[-<i>-] ON THE MUSIC OF THE COSMOS, A TREATISE BY MACROBIUS AMBROSIUS AURELIUS THEODOSIUS contained in the first four Divisions of the second book of his Commentary on the Dream of Scipio in the sixth book of the Republic by Marcus Tullius Cicero TRANSLATED INTO Italian BY KNIGHT HERCOLE BOTTRIGARO and ON PLUTARCH' S COMMENTARY ON THE PROCREATION OF THE SOUL DESCRIBED BY PLATO IN HIS TIMAEUS, THE PART THAT PERTAINS TO THE MUSIC OF THE COSMOS TRANSLATED INTO ITALIAN BY THE SAME, and, finally, the EXCERCISES OR CONSIDERATIONS OF THE SAME AUTHOR on that Treatise by Macrobius and on his Commentary. AT BOLOGNA 1610.

[-<ii>-] From Eusebius' De Temporibus

Plutarch of Chaeronea lived at the time of the Emperor Trajan, around the year 122 anno Domini.

Aurelius Ambrosius lived under Antoninus Pius, around the year 140 anno Domini.

Michael Psellius lived under the Emperor Constantine around the year 306 anno Domini.

The Senator Severinus Boethius, a Roman Senator, wrote many works at the time of Anastasius, around the year 513 anno Domini.

The Monk Cassiodorus lived around the year 559 anno Domini.

Isidorus Hispalensis, a very famous Bishop lived around the year 626 anno Domini.

The Venerable Bede, a famous Presbyter lived around the year 693 anno Domini. He died in the year 734 according to his Life.

1 Euclid of Megara lived around the year 420 before Christ.

2 The Music Theorist Aristoxenus lived around the year 360 before Christ.

3 Aristotle of Stagira lived around the year 380 before Christ.

4 Marcus Tullius Cicero lived around 50 years before Christ at the time of Pompey the Great and Gaius Iulius Caesar

5 Eratosthenes lived around the year 260 before Christ.

[-1-] ON THE MUSIC OF THE COSMOS, A TREATISE BY MACROBIUS AMBROSIUS AURELIUS THEODOSIUS [He lived 140 years after the birth of Christ under the Emperor Antoninus Pius in marg.] Contained in the first four Divisions of the second book of his Commentary on the Dream of Scipio [This part of Macrobius' Commentary on the Dream of Scipio, where the matters pertaining to the Music of the Cosmos are contained, has to be [[defined]] entitled Treatise, because Macrobius himself at the end of it calls it such in marg.] in the sixth book of the Republic by Marcus Tullius Cicero Translated into Italian by Knight HERCOLE BOTTRIGARO.

"In the Previous Exposition, Eustatius, son of mine most dear and more loved than the light of my eyes, our conversation has extended up to the progress of the Sphere of the fixed Stars, and of the other ones placed beneath it. Now, let us talk about the Music that they produce." I say: "What is this? What is this sound, so great and sweet, which fills my ears?" He said: "This is the sound that, divided into Intervals distinguished into fixed parts is created by the force and movement of the Skies, and, mixing high and low in equal parts, it creates various combinations of sounds, since so many Movements cannot be produced in silence. Nature is pleased that the extremes produce a low

sound on one side, and [-2-] a high one on the other. Therefore, that highest progress of the Sky that carries the Stars, whose Revolution is swifter, moves with a high and awoken sound, but this Sky of the Moon (and last one) moves producing the lowest sound. In fact, the ninth (since the earth is still and occupies the centre of the Cosmos) is always in the lowest part of it. Conversely, those eight Progresses [From the coupling of the odd and the even of these numbers the Tetractys or Quaternio it derives its origin. All this is mentioned by Macrobius himself in the sixth Chapter of the first book of his commentary on the Dream of Scipio, and Plutarch does the same three times in his Commentary on the Procreation of the Soul according to Plato in marg.]

[[Bottrigari, On the Music of the Cosmos, 2; text: 1. 2. 3. 4. 5. 6. 7. 8. a, b, c, d, e, f] in marg.]

