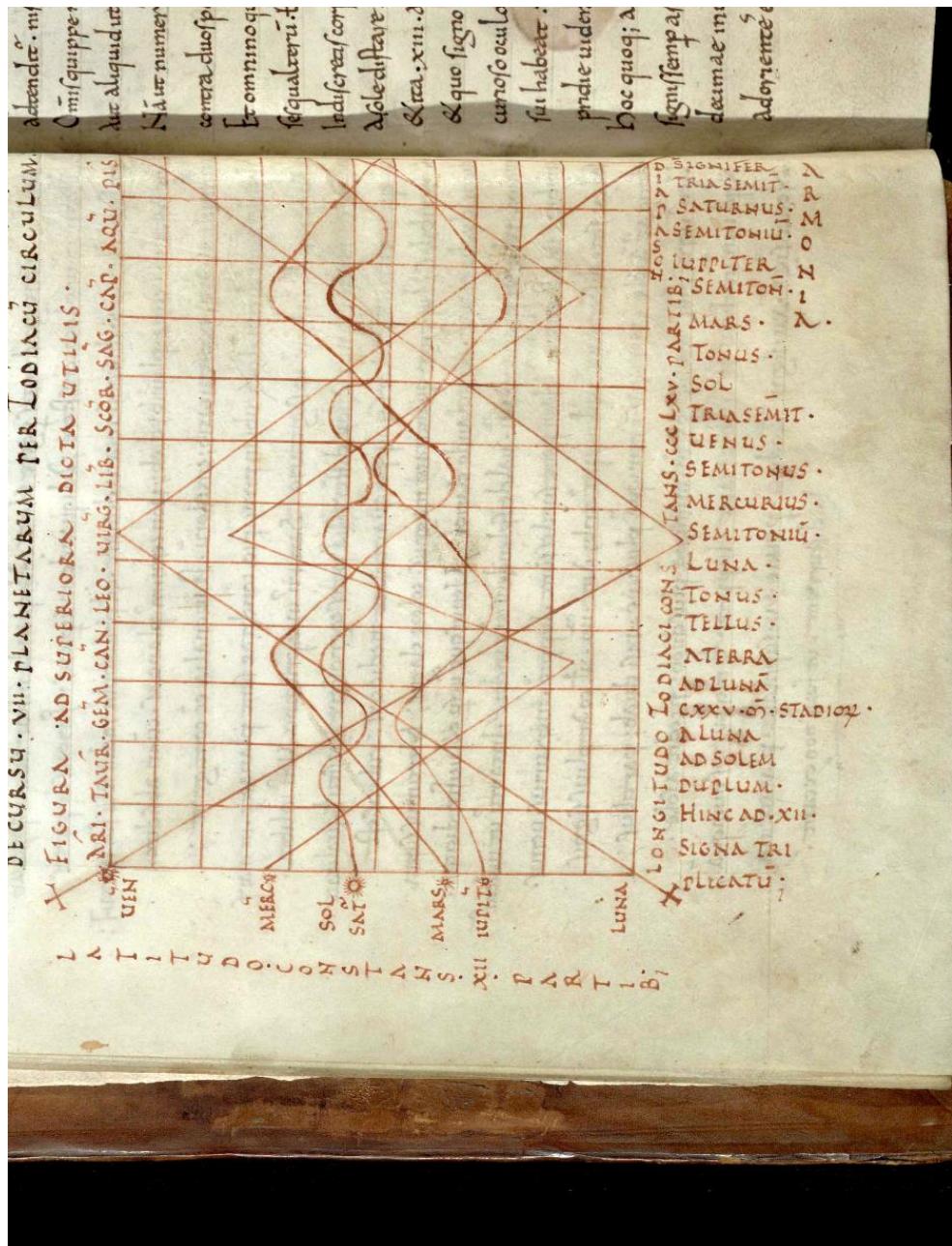


Figure 9. Planetary latitudes diagram and Plinian intervals from ms. R. 15. 32 (James 945), f. 4v (Trinity College, Cambridge, UK).

7. SYMPHONIA COELESTIS: A POLYPHONIC INSTRUMENT

By tuning the strings either (A-d-a) or (A-e-a) we get an overall extension of two chromatic octaves. Before lifting each key, the performer can choose which string he is going to touch, simply by turning the key to the proper position: the first one allows him to act on the bass string, the second on the mid-

dle one, the third on the higher string (Fig. 10). Thus it is possible to play two different melodic lines simultaneously. In the Santiago sculpture the hands of the musician on the right are on the third and on the fifth key. This means he is playing (c-g) rather than (d-f) stops on the bass and middle strings, or (g-c') rather than (f-d') stops on the middle and higher strings (first tuning) (Table 1).

In position 4 the key is provided with two tangents in order to act on the second and third strings (tuned either in Fifth or Fourth) at the same time to perform *Organum parallelum*, leaving the bass string as a drone. On the other side, the musician who is in charge of turning the crank, by a smooth, even movement of his right hand, can lift each string from the edge of the wheel in order to stop it vibrating with his left hand. This way you can either avoid conflicts between the voices or stop undesired drone effects.



Figure 10. Detail of polyphonic keyboard.

Table 1. According to Helmholtz's notation; e.g. # = sharp.

Head 1	Head 2		Head 3		Head 4		Sum
First string	A	a#	b	c'	c'#	d'	
Middle string	D	d#	e	f	f#	g	
Bass string	A	A#	B	c	c#	d	
Keys	0	1	2	3	4	5	

8. CONCLUSIONS

Organistrum looks like a summary of the main concepts of *musica mundana* (Boethius, *De Institutione Musica*), a retelling of the ancient myth of Music of the Spheres (Godwin, 1993; Lindberg, 1992). Thus *Symphonia Coelestis* could be its most meaningful name. It is not the first time in history that a musical instrument was assigned the role of representation

of Cosmos (for example, the Arabic Lute in its Persian origin and tradition) (Severini, 2015). Its representation in Santiago de Compostela could be an exclusive message for a restricted group of scholars capable of understanding the cosmological and musical implications of a non-traditional object that had been invented by scholars trained in the liberal arts of *Quadrivium*.

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