in which is contained the same force of the two, create seven sounds divided into Intervals. This number is almost the aggregation of everything, and learned men, by imitating this with gut Strings and with Musical Compositions, have opened the way for themselves so that they may return to this place." Having explained the order of the spheres and having described the Movement with which the seven underlying are carried in contrary motion to the Sky, it follows that we should research what sound the force of such great Mass produces. In fact, it is necessary that sound is generated by that Revolution of the Skies, because Air hit by the occurrence of the percussion itself emits the force of the noise, and Nature forces that the violent attrition of two bodies has, as a final consequence, a sound. But the sound which is born from that percussion of Air brings to the ear [-3-] something sweet and musical, or something useless and harsh, because, if the obedience to certain numbers presides over the percussion, the result is something ordered within itself and agreeable to the Modulation itself. However, if there is a random and disorderly Percussion, it produces a noise and it offends the ear with a turbulent, unpleasant and disorderly din. However, it is certain and clear that nothing random and nothing disorderly derives from the Sky, but that there everything proceeds according to divine laws and strict [[reason]] [proportion corr. supra lin.]. Hence, it has been gathered with invincible reasons that musical sounds derive from the Revolutions of the celestial Spheres. In fact, it is necessary that the movement produces the sound, and the proportion, which partakes of the divine, is realised with the sound because of the Modulation. This was Pythagoras' thinking, one of the [Pythagoras in marg.] most important men among the Greeks. In truth [Certainly ante corr.], he understood that something orderly deriving from the celestial Spheres produced a sound because of the necessary proportion, [reason ante corr.] which is one thing with celestial things; but what that proportion [reason ante corr.] was, or how it should be observed, He could not understand it with ease. [[Legendary Enigma. Boethius, Chapter 10 of the first Book of his Music, Gaudentius, Chapter 8 of his Music in marg.]] [This discovery of the Musical Consonances made by Pythagoras through the sound of the Hammers, and narrated by Plutarch in his Commentary on the Procreation of the Soul according to Plato in his Timaeus, by Gaudentius at chapter 8 of his Music, and by Boethius at Chapter 10 of the first Book of his Music, is explained in detail. Therefore you will observe the Discovery and the very detailed explanation of it. in marg.] After he worked long and hard to discover such a great and secretive matter, Fate offered him what his imagination had not been able to find in any way. In fact, walking in the proximity of some Blacksmiths who were beating a burning piece of iron, his ears were hit by the sounds of the Hammers, which answered each other with a fixed order. [-4-] Their high sounds sounded agreeably with the low ones, so that they both reached the ears of the Listener with strict measure and from various percussions one was born which was consonant with itself. Hence, imagining that he was offered the chance to understand with his eyes and with his hands what that he was seeking with his mind, entered the Blacksmiths' workshop and, standing in close proximity to the worker, he observed with greater curiosity and noted down the sounds which were created by the strength of their arms. Thinking that the variety of sounds should be ascribed to the varying forces of the workers who hit the pieces of iron, he ordered them that they should swap the Hammers between one another. They did so, and the variety of the sounds accompanied the swap of the Hammers. Then, he devoted all his thoughts to examine the weight of those hammers. Having

noticed that they varied in weight from one to the other, he commanded that other Hammers, of different weight, both heavier and lighter, should brought to him. Their percussions were different from the first ones and of such kind that they did not produce the same consonances. He realised then that the consonance of the sound derives from the strength of the weights. So, he made a note of the [[numbers]] [weights corr. supra lin.] which produced consonant sounds with each other, and addressed his research from the Hammers on to the Strings. [Plutarch himself, in the Commentary on the Procreation of the Soul according to Plato in the Timaeus, writes about the weights attached to Strings made of sinews or gut, but not without some important difference. You will be able to check my exposition and explanation of Pythagoras' Enigma itself. in marg.] Thus, he laid out the guts of some sheep and the sinews of some cows and attached to them the same weights which he had found in his study of the Hammers, and the same consonances occurred, which the worthwhile observation of his previous [-5-] experiment had produced, enhanced by the sweetness afforded by that Nature of the Strings. [If the sound of gut strings is such that Macronbius thought that the adjective 'sweet' was appropriate to it, what Epithet would he have given to the sound of brass or steel, had they been invented and used in this time, as they are now? Certainly, He would have called it most suave and most polished. in marg.] In this way Pythagoras, having mastered such a great secret, understood the numbers from which the sounds, that are consonant with each other, are born. Thus, by applying this observation of the numbers onto the Strings, they were laid out and tuned in concordance with numbers which agree with each other, so that, if one was struck with a plectrum, another one, even if far removed, but correspondent to it in its numbers, would be consonant with it. [On the Correspondence between the plucked String and of another Stable one, albeit rather removed from it, see Franchino, De Sympathia et Antipathia, Ficino, at Chapter 20 of his Commentary on Plato's Timaeus, and the Problem 23 of Aristotle's Nineteenth Division with the commentary by Pietro of Abano. It is taken as an example of reciprocal love, because when the Stable Strings is reached by the Sound of the plucked one, not only at the interval of a Diapason or Octave, both higher and lower, but at the interval of a Diapente, or, Fifth, as we also call it, but in a way that does not vibrate too much. The proof of this is achieved by putting a bit of string redoubled across the Stable String which will be seen not only <aliqua verba legi non possunt>. The six musical numbers are 3, 4, 6, 8, 9 and 12, since the Epitrite proportion is found not only between the first two numbers 4 and 3, but also between the last two 12 and 9, and between the middle ones 8 and 6 and it represents the Diatessaron. The Hemiolic proportion, or Sesquialtera is not only found between 6 and 4, but also between 12 and 8, and it represents the Diapente. The dupla proportion is found between 6 and 3, 4 and 8 and 12 and 6, and it represents the Diapason. The Tripla constitutes the Diapasondiapente and is found not only between 3, the first number, and 9, the penultimate one, but also between the second, 4, and the last one, 12. There is also the quadrupla proportion between the first number, 3, and the last one, 12, and it represents the Bidsiapason. Finally, there is the epogdoa proportion, namely, sesquiottava, between 9 and 8, and it represents the said larger tone in the Diatonic Syntonic Species and according to Ptolemy. The four largest numbers of these are the Pythagorean ones which figured in his Enigma of the Hammers, to which are added the two smaller ones, as one can see more clearly in my ample explanation and exposition of said Enigma. See also Plutarch in his Commentary on the Procreation of the Soul according to Plato in the Timaeus, and my Exercises and Considerations on it. in marg.]

However, out of the infinite variety of the numbers, few and limited in number were found that would be suitable to make Music. These are six in all: the Epitrite, the Hemiolic, the Duble, the Triple, the Quadruple, and the Epogdous. The Epitrite occurs when, the larger of two numbers contains in itself the smaller one and one third of it, such as four and three, since four contains three, and one third of three, which is one. This number is called 'above three' (Epitrite) and from it the Consonance called [Diatessaron] Diatessaron is born. The Hemiolic occurs when the larger of two numbers contains in itself the entire smaller one and half of it as well, as in the case of three and two. In fact, the number two and its half, which is one, is contained in the number three. From

this one, which is called Hemiolic, the Consonance called [Diapente] Diapente is derived. The Duble number occurs when [-6-] the smallest of two numbers is contained twice inside the larger one, such as in the case of Four and Two. From this double number, the Consonance whose name is [Diapason] Diapason, derives. The treble one occurs when the smaller of two numbers is contained three times in the largest one, such as in the case of three and one. The Consonance which is called [Diapason kai Diapente] Diapason diapente is born of this number. The Quadruple occurs when the smaller of two numbers is contained four times in the larger one, such as Four and one. This number produces the Consonance called [Dis Diapason] Disdiapason. The Epogdoo occurs when a number contains within itself the whole of another smaller one and one eighth of it, such as Nine and Eight, because the Eighth and its eighth part, which is one, are contained within Nine. This number produces a sound which Musicians call a Tone. The Ancients wanted that sound that is smaller than a Tone should be called a Semitone, [The Semitone is not really one half of a Tone, according to the Greek sense of the word as one half, but the word Semis has to be interpreted as we do in Italian, namely, to mean lacking. Thus, one can make the comparison with the Semivowel. As to the fact that the Tone cannot be divided, according to the Pythagoreans, into two parts in arithmetic proportion as far their qualitatively, there is no doubt at all. However, this is absolutely true according to the followers of Aristoxenus in geometric proportion and quantitatively. See Aristoxenus in the first book of his Harmonics and Ptolemy at chapter 12 of the first book of his Harmonics, Euclid in the books of his musical Isagoge, which have all been translated by me into Italian. This comparison of the Semivowels between the vowels and the consonants is taken, albeit in a way different from its original intention, from Plutarch in his Platonic Questions, or Discussions. in marg.] but this has not to be taken in such a way as to mean half of a tone, just as we do not understand a letter which is a semivowel to be half of a vowel. Moreover, the Tone cannot be divided into two parts equal with each other because of its nature. In fact, since it originates from the number Nine, and since the the number Nine cannot be divided into two equal parts, the Tone cannot be divided into two parts. However, they called Semitone the Sound which is smaller than a Tone, which is so little different [-7-] from the Tone as these two numbers differ from each other, namely, two hundred and forty-three 243 and two hundred and fifty-six 256. [256. 243. difference in marg.] The ancient Pythagoreans called this Semitone Diesis, but later practice ordered that the sound smaller than the Semitone should be called Diesis. Plato called the Semitone Limma. Therefore, five are the Consonances, namely, the Diatessaron, the Diapente, the Diapason, the Diapasondiapente and the Disdiapason. [The Symphonies, namely, the musical Consonances are only five according to the Pythagoreans, as Macrobius relates in this passage. However, according to Ptolemy at Chapter 13 of the first book of his Harmonics, and Euclid in his musical Isagoce, they are six. In fact, He adds to those five the Diapason diatessaron, whose form and proportion is Dupla superbipartienteterza from 8 to 3. For this reason, just as all the others harmonic Intervals in superpartiente proportion, it is reprehended by Pythagoras. in marg.] But this number of Consonances belongs to Music which can be understood by the human Ear, or elevated in pitch by the human breath, while the Aggregation of the Celestial Harmony extends further, namely, up to four [Diapason kai Diapente] Diapasondiapente. Let us discuss for a while these which we have mentioned. The consonance [Diatessaron is composed add. supra lin.] of two Tones and of a Semitone (leaving aside the minutiae which are in the addition to avoid any difficulty) and it derives from the Epitrite or sesquiterza. [The Composition and form of the five mentioned symphonies or Consonances can be understood, according to Macrobius' words, both in Pythagoras' and Aristoxenus' way. In fact, when one says that the Diatessaron is composed by tow Tones and a Semitones, it is not clear which species of Tones and Semitones one is the one which contain it and compose it, since one can mean that the two Tones are sesquiottavi and the Semitone is the Limma according to the Diatonic Diatonus of Pythagoras, or natural, or, if one understands one of the two Tones to be sesuiottavo and the other sesquinono, and the Semitone Sesquiquindicesimo, this corresponds to the Diatonic Syntonic or intense by Didymus or Ptolemy. By saying simply that it is composed of two Tones and a Semitone, this description may be understood to be corresponding to the Diatonic Syntonic of Aristoxenus, particularly as Macrobius adds that the Diapason is composed

of six Tones and the Bisdiapason of twelve, which cannot occur in the Pythagorean, Didymic or Ptolemaic distribution cannot occur, but only in the one of Aristoxenus, since two Semitones are required for the Diapason in one and the other of Pythagoras, Ptolemy and Didymus, which Semitone do not constitute in either of them a Sesquiottavo or sesquinono Tone, just as in the Bisdiapason the four Semitones do not add up to two Tones. The fact that Macrobius added then the proportions according to the Pythagoreans and the followers of Ptolemy, adds to the uncertainty instead of clarifying it. in marg.] The Diapente is composed of Three Tones and a Semitone, and it derives from the Hemiolic, or sesquialtera. The Diapason is composed of six tones and it derives from the Double, while the [Diapason kai Diapente] is composed of nine Tones and a semitone and it derives from the Triple number, and the Disdiapason contains twelve Tones and it originates from the Quadruple.

SECOND DIVISION. [Second Division in marg.]

Hence Plato, since he realised, both by following the doctrine [-8-] of Pythagoras and from the divine depth of his intellect, that the astronomical aspect able to be unified could not exist without these numbers, established the Soul of the Cosmos through the ineffable providence of God, Creator of the combination of these numbers, in his Timaeus. If we add to this Work the meaning of this, it will be very useful to us to understand Cicero's words on the Discipline of Music, which appear difficult to understand. But, to avoid consequence that what is provided to defend another exposition should be deemed difficult in itself, we will say a few things first which will facilitate the understanding of one and of the other. Every solid body extends along three dimensions, since it has length, width and depth, nor it is possible to find a fourth dimension in any body, but every solid body is contained by these three. Nevertheless, the Scholars of Geometry propose to themselves other Bodies, which they call mathematical, which must pertain only to the mind and not to the senses. [Euclid, first definition of the eleventh book of his Elements of Geometry in marg.] In fact, they says that the dot is an indivisible body, because in it one cannot distinguish either length, width or depths, since it cannot be divided into any part. This dot, extended in length, creates the line, [Euclid, fourth definition of the first book of his Elements of Geometry in marg.] namely, a body with a single dimension, since it extends only in length without width or height, and it is contained within two points on either side, which contain [-9-] only length. [It is not true that when a Line is doubled the second mathematical body, namely the Surface is created. In fact, the duplication of said Line can be done in different ways, and in none of them the Surface is created, as in the example of the straight line:

A⎯⎯⎯⎯B first line

B⎯⎯⎯⎯C second line

Here, although there is the duplication of the line A B and C D, nevertheless there are not two dimensions, namely length and width, but only length. Hence, it is well said that the Surface, as it is defined by Euclid, is formed by the continuous motion of a Line which extends in width, because in this case there is no space left between the first and the second line, but all is closed together and contained. In this way:

A, B, C, D]

The surface A B C D is created from the continuous movement of the first line AB continued to the line C D, whose terms are A B and C D, while A B C D are its length and A C and B D are its width. In the same way all that Macrobius deduces after this will be considered, concerning the Cubic body, the plain Surface and similar matters. See Aristotle, Metaphysics book 5, Chapter 6. in marg.] If this line is doubled, the other mathematical body, which consists of the two dimensions of length and width without height, will be created. This is what they call Surface, and it is contained by four dots, namely, two for each line. However, if these two lines are doubled, so that two are drawn above the other ones which are drawn below them, Height will be added to them, and thus

the Solid body will be created, which will be contained by eight angles without any doubt. We see this in the Dice, which the Greeks call [kubos] Cubus. The nature of the numbers is applied to these by geometric reasons. Therefore, the [monas] or the monad, namely, the number one represents a dot, because, just as the dot is not a body, but bodies are made of it, thus the number one is not called a number, but it is the origin of the numbers. The first number is two, which is similar to the line which originates from the dot, because of it is contained by two dots. This number Two, multiplied by itself produces four, in a similar way to the mathematical body, which extends, under four points, in length and width. The number Four, doubled, produces eight, and this number represents the solid body, as we have said, since two lines superimposed to another two create the entire solid quality of the Body by measuring eight angles. This is what the Scholars of Geometry say, namely, two twos twice is a solid body. [-10-] Therefore, the addition from the even number up to the eight represents the solid quality of the Body, and for this reason Plato attributed fullness to this number among his basic principles. Now, we have to consider how that number is created from the odd number. Since the Monad, or the number one, is the origin of both even and odd numbers, suppose that the number Three is the first line. This number trebled creates the number Nine, which itself creates the body long and wide as if from two lines. The number Nine, itself trebled, similarly produces the third dimension. Thus, from the part of the odd number the solid body is created and funded on the number twenty-seven, which is three threes thrice, just as, in the case of even numbers the solid quality was created and based on two twos twice, which is the number Eight. The number one is necessary in both cases to create the solid body, and also the six other numbers; namely, on the side of the even numbers, twice four is eight, while on the side of the odd numbers thrice Nine is twenty-seven. Therefore, in Plato' s Timaeus, in the creation of the Soul of the Cosmos, he says reciting the will of God that it was composed of these numbers, [The odd and even numbers which make up the cube, namely 2, 4, and 8, as to the even ones, and 1, 3 and 9 as to the odd ones, added together give 27, the Cubic number. See Plutarch at the beginning of this Commentary on the procreation of the Soul according to Plato in the Timaeus. in marg.] which from the side of the even numbers and from the side of the odd ones create the Cube, namely, the perfection of the solid quality; and that it was created, not because he meant that he had anything corporeal about it, but so that It could penetrate the entire Cosmos filling it with the Soul and fill the solid body of the Cosmos with the numbers of the solid quality. However, do let us come to Plato' s words themselves, since [-11-] he says when he tells about God creating the Soul of the Cosmos: "Firstly, He took from the entire universe one part, then the second one, which was the double of the first one, and the third one, which was in Hemiolic or Sesquialtera proportion with the second, [but was the triple of the first one, the fourth one, which was double than the Second one in marg.] the Fifth one which was three times the third one, the sixth one, which was eight times the first one, the Seventh one, which was, multiplied, twenty-seven times the first one. After this, He filled the gaping spaces between the double and the treble by inserting compounded parts, so that two halves connected the spaces one by one. The Hemiolic Sesquialteri, the Epitrites sesquiterzi and the Epogdoi sesquiottavi were born from these links." These words by Plato have been understood by many in such a way that they believed the first part to be the Monad, or number one; [Bottrigari, On the Music of the Cosmos, 11, 1 ; text: 1. 2. 3. 4. 8. 9. 27.]

The even numbers (2, 4 and 8) are called feminine, while the odd numbers (3, 9 and 27) are called masculine. Plutarch in his Commentary on the Procreation of the Soul according to Plato in the Timaeus writes very appropriately on the way to add them together, and also Marcus Tullius Cicero in the Creation of the Cosmos, as well as Macrobius himself in the first book at Chapter 6. The unit is called then hermaphrodite, namely, Masculine and Feminine, because it is both odd and even. in marg.] the second one, which I said to be double of the first one, to be the number Two; the Third one, to be the number three, which is the Hemiolic sesquialtero in relation to the number two, and three times the number one; the Fourth one, to be the number Four, which is twice the Second one, namely, the number two; the fifth one, to be the number nine, which is three times the third one, namely the number Three; the Sixth one, to be the number eight, which contains eight time the first

one; and the Seventh one, the number twenty-seven, which is the third increased number of the series of the odd ones. That composition of the numbers progressed thus in alternate fashion, namely after the Monad, or number one,
[Bottrigari, On the Music of the Cosmos, 9; text: 1. 2. 3. 4. 8. 9. 27. a. b. c. d. e. f. g.]

which is even and odd, there was the first even number, namely Two, then the first odd one followed, which is Three; in fourth place there was the second even number, which is Four; in fifth place the second odd one, which is [-12-] Nine; in Sixth place the third even one, which is Eight; in Seventh place the third odd one, namely, twenty-seven, so that (since the odd number is considered as male and the even as female) from the Even number and from the Odd one, namely, from the Male and from the Female, that, which would give birth to the universe and progressed to the solid quality of one and the other, as if it were to penetrate any solid, would be born. Moreover, it had to be composed of these numbers, which alone contain the astronomical aspect able to be unified, since it was to give to the whole Cosmos the unified accord. In fact, the number Two is the double of the number one, and we have said that that the Consonance Diapason is born of the double. The ratio of the number Three to the number Two creates the Hemiolic Sesquialtera, from which the Diapente is born. The ratio of the number Four to the number Three is called Epitrite or Sesquiterzo, from which the Diatessaron is created. Similarly, the number Four is in dupla proportion to the number One, and from this ratio the Consonance Disdiapason originates. Therefore, it is necessary that the Soul of the Cosmos (which pushes with its motion the Body of the Universe which we see, and is composed of numbers which create of themselves the Musica which can be sung) should create musical sounds as a result of its motion through its eternal thrust. In fact, Plato says (as we have related above) that God, creator of the Soul, after combining the odd numbers with each other, filled the gaping Intervals with the [-13-] Hemiolic, Epitrite, Epogdoi, and Limma. Therefore, the very learned Tullius demonstrated the depth of Plato's doctrine with these words of his: "What is, I say, this sound, so vast and sweet that fills my ears? This one, He said, that is created through odd Intervals, but separated by strict proportion, with the thrust and motion of their Skies." You can see how he mentions the Intervals and accounts for the fact that these are odd intervals between each other. I do not deny that they are distinguished by strict proportion, because, according to Plato in his Timaeus the Intervals are separated by intervals with numbers which are strict with each other, namely, [The numbers which are strict with each other, namely, strictly composed with each other are three over two 3/2 for the Hemiliolics, four over three 4/3 for the Epitrites, nine over eight 9/8 for the Epogdoi, and two hundred and fifty-six over two hundred and forty-three 256/243 for the fro the Limma or minor semitones. in marg.] Hemiolic Sesquiateri, Epitrites, Sesquiterzi, Epogdoi, sesquiottavi, Limmas or Semitones, in which every musical proportion is contained. Therefore, one realises from here that these words of Cicero's would never be intelligible without the premise of the proportion of the Hemiolic, Epitrite, and of the Epogdoi proportions by which the intervals are distinguished, if the Platonic numbers, [The Platonic numbers are 12, 9, 8 and 6, and they are called the Plato's Tetractys. in marg.] in which the Soul of the Cosmos is contained, are not understood, and if the reason, according to which the fabric of Soul is weaved with those numbers which create Music, is not explained first. All these facts also show the cause of the motion of the Cosmos, which is given by the sole thrust of the Soul, and the necessity of the musical Collective Song, which the Soul inserts inside the movement produced by itself in its original Nature.
DIVISION III [Third Division in marg.]

Hence Plato in his Republic [Tenth Dialogue in marg.], when he deals with the Revolution of the Celestial Spheres, says that the Sirens oversee each Sphere, meaning that singing is attributed to the Deities because of the motion of the Spheres. [The Syrens mentioned by Plato, by Theologians and Philosophers are called Muses. They are nine in all. According to Vergil in the Opuscula, these are their names: Calliope, Clio, Erato, Thalia Melpomene, Terpsichore, Euterpe, Polyhymnia and Urania, but Ficino in his commentary to Plato's Ion, he attribute to them the supervision of the movement of the Spheres of the Planets and disposes them in a different sequence, namely, he

ascribes to Urania the Eighth Sphere of the fixed stars, to Polyhymnia the Sphere of Saturn, to Terpsichore the Sphere of Jupiter, to Clio the Sphere of Mars, to Melpomene together with Apollo the Sphere of the Sun, to Erato the Sphere of Venus, to Euterpe the Sphere of Mercury, to Thalia the Sphere of the Moon and to Calliope to the consonance of these Spheres in their eternal and perpetual revolution. See, with regard to this continuous Harmony, Ptolemy's Chapter eleven in the third book of his Harmonics and a Sonnet by me in which the Mount Parnassus is described, which is this one:

It rises in Boeotia to the side
Of Thebes and Phocis the high mount of Parnassus;
To Apollo and To the Muses sacred.
Here Erato sings strophes, dances and plays Erato,
Here Clio with her hands stretched
Tells the efforts of Love and War,
Here Urania measures the starry Sky.
And here Polyhymnia creates rhetoric speeches,
While Calliope sings in heroic style
And Terpsichore plays the Cithara.
Melpomene tells tragic laments,
While Euterpe writes in humble and sweet style
And Thalia argues in Comical verse. in marg.]

In fact, the word [Syren] Siren is understood in Greek as 'he who sings to God'. The Theologians also wanted the Muses to be nine and eight the musical songs of the Spheres, which unite in a supreme collective Song. Hence Hesiodus in his Theogony invokes the Muses, and Urania as the eighth one, because, after the seven planets, the eighth Sphere which carries the superior stars is called Sky with its proper name. Also, in order to show that it was the Ninth and the one more completely created by the universal accord of the Sounds, he added

[kalliope th' he de proferestate estin a pasaon],

showing through its name that the sweetness of the voice was called the ninth Muse, because the name [Kalliope] calliope translates from the Greek as 'the best voice'. In order to show more clearly that that is the one that derives from all of them, he gave it the adjective which indicates that it was the superior one to all, namely, [proferestate a pasaon] Proferestate à Pasaon. For this reason they call Apollo [Mousageton], Musàgeton as the leader, Prince and Governor of all the remaining Orbs, as Cicero himself calls him, namely, "Guide, Prince and Governor of the other remaining Stars, Mind [-15-] and moderator of the Cosmos." That the Muses are the song of the Cosmos, even the Etruscs uncultured know it, who called them Camene, which is close to the word Canenas, derived from the verb 'to sing' [canere]. For this reason the Theologians, approving the notion that the Sky sings, accompanied the sacrifices with musical Sounds, which some used to perform with the lyre and the Cithara, and many others with the Tibia and other musical instruments. Even in the Hymns of the Gods they added certain measures in musical verses [through Strophe and Antistrophe, namely, add. supra lin.] through turns and counter-turns, so that the straight movement of the of the Sky may be understood through the turn, and the differently-moving return of the Erranti Stars through the counter-turn. From these two Motions the first Hymn to be dedicated to God originated. [The Strophes and Antistrophes, or the Volta and Contravolta were a type of dance used by the ancient lyrical poets. In these, when the dancers sang their songs, they turned now to the right and now to the left, a little like we do in the dance of the Passamezzo to the sound of Lutes, Violoni, Harps, Cithara, Harpsichords, Spinets and Bagpipes. in marg.] The Institutions of very many peoples and Religions ordered that it was necessary to accompany the Dead to their burial with Singing, with this conviction, that they believed that the Souls return to the sweetness of Music, or to the Sky, after they left the body. For this reason, every soul in this life is captivated by musical sounds, so that not only those who are more refined in their traditions and habits, but also all the

barbaric Nations practiced Singing, through which they encouraged the passion for Virtue or devoted themselves to the lasciviousness of the pleasures because the Soul conserves the memory of Music, of which it was aware in the Sky, and it is taken with such seductive Songs that there is no heart so harsh and wild [-16-] that is not affected by such pleasurable delights. [[Therefore, I]] Therefore, [I corr. supra lin.] believe that [[the]] [that famous corr. supra lin.] fable of Orpheus and Anphion, one whom was said to be attracting to himself with his Songs Animals not endowed with reasons, and the other one said to be charming the Rocks, had its beginning, because they were the first ones to have attracted to the sensations of the pleasures with their singing peoples who happened to be barbaric, or devoid of reason and unmoved by any feeling. [On the powerful effects of Music and on its praises, beyond what Macrobius writes here, see Plato in the Laws and in the Timaeus, together with Ficino's the commentary. See also Aristotle at Chapters 3, 5, 6 and 7 of the eighth book of his Politics, together with the notes and explanations of Faber Stapulensis in the Proem of his first book on Music. in marg.]

Thus, finally, every habit of the Soul is governed with Songs, so that songs are sung when one goes to war and when one retires from it, since it excites and dampens down military courage,

it offers sleep, and takes it away,

sometimes it arises preoccupations and calms them, induces Ire and convinces to Clemency, and offers a remedy to the physical Infirmities. The saying that those who provide remedies for the Infirms are said to perform a song [praecinere]is derived from this fact. How could it be surprising that Music has such great Domain among men, when even the Birds, such as the Nightingale and the Swans, and others such like practice Singing as if it were an artful doctrine, while some, either Birds, or terrestrial or aquatic animals run into the Nets enticed by Singing, and the pipes of the shepherds orders the grazing Sheep to rest? It is no wonder that this happens, because the causes of Music are intrinsic to the Soul of the Cosmos, as it is composed of it, while the Soul of the Cosmos itself gives life to all Living beings.

[-17-] Virgil, in the sixth book of the Aeneid says:

Hence Humanity comes, and the Sheep,

And also the lives of the Birds,

and even the Monsters which, within its water,

the Sea contains.

Therefore, it is reasonable to believe that every living being is taken with Music, because the celestial Soul, from which the whole of the living beings came to be, originates from Music, which, while it thrusts the Cosmos accompanied by the motion of the Spheres, produces a sound which is divided into odd intervals, which are divided nevertheless in strict proportion, in the same way as the Soul was composed in the beginning. It remains to investigate if it has maintained these Intervals in a balanced measure in the body of the Cosmos. It is said that Archimedes [Archimedes in marg.] [Macrobius does not recount here which were the distances of the Moon and of the other Planets not only from the Earth, but also between each other in the way that he tells, further on, what the Platonists thought they were, since they refused to accept the ones of Archimedes. They say that distances according to Pythagoras were these:

From the Earth to the Moon, 126000 Stadia

Moon to Mercury, 62000 Stadia

Mercury to Venus, 63000 Stadia

Venus to the Sun, 189000

Sun to Mars, 136000

Mars to Jupiter, 63000 Stadia

Jupiter to Saturn, 63000 Stadia

Saturn to the eighth Sphere, 378000 Stadia

[Bottrigari, On the Music of the Cosmos, 17, 1; text: T, signa]

Here one must note not only the different distances but also the order in which those Planets are placed. See Plato in the Timaeus. Ficino at the end of Chapter 34 of the Commentary on the mentioned Plato's Timaeus gives the following distances between Planets, namely,

[Bottrigari, On the Music of the Cosmos, 18, 1; text: 1. 2. 3. 4. 9. 8. 27. 24. 216. 1728. 46656. per, signa, moltiplicando]

These distances are the same as the one given by Macrobius, who, towards the end of Chapter 71 of the first book quotes the position of these with some alteration of the order, but according to Plato's intention. They are these:
[Bottrigari, On the Music of the Cosmos, 17, 2; text: 1. 2. 3. 4. 5. 6. 7. signa]

calculated the distance in Stadia between the Moon and the surface of the Earth, between Mercury and the Moon, between Mercury and Venus, between Venus and the Sun, between the Sun and Mars, between Mars and Jupiter and between Jupiter and Saturn. He is thought to have measured each distance from the Sky of Saturn to the Sky which carries the Stars itself proportionally. [Platonists in marg.] This measurement of Archimedes' was rejected by the Platonists, because it did not observe the double and triple Intervals. They established that it should be believed that the distance between the Earth and the Sun is twice the distance from the Earth and the Moon;

[Bottrigari, On the Music of the Cosmos, 17, 2; text: T. signa]

[-18-] the distance between the Earth and Venus is three times the distance between the Earth and the Sun,

[Bottrigari, On the Music of the Cosmos, 18, 3; text: 3. 4. 9. 8. 27. signa]

the distance between the Earth and Mercury is four times the distance between the Earth and Venus, the distance between the Earth and Mars is nine times the distance between the Earth and Mercury, the distance between the Earth and Jupiter is eight times the distance between the Earth and Mars, and the distance between the Earth and the Sky of Saturn is twenty-seven times the distance between the Earth and Jupiter. This belief of Plato' s was inserted by Porphyry in his books, where he provided much clarity to the obscure passages in the Timaeus. He says that they believe that these Intervals in the body of the Cosmos are made in imitation of the Composition of the Soul, that they are combined in Epitrites [4/3 in marg.], Hemiolics [3/2 in marg.], Epogdoi [9/8 in marg.], hemitones and Limma [256/243 in marg.], and that they produce Music in such way that its proportion is weaved in the substance of the Soul and it is inserted in the Body of the Cosmos, which is moved by the Soul. Therefore, the statement by Cicero which says that "the sound of the Skies is divided according to intervals, which are distinguished by strict proportions" is learned and perfect in every respect.

FOURTH DIVISION. [Fourth Division in marg.]

[See Chapter 22 of the Second book of Pliny's Natural History, and also what I have written amply on this Chapter at the end of my Melone, Harmonic Discourse in marg.] This place invites us to

discuss the low and high quality of the Sounds, which he calls diversity. "And Nature causes the high Sounds to be placed in one extremity and the low ones in the other. For this reason the highest Course of the Sky which carries the stars, whose Revolution is faster, moves fast [-19-] and produces a high sound, and this lowest one, which carries the moon, moves producing the lowest sound." We have said that sound cannot be produced if the Air is not hit stricken. Now, the percussion of the air produces the Sound which is either higher or lower: if it is a strong and fast percussion, it produces a high sound, while if it is slow and light, it produces a low sound. A stick demonstrates this. [When the Stick hits the Air with its stroke, the sound is not rendered different by the speed of the movement of the Stick, but by its size. In fact, a thin Stick produces the high sound and a thick one creates the high one. The same is the proven with the Strings, because a String with a small gauge kept tensed by a weight produced, when it is struck, a high sound, while a String with a large gauge of the same length and tensed by the same weight as the above, or by one equal to it, produces the high sound. Among the Flutes, endowed with holes as the modern Flutes are, <tria verba legi non possunt> produce the high sound not only because of the reason of the breath adduced by Macrobius, but because of the short length of the Flute itself played with all the holes open. However, played with both of the orders of holes closed and well covered, the sound becomes lower and at the Octave lower compared to the high one. If one takes two Flutes or two pipes without holes and of the same length but of different concavity, the more concave will produce a sound which is lower, proportionally, than the other. in marg.] In fact, when it hits the air, if it hits it with a fast motion, it renders the sound higher; if with a slow movement, it hits the Ear with a low sound. We see that the same happens in the case of Strings. In fact, if they are laid out with tighter tension, they produce a high sound, while, if they are laid out will more relaxed tension, they produce a low sound. Therefore, the higher Skies, since they move with greater thrust because of their amplitude, and since they are tensed in their origin with a stronger spirit, move with a high and fast sound because of their faster Revolution itself, as he says. Conversely, this lowest one of the Moon moves producing a very low sound, because it revolves with endless and extreme languor, and makes its Revolutions with less aggressive thrust through the narrow path which is contained by the penultimate Sky. Similarly, we have evidence of this in the sounds of the flutes. In fact, a high-pitched sound is produced from the holes near the mouth of the person who blows, while from the ones that are far from it and near the extremity a low-pitched sound is produced. Equally, a high sound is produced through large holes, and the low one through small ones. The reason for both of these events is one and the same and consists in the fact that the Air that is blown is stronger near its origin, and weaker near [-20-] its end, and because a strongest thrust pushes the air through a wider hole, while the opposite happens in the small ones at a distance. Therefore, the highest Sky, since is both open widely and moved but a spirit which is so much stronger as it is closer to its Origin, it sends out of itself the highest Sounds. The Voice of the last one is broken because of the narrowness of the space and because of the distance. Hence, it is proved even more clearly that the more the Spirit, in the lower regions, departs from its Origin, so much weaker it becomes in its thrust, and, therefore, it is so condensed and thick around the Earth, which is the last one of the Spheres, that it causes the Earth to be always still in the same place and not to be allowed to move in any direction, besieged as it is on every side by the density of the Spirit which surrounds it. [The Pythagorean Philolaus, Heraclides Ponticus and Ecphantus, also a Pythagorean, opposed this common opinion of Philosophers and Astrologers, who stated that the Earth was still and rotated around its poles around fire. This opinion has been embraced by Copernicus in our time and it was demonstrated by him in his Suppositions on the Revolutions of the Celestial Spheres, where he placed the Earth in the place of the Sun and the Sun in the place of the Earth at the center of the Cosmos. See Copernicus himself in the Preface to Popo Paul III in the ninth Chapter of the first book of Plutarch quoted by Copernicus himself at Chapter 13 of the third Book of the Opinions of the philosophers on the matters of the cosmos. in marg.] On the basis of what has been said, it has been proven that the last place of the Sphere is the middle one. Therefore, Nine are the Spheres of the Universal Body of the World. The first is the one that carries the Stars, which is called Sky with its proper name. It was called [Aplanes] Aplanes by the Greeks, and it contains and surrounds all

the other remaining ones. This one always Revolves from the Est to the West, while the ones that lay below it, and which we call Erranti, are carried from the West to the East. The Ninth is the Earth which has no movement. Therefore, the ones that move are eight, but the sounds which derive from the Revolutions are seven. In fact, the Sky of Venus and the one of Mercury follow the sun with equal motion, [-21-] and like satellites accompany its journey. Therefore, many who study Astronomy believe that they have the same power. Therefore, he says: "Those eight Courses, in which the power of two of them is the same, produce Seven Sounds separated by Intervals, and this number is the knot and aggregation of all things." And we did say above, when we talked of the numbers, that this number seven is the knot of all numbers. This Treatise on Music [The Title of Treatise is given by Macrobius himself to this part of his Commentary on the Dream of Scipio of Marcus Tullius Cicero, which pertains to the Music of the Cosmos in marg.] written and summarised with that brevity of which we have been capable, will suffice, I believe, to provide some light to the obscurity of Cicero' s words, because to pursue what the Nete and the Hypate are, and the names of the other Strings, and to talk about the subtle minutiae of the Tones, Limma, and how the Sounds are considered according the letter, the Syllable and their entire [[name]] [word corr. supra lin.] is the action of an empty Boaster, rather than of a Teacher. Because Cicero talked about Music in this passage, [If the books which deal with Music were infinite in number at the time of Macrobius, one should not be surprised that they are innumerable in our times, because then singing many melodies in consonance at the same time was not practised, as it is now. Therefore, it is necessary that there are some Authors who write about the speculative part of Music, and others of the practical one in marg.] one should not consult all the Books which deal with Music on this basis, which I deem to be infinite, but one should pursue those which will help to clarify the words that you will take to explain. In fact, who extends himself longer than it is necessary in a subject which is naturally obscure increases its obscurity and does not remove it. Therefore we will conclude [-22-] dealing with this section by adding only one thing, which we deem worthy to be known, [[because]] [which is this one, namely, that corr. supra lin.] the three Genera of [1. Enarmonic 2. Diatonic 3. Chromatic in marg.] musical Melody are the Enharmonic, the Diatonic and the Chromatic. The first one is certainly no more in use because of its extreme difficulty, the Third has a bad reputation because of its lasciviousness, the middle one, namely, the Diatonic is [[ascribed]] attributed to the Music of the Cosmos according to Plato' s doctrine. But we will not put this among matters that have to be put aside since we do not hear the Music that is born of the eternal Revolution of the Sky with clarity, because the Sound is greater than it can be received by the limited nature of the human ear. Therefore, if the [katadoupa[[a]]], Catadupa of the Nile [[Katadupa] Catadupa is the union of the waters of two or more rivers together, and even of the same river that had already divided its Flow into two, as in the case of the Nile itself, which then, falling headlong from that very high Mountain produces such a great noise that the people who live nearby become Death. Hence, Petrarch said in that Sonnet If ever fire by fire: 'It does in itself as the Nile, which, falling from a great height, deafens the neighbouring people with its great noise'. And Cicero himself in this passage [from the Dream of Scipio add. supra lin.] says it clearly. add. in marg.] exclude the vastness of the noise from the ears of the Inhabitants, why should one be surprised if the Sound emitted by the Machine of the Cosmos exceeds our ears. Nor it is trivial what it is said, namely, The sound so great and sweet which fills my ears', but he wants it to be understood that, if his ears, who deserved to partake of the celestial mysteries, are filled by the vastness of the Sound, it follows that the Sense of hearing of the rest of humanity cannot contain the Sound of the Music of the Cosmos. But let us move on to deal with what remains.
[copy completed at the beginning of the hour1 and 2/3 of the night following the day Friday 3 February 1610. in marg.] This Italian Translation was completed at just before the third hour, the night following the last day [Saturday add. supra lin.] of the year 1609. At Bologna, by me, Hercole Bottrigaro